IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

OPENTV, INC.,	)	
	)	
Plaintiff,	)	
	)	C.A. No. 24-1301-CFC
v.	)	
	)	**JURY TRIAL DEMANDED**
PINTEREST, INC.,	)	
	)	
Defendant.	)	

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff OpenTV, Inc. ("Plaintiff" or "OpenTV"), by its attorneys, for its First Amended Complaint of patent infringement ("Complaint") against Defendant Pinterest, Inc. ("Defendant" or "Pinterest"), hereby alleges as follows:

INTRODUCTION

1. OpenTV brings an action for patent infringement under the Patent Laws of the United States, 35 U.S.C. § 1, *et seq*., to stop Pinterest from continuing its wrongful and unlicensed use of OpenTV's patented technologies for, among other things, storing, providing, managing, delivering, securing, playing, and viewing interactive content on smartphones, tablets, computers, and other devices.

2. Plaintiff and its affiliates have a long and distinguished history of innovation, and today these companies design and manufacture widely used, critically acclaimed, and award-winning digital media technologies, employ hundreds of employees in the United States and worldwide, and protect their research and development investment with a robust patent portfolio comprising thousands of patents reflecting the years of innovation and effort by numerous inventors and engineers. Plaintiff and its affiliates encourage innovation by licensing their

intellectual property portfolio, but enforce their patent rights when necessary to protect their research investment and protect the fruits of the efforts of their employees from unauthorized use.

3. Pinterest's products and services, including, without limitation, its website, www.pinterest.com, its mobile application, digital advertising manager, ad delivery system, machine learning content distribution technologies, and all related methods of predicting and suggesting content to end users, make pervasive use of OpenTV's patented technology and infringe one or more of the following United States patents (the "Asserted Patents"):

- 10,419,817 ("the '817 patent") (Ex. A);
- 9,699,503 ("the '503 patent") (Ex. B);
- 7,669,212 ("the '212 patent") (Ex. C); and
- 7,055,169 ("the '169 patent") (Ex. D).

4. Plaintiff seeks damages in an amount adequate to compensate it for Pinterest's infringement, a permanent injunction barring Pinterest from continuing to infringe OpenTV's patents, and attorneys' fees and costs associated with this action.

THE PARTIES

5. Plaintiff OpenTV, Inc. is a Delaware corporation whose principal place of business in the United States is located at 5090 North 40th Street, Suite 450, Phoenix, Arizona 85018.

6. Defendant Pinterest, Inc. is a Delaware corporation with a principal place of business at 651 Brannan Street, San Francisco, California 94107.

JURISDICTION AND VENUE

7. OpenTV brings this action for patent infringement under the Patent Laws of the United States, 35 U.S.C. § 1, *et seq.*

8. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

9. This Court has both general and specific jurisdiction over Pinterest because Pinterest is incorporated in Delaware. In addition, Pinterest has committed acts within this District giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Pinterest would not offend traditional notions of fair play and substantial justice. Pinterest, directly and indirectly (through vendors, service providers, customers, end users, and others), has committed and continues to commit acts of patent infringement in this District, by, among other things, providing, making, using, testing, selling, and/or licensing products and services that infringe the Asserted Patents. Pinterest has purposefully directed activities at the residents of this District, and by placing the accused instrumentalities into the stream of commerce with knowledge and intent that they would be accessed, downloaded, and/or used in this District.

10. Venue is proper in this District pursuant to 28 U.S.C §§ 1391(b) and (c) and 1400(b). Pinterest is incorporated in Delaware and therefore resides in this District.

FACTUAL BACKGROUND

I. OpenTV

11. OpenTV, and the other subsidiaries of Kudelski SA, a Swiss corporation with shares publicly traded on the SIX Swiss Exchange, make up the various companies of The Kudelski Group. The history of The Kudelski Group is one highlighted by over 70 years of innovation, award winning products, and loyal, long-term customers who entrust The Kudelski Group with their business. Today, The Kudelski Group has employees in the United States, Europe, Asia, and elsewhere, providing jobs in manufacturing, engineering, research and development, marketing,

sales, and many other specialties, with over 1,700 employees worldwide. On information and belief, The Kudelski Group maintains international headquarters in Cheseaux-sur-Lausanne, Switzerland and its U.S. headquarters in Phoenix, Arizona.

12. In 1951, Stefan Kudelski created the first company in what became The Kudelski Group and launched the now legendary "Nagra" line of portable recording devices for cinema, TV and radio recording. In 1952, a Nagra recording device was used to record an excursion to the heights of Mount Everest. Then, in 1960, a Nagra recording device was used in the exploration of the depths of ocean (specifically, The Challenger Deep) in the famous Trieste voyage (35,814 feet deep). Stefan Kudelski's recording devices, and the inventions in them, were considered revolutionary throughout the movie industry. The NAGRA III, a cinema recorder produced in 1958, began Mr. Kudelski's 20-year journey recording most Hollywood productions.[1] The Nagra devices allowed precise synchronization of audio tape with film, providing filmmakers with studio sound quality during on-location filming. And in the mid to late 1960s, Nagra recorders were used by the United States government for intelligence operations and by NASA during its Apollo mission to the moon.

13. Throughout his career, Mr. Kudelski received numerous awards and honors for his technological achievements. For example, Mr. Kudelski received four Oscars from the Academy of Motion Picture Arts and Sciences: three Scientific or Technical Awards in 1965, 1977, 1978, and the Gordon E. Sawyer Award in 1990. Mr. Kudelski also received two Emmy Awards, as well

[1] *See* Company, NagraVision Kudelski Group (November 4, 2024), https://dtv.nagra.com/why-nagra (quoting Academy Award-Winning Sound Engineer, Chris Newman: "There was virtually no film made from 1961 until the early '90s that did not use the NAGRA") (last accessed February 11, 2025).

as Gold Medals from L. Warner, Audio Engineering Society, Lyra and Eurotechnica. Mr. Kudelski was also recognized by the FBI for his technology contribution in audio recording.

14. Over the next 50 years, The Kudelski Group transformed and grew its business to include encryption systems for television (1989), digital TV access solutions (1995), public access solutions (2001), pay-TV software (2009), cybersecurity (2012), artificial intelligence and big data (2016), and Internet-of-Things (2017).

15. The success of its products allowed The Kudelski Group to expand its technology into the digital television domain.

16. As part of its NagraVision division, The Kudelski Group has developed technologies to help global service providers deliver digital entertainment to consumers. The Kudelski Group's technology and intellectual property has been integrated and recognized by the world's leading technology companies such as Apple, Bloomberg, Google, the Walt Disney Company, Cisco, Hulu, Netflix, Verizon, and Yahoo.

17. In 1989, The Kudelski Group launched its first conditional access system for pay TV. Over the next decade, The Kudelski Group continued to expand its technology development in the digital TV space, providing global, universally compatible solutions to manage, organize, enhance, market, and secure digital content, regardless of whether it was transmitted over managed or unmanaged networks and broadcasted linearly or on-demand.

18. Today, digital media is one of the core businesses of The Kudelski Group. With that business priority, The Kudelski Group has become a world leader in digital security and convergent media solutions for the delivery of digital and interactive content. The Kudelski Group's innovations are continuously contributing to the evolution of the entire digital ecosystem, enabling

operators to extend their multimedia offerings across the entire digital ecosystem to numerous client devices through traditional managed networks as well as Internet delivery.

19. The Kudelski Group has also grown as a leader in the digital media domain through acquisitions of pioneering technology companies, including such notable companies as Lysis (2001), Livewire (2001), MediaGuard (2004), SmarDTV (2006), OpenTV (2007), and Conax (2014).

20. OpenTV was founded in 1996 as Thomson Sun Interactive, LLC, a joint venture of Thomson Multimedia SA and Sun Microsystems, Inc. In 1997, Thomson Sun Interactive LLC was converted into a newly-formed corporation—OpenTV. From its inception, OpenTV has been dedicated to developing and commercializing cutting-edge, patented technology required for the delivery of television and other media content to consumers through cable, satellite, and terrestrial networks, and other managed and unmanaged networks.

21. OpenTV has a long history of innovation in the field of software for set-top boxes for television sets. Within four years of its creation, OpenTV became the first interactive television middleware provider to integrate its middleware technology into more than 10 million set-top boxes worldwide—more than all other industry competitors combined. OpenTV also partnered with EchoStar's DISH Network, which was the first satellite company to provide interactive television services in the United States. OpenTV's set-top box middleware technologies were key to the successful growth of DISH Network. Today, OpenTV's software is used by companies around the world.

22. In addition to its industry-leading pay TV software solutions, OpenTV has been an innovator in web-based content delivery.

23. As a result of its ongoing commitment to interactive television and web-based content delivery, by 2004-2006, OpenTV led the industry in integrating browser software into television sets, built the first interactive shopping application for DISH Network, successfully launched real-time two-way interactive television shopping services on QVC, and provided the technology for CNN Enhanced TV, among other notable achievements. All of these innovations helped pave the way for the growing revolution in how media content is delivered and enjoyed, including over the Internet.

24. In addition to these achievements, OpenTV also developed complementary technology related, for example, to personal video recording ("PVR"), video-on-demand ("VOD"), television home networking, advanced advertising methodologies, and tools for recommending content to viewers. The industry has also long recognized OpenTV's technology contributions. For example, OpenTV's PVR was named as one of the best in its field by Seagate Technology in 2009.

25. Today, OpenTV develops software that enables intuitive and personalized viewing experiences for consumers. OpenTV's software solutions provide a variety of advanced and interactive services for digital media, including advanced user interfaces, VOD, PVR, high-definition ("HD"), interactive, and addressable advertising, and a variety of enhanced television applications.

26. The Kudelski Group products that are integrated with the OpenTV platform have won numerous industry awards, including "Best New Technology" at the 2009 DISH Network Interactive Awards for OpenTV, a TV Innovation Award in the category of "Advanced User Interface" for OpenTV's cross-device user experience in 2010, an IPTV World Forum Award for "Best Multiscreen Solution/Service" for Nagra Multiscreen in 2012, and "Best IPTV Technology"

for Nagra MediaLive and "Best Middleware" for OpenTV at IBC 2012. OpenTV's next generation middleware software, known as OpenTV5, was widely praised following the 2013 International Broadcasting Convention trade show as a stand-out product for showing "how the user interface and the overall user experience can be enhanced with 4K screens," "bring[ing] the HTML5 user experience and 4K to a new level," and for providing a "stunning" and "compelling" user interface.

27. OpenTV became a part of The Kudelski Group in 2007 through The Kudelski Group's acquisition of a controlling stake in the company. OpenTV is now a wholly-owned subsidiary of Kudelski Corporate, Inc., which is a wholly-owned subsidiary of Kudelski SA.

28. The Kudelski Group devotes substantial resources to research and development, with nearly 800 employees engaged in engineering worldwide. In fact, The Kudelski Group companies have invested over $3 billion in research and development in the past 20 years.

29. To protect their investment in research and development, OpenTV and The Kudelski Group companies have garnered a robust international portfolio of over 3,000 worldwide pending and issued patents, including many related to the delivery of end-to-end secure media solutions for digital content, and continue to substantially grow their worldwide patent positions in this and other complementary technology areas.

30. These patents include key technologies related to content management and delivery systems, content recommendation engines and targeted content delivery, subscriber management systems and tools, Digital Rights Management ("DRM") and other content access control techniques, billing and payment systems, user interfaces, digital video recorder ("DVR") content storage and scheduling, end-to-end digital content security, including securing digital content within the home network, VOD content selection, advanced advertising techniques, and many others.

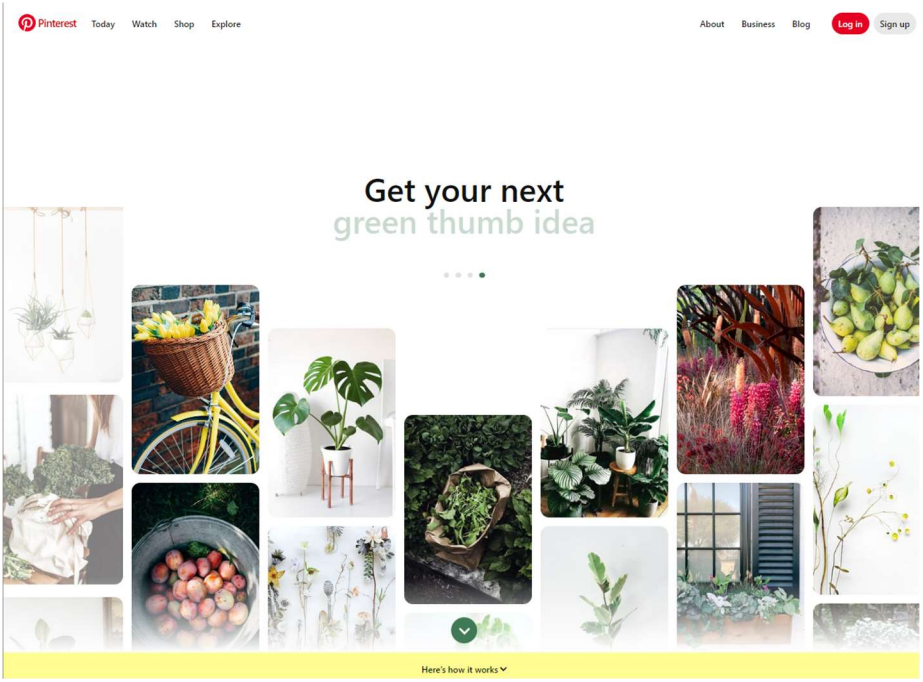
31. Companies worldwide have acknowledged the commercial importance of The Kudelski Group's patent portfolio, taking licenses to OpenTV and other patents of The Kudelski Group relevant to their businesses.

32. With the proliferation of video-based content and advanced advertising techniques on social media platforms such as Pinterest, Kudelski's inventions are now used to, for example, optimize content recommendation systems, enhance video streaming applications, and provide curated advertising recommendation and delivery functionality.

II. Pinterest

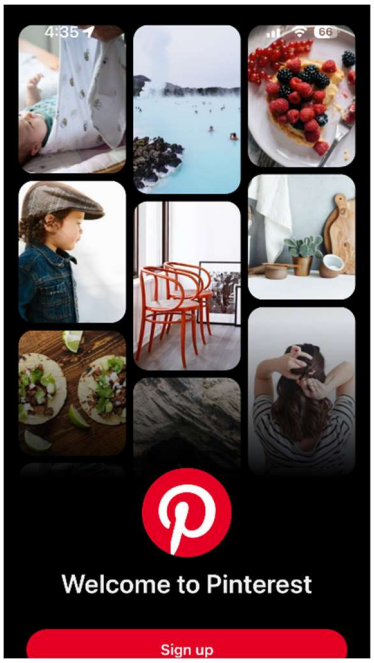
33. Pinterest is a Delaware corporation with a principal place of business in San Francisco, California.

34. Pinterest is a "visual discovery engine for finding ideas."[2] Pinterest can be accessed by either a web browser at www.pinterest.com, (the "Website"):



[2] Pinterest, "What is Pinterest," https://help.pinterest.com/en/guide/all-about-pinterest, (last accessed February 11, 2025).

or as a mobile application called "Pinterest" that can be installed on iOS, Android and Windows mobile devices, (the "Mobile App").[3]



35. Pinterest presents digital visual content, including video content, which Pinterest describes as a "Pin." Pinterest allows individuals and groups to organize their desired Pins into various "Boards." Pinterest's Website and Mobile App contain a "home feed" where users "find Pins, people and business [Pinterest] think[s] [users] will love, based on [users'] recent activity."[4] Pinterest also claims to "show [users] Pins from the people and boards [users] choose to follow."[5]

A. The Importance of Video to Pinterest's Platform

36. According to Pinterest engineers, "Pinterest is one of the most image-heavy services online, and so it's crucial that [Pinterest] constantly work to improve the speed and quality

[3] Pinterest, "Upgrade the Pinterest app," https://help.pinterest.com/en/article/use-pinterest-in-a-mobile-browser, (last accessed February 11, 2025).
[4] Pinterest, "What is Pinterest", https://help.pinterest.com/en/guide/all-about-pinterest, (last accessed February 11, 2025).
[5] *Id.*

of those images whether static, GIF or video."[6] Pinterest built its native video platform in or around 2016.[7] In addition to providing a platform for videos, Pinterest began converging GIFs to videos to improve user experience and engagement.[8]

37. In September of 2020, Pinterest introduced a concept known as story pins, allowing pinners to use videos to tell dynamic and visual stories.[9] In or around 2021, the concept of story pins evolved into Pinterest idea pins, providing pinners with a suite of new publishing tools including, video-first features.

38. Video Pins were necessary for Pinterest to remain a viable competitor in the social media market. "In July of 2021, Pinterest saw a 5% decrease in users . . . [which t]hey attributed to . . . people spending less time at home after the Covid restrictions started easing up."[10] Pinterest determined that "[v]ideo [was] a necessary element in the idea pins . . . because of the consumer demand for short form video introduced by TikTok and adapted by Instagram, Snapchat, and YouTube."[11] According to one source, Pinterest's "move [to short-form video] allows Pinterest to keep up with other short-video heavy hitters such as TikTok, Instagram Reels, YouTube Shorts, and Snapchat."[12]

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[6] Pinterest Engineering, "Improving GIF performance on Pinterest," Medium, https://medium.com/pinterest-engineering/improving-gif-performance-on-pinterest-8dad74bf92f1 (last accessed February 11, 2025).
[7] *Id*.
[8] *Id*.
[9] Pinterest Newsroom, "Introducing Story Pins and new ways for creators to build and grow with Pinterest," https://newsroom-archive.pinterest.com/introducing-new-ways-for-creators-to-build-and-grow-with-pinterest, (last accessed February 11, 2025).
[10] "Short-Form Video and Pinterest – How Did it Change the Platform," Teaching Social Media, September 13, 2022, https://teachingsocialmedia.org/2022/09/13/short-form-video-and-pinterest-how-did-it-change-the-platform/, (last accessed February 11, 2025).
[11] *Id.*
[12] *Id.*

39. Pinterest's CEO and co-founder, Ben Silbermann, related the success of launching video on the platform to the company's increasing profitability: "We took important steps in 2021 with the launch of our foundational technology to deliver a video-first publishing platform. And, I'm proud to say that for the first time, we surpassed $2 billion in revenue for the year — growing 52% over the previous year — and reached our first full year of GAAP profitability."[13]

40. Pinterest also found that video Pins enhanced the user experience. Specifically, Pinterest marketing consultants explain that video Pins create an immersive experience that keeps users engaged for longer periods of time than static images, which strengthens Pinterest's value as an inspiration-based discovery platform. Video Pins are widely viewed, saved, and shared, converting viewers into active participants in the discovery process, thus making video Pins crucial to Pinterest's user experience. According to Pinterest, "video content . . . not only grabs . . . users' attention but takes them from inspiration to action."[14] Pinterest further notes that users "view videos mindfully, scrolling three times slower than they do on other social platforms," causing videos to "play[] a critical role" in converting users to buyers.[15] "When viewers are captivated by the videos they see and watch them until the end, they're more likely to remember your brand and take action, transforming viewers into potential customers." [16] Pinterest avers that video Pins enhance the user experience. "In fact, 66% of Pinners [Pinterest's term to describe its users] say that videos add to their discovery experience more significantly than videos on other media

[13] Pinterest Announces Fourth Quarter and Full Year 2022 Results, BusinessWire, February 03, 2022, https://www.businesswire.com/news/home/20220203005895/en/Pinterest-Announces-Fourth-Quarter-and-Full-Year-2021-Results, (last accessed February 11, 2025).
[14] Tretera, Sibylle, "Tap into high-intent shoppers with video ads on Pinterest," Pinterest Business, Nov. 30, 2023, https://business.pinterest.com/en-gb/blog/video-ads-pinterest-high-intent-shoppers, (last accessed February 17, 2025).
[15] *Id.*
[16] *Id.*

platforms."[17] "Pinners are also 54% more likely to say that videos on Pinterest inspire them to take action."[18]

41. To support the creation and enablement of video Pins on the Pinterest platform, Pinterest provides online help to users for uploading video content and creating video Pins[19]:

Create a video Pin

1. Log in to your Pinterest account.
2. Click **Create** at the top-left of your screen.
   - If you have a business account, select ☰. Under **Create**, select **Create Pin.**
3. Click ⬆ to select a video from your computer (or drag and drop into the upload window).
   - You can select up to 10 videos. Each video will create a new Pin.
   - To combine multiple images and videos in one video Pin, create a Pin with the Pinterest app.

42. Pinterest has leveraged the enhanced user experience of video Pins to grow its advertising revenue with its commercial customers. Pinterest instructs its users on how to create and configure video ads.[20] Pinterest offers a sophisticated suite of video advertising options:[21]

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[17] Pinterest Newsroom, "Mastering the art of inspirational videos on Pinterest, https://newsroom-archive.pinterest.com/en-gb/mastering-the-art-of-inspirational-videos-on-pinterest, (last accessed on February 11, 2025).
[18] *Id.*
[19] Help Center, Pinterest, "Create a Pin from an image or video," https://help.pinterest.com/en/article/create-a-pin-from-an-image-or-video, (last accessed February 13, 2025).
[20] Pinterest Business, "Video ads", https://help.pinterest.com/en/business/article/promoted-video-with-autoplay, (last accessed February 11, 2025).
[21] Tretera, Sibylle, "Tap into high-intent shoppers with video ads on Pinterest," Pinterest Business, Nov. 30, 2023, https://business.pinterest.com/en-gb/blog/video-ads-pinterest-high-intent-shoppers/, (February 11, 2025).

Your ads work harder here

Pinterest's suite of full-funnel video ads is designed to cater to every stage of the purchase journey, no matter your objectives. Whether aiming to drive brand lift in the upper funnel or achieve conversions in the lower funnel, there's a video solution to match.

- **Video ads:** Available in two formats: standard, which is the same size as a vertical Pin, and max-width, which covers the full width of the Pinterest mobile feed. These eye-catching videos are designed to grab attention as people scroll their feed, making them ideal for driving both awareness and consideration.
- **Idea ads:** Dive into the world of mobile-first native storytelling. With an array of creative and interactive features at your disposal, you can either take the reins or collaborate with a creator to craft a compelling narrative via our paid partnership tool.
- **Premiere Spotlight:** Want to make a splash at the moments that matter most for your brand? By using Premiere Spotlight, our newest high-impact awareness offering designed to reach Pinners at scale, brands observed a staggering 8.2x surge in Aided Brand Awareness.[6]
- **Video shopping ads:** Currently in beta, merchants have the opportunity to include a video clip in their product catalogue and promote the product as an ad.[7]

According to Pinterest, "advertisers leveraging at least two video formats saw a notable increase in various brand metrics, from a 1.4x uplift in brand awareness and favorability to a 1.2x boost in brand recall and action intent."[22] Accordingly, video pins play a crucial role in Pinterest's success as an advertising platform.

43. By incorporating video Pins, Pinterest has been able to remain a viable competitor as a social media platform. Pinterest has further been able to increase its value through enhanced

[22] *Id.*

experiences for its users on one hand, and more effective advertising for its commercial customers on the other.

B. Pinterest's Use of Adaptive Bitrate Streaming

44. Pinterest engineers acknowledge that engagement with video is significantly impacting how fast the client platform performs.[23] According to Pinterest, a three second delay can cost a 13 percent decrease in views.

45. To mitigate problems with poor video quality and experience, Pinterest indicates that it uses adaptive bitrate streaming protocols (or ABR) including HTTP Live Streaming (HLS) and Dynamic Adaptive Streaming over HTTP (MPEG-DASH).[24] As described by Pinterest, these technologies work by encoding a source file into multiple streams with different bitrates. Then those streams split into smaller segments with similar duration times. The video player then seamlessly switches between the streams depending on the available bandwidth and other factors. This allows the video to still play (at a lower quality) when the signal is poor and jump to the higher quality stream when the signal strengthens.[25] Pinterest's incorporation of ABR (and its associated HLS and MPEG-DASH technology) are referred to herein as "Pinterest ABR."

46. According to Pinterest, as of August 2024, HLS accounts for approximately 70% of video playback sessions on iOS apps, and DASH accounts for around 55% of video sessions on Android.[26] Pinterest indicates that DASH is supported by Android's ExoPlayer.[27]

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[23] Pinterest Engineering, "Optimizing video playback performance," Medium, https://medium.com/pinterest-engineering/optimizing-video-playback-performance-caf55ce310d1 (last accessed February 11, 2025).
[24] *Id*.
[25] *Id*.
[26] Pinterest Engineering, "Improving ABR Video Performance at Pinterest," Medium, https://medium.com/pinterest-engineering/improving-abr-video-performance-at-pinterest-f0ea47a6d4fc (last accessed February 11, 2025).
[27] *Id*.

47. Pinterest utilizes ABR for delivering video content to its users.[28] Pinterest describes how this method involves encoding the content at multiple bitrates and resolutions, resulting in several rendition versions of the same video. Then during playback, players (*e.g.* ExoPlayer) enhance the user experience by selecting the best possible quality and dynamically adjusting it based on network conditions.[29]

C. Pinterest's Website, Mobile Application, and Pin Recommendation System(s)

48. Pinterest recognizes that "[u]ser experience in modern content discovery applications critically depends on high-quality personalized recommendations. However, building systems that provide such recommendations presents a major challenge due to a massive pool of items, a large number of users, and requirements for recommendations to be responsive to user actions and generated on demand in real-time."[30]

49. To that end, Pinterest's Website and Mobile App collect data from users, such as their viewing history, location, IP address, platform and device type (*i.e.*, iOS, Windows), browser, content engagement, search queries, actions on Pins, actions on Boards, and ad engagement.[31]

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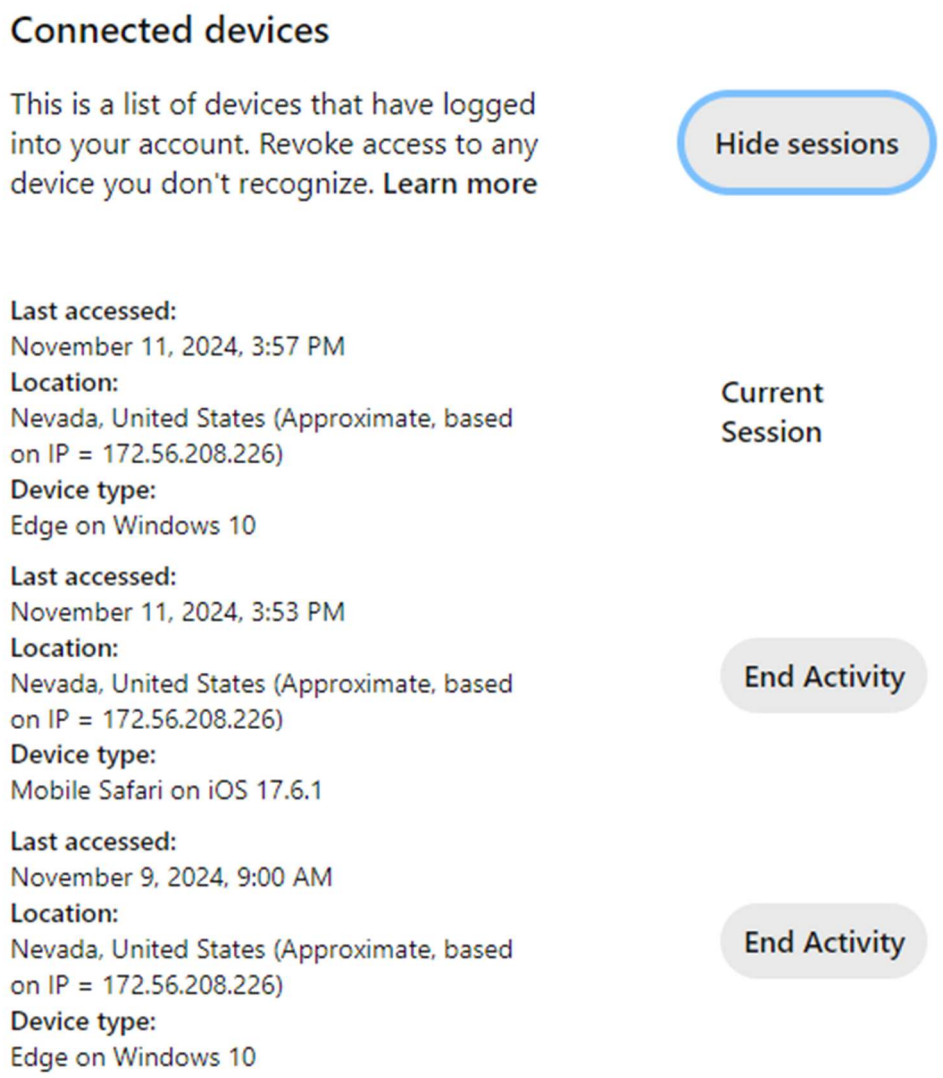
[28] *Id.*
[29] *Id.*
[30] Eksombatchai *et al.*, *Pixie: A System for Recommending 3+ billion items to 200+ million users in real time* https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf, (last accessed February 11, 2025).
[31] Pinterest, "Technical Information We Collect When You Use Our Service," https://policy.pinterest.com/en/technical-information-we-collect-when-you-use-our-service, (last accessed February 11, 2025).



50. Pinterest informs its users that the Website and Mobile app "store [a user's] information," for various purposes, including, without limitation, the ability to recommend new content to users. For example, Pinterest explains that it uses the stored information to "[r]ecommend Pins, boards, or content [a user] might like [based on that user's] activity on [Pinterest's] services and [the user's] offsite behavior."[32]

[32] Pinterest, "Privacy Policy," https://policy.pinterest.com/en/privacy-policy, (last accessed February 11, 2025).

51. Pinterest explains to its users that it collects and uses their data to ensure the users receive relevant content. Specifically, Pinterest maintains a database of information collected from users' devices (mobile or desktop devices). Pinterest expressly informs users that "[b]y using [Pinterest's] products and services, you authorize [Pinterest] to transfer and store your information . . . for the purposes described in this policy."[33] Additionally, Pinterest informs users that "[w]hen you use [Pinterest's] website [or] mobile application, certain . . . information gets created and logged automatically." This collected information includes "information about the device you use to access [Pinterest's] services" and "'log data', [which] . . . includes . . . [a]ctions taken during session . . . [a]ccount profile information[, s]ocial contacts you authorize [Pinterest] to receive[, and] Pinterest content engagement."[34] "Pinterest content engagement" includes a user's "search queries[,] [a]ctions on pins (clicks, close-ups, likes, saves and shares of Pins)[, a]ctions on Boards (creation of boards, likes, saves, and shares of Pins)[, and c]omments."[35] Pinterest also collects data reflecting a user's engagement with ads, such as "[a]ds served to a page and likelihood you have seen them" and "[a]ctions on ads (clicks on ads, saves on pages featuring ads)."[36]

52. Pinterest describes its search and recommendation system as comprising multiple stages including a retrieval stage (*i.e.*, candidate generator stage) and a ranking stage.[37] At the retrieval stage, Pinterest describes how one or more candidate generators are used to narrow down

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[33] Pinterest, Privacy Policy, https://policy.pinterest.com/en/privacy-policy, (last accessed February 11, 2025).
[34] Pinterest Policy, "Technical Information We Collect When You Use Our Service," https://policy.pinterest.com/en/technical-information-we-collect-when-you-use-our-service, (last accessed February 17, 2025).
[35] *Id.*
[36] *Id.*
[37] Pinterest Engineering, "Representation online Matters: practical end-to-end diversification in search and recommender systems," Medium, https://medium.com/pinterest-engineering/representation-online-matters-practical-end-to-end-diversification-in-search-and-recommender-cb60b547f2e0 (last accessed February 11, 2025).

the set of candidates to a narrower set based on some predicted scores, such as the relevance of the items to the query and the user.[38] At the ranking stage, Pinterest describes how the goal is to find an ordering of the candidates that maximizes a combination of objectives, which may include utility metrics, diversity objectives, and additional business goals.

53. Pinterest describes how candidate generators, such as Pixie, and ranking models, such as Pinnability, provide home feed recommendations to a user.[39]

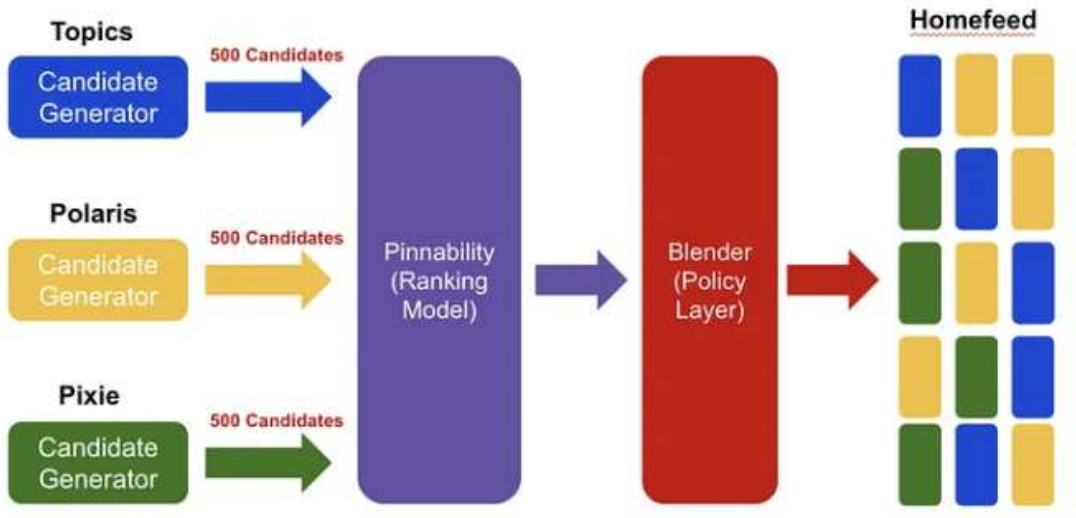


Fig. 1. Overview of current home feed recommendation pipeline. Home feed recommendation is powered by many different candidate generators. Each of them serves a unique role and has its own light-weight ranking layer.

54. Pinterest engineers describe how candidate generation is a recall-driven step that aims to efficiently fetch a set of broadly popular Pins with potential relevance to the targeted user. This step uses recent user engagement from an indiscriminate universe of users to first, determine

[38] *Id.*

[39] Pinterest Engineering, "Pinterest Home Feed Unified Lightweight Scoring: A Two-tower Approach," Medium, September 9, 2021, https://medium.com/pinterest-engineering/pinterest-home-feed-unified-lightweight-scoring-a-two-tower-approach-b3143ac70b55 (February 11, 2025).

a universe of potentially popular Pins, and second, to formulate an input representative of the Pinner's interest. The input Pin is used to fetch similar Pins, which are quickly scored based on simple heuristics (in Pixie's case, this is the visit count score).[40]

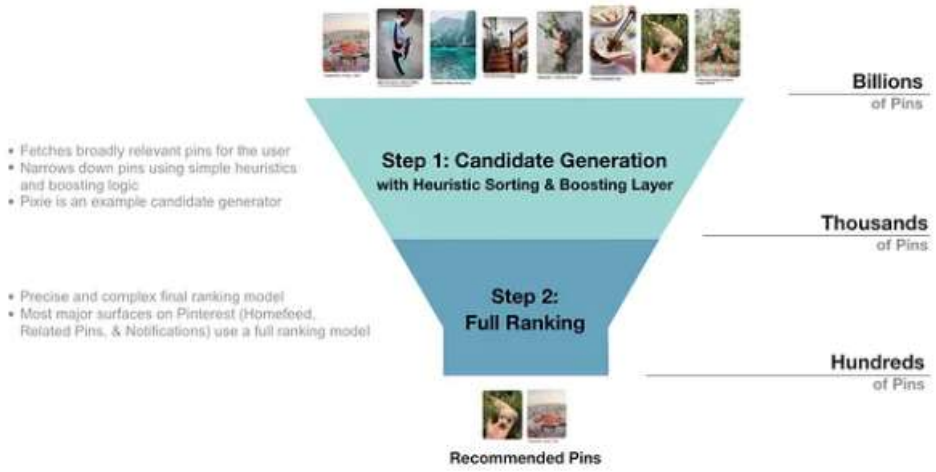


Figure 1. Number of Pins at each stage of the current Recommendation Funnel

The first step, "Candidate Generation", is a recall-driven step that aims to efficiently fetch a set of broadly relevant Pins. Pixie is one such candidate generator. This step uses recent user engagement to formulate an input representative of the Pinner's interests. The input Pin is used to fetch similar Pins, which are quickly scored based on simple heuristics (in Pixie's case, this is the visit count score), with additional boosting logic applied for specific business needs. The Pins with the highest score are then passed to the next step of the funnel.

[40] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

55. Pinterest describes Pixie as a scalable real-time graph-based recommendation system.[41]

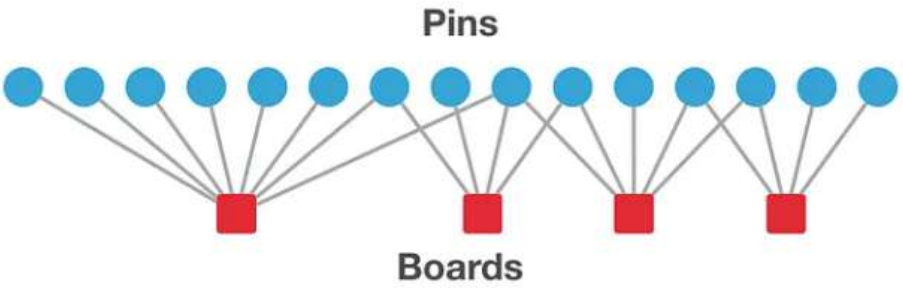
> **Present work: Pixie.** Here we present Pixie, a scalable real-time graph-based recommendation system deployed at Pinterest. Currently, pins recommended by Pixie represent more than 80% of all user engagement at Pinterest. In an A/B tests recommendations provided by Pixie increase per pin engagement by up to 50% higher compared to the previous Pinterest recommendation systems.

[41] Eksombatchai *et al*., Pixie: A System for Recommending 3+ billion items to 200+ million users in real time, April 23, 2018, https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf (last accessed February 11, 2025).

56. Additionally, Pinterest describes its Pixie technology as collecting a universe of data across an indiscriminate set of users.[42]

Pixie

We started from a bipartite graph where each edge shows that a person saved a Pin to a board.



This graph captures a huge amount of rich data from our users, and is quite large, with more than 100 billion edges and several billion nodes. Thankfully, RAM today is incredibly cheap, and big data like this is small enough to fit on readily available AWS machines. Before terabyte-scale RAM machines were available, complex distributed systems like Hadoop or Spark were needed to compute algorithms for data of this scale. Fortunately, in a way big data is actually getting smaller! Now we can load the entire graph into a single machine and traverse all of it without making any network calls. This makes real-time algorithms on densely connected graphs much easier to develop and deploy at scale, and allows us to make recommendations in real-time the moment a Pinner opens our app (instead of computing them in batch jobs the night before).

57. According to Pinterest, Pixie uses a "visit count" score to sort generated pins.[43]

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[42] Pinterest Engineering, "Introducing Pixie, an advanced graph-based recommendation system," March 31 2017, https://medium.com/pinterest-engineering/introducing-pixie-an-advanced-graph-based-recommendation-system-e7b4229b664b (last accessed February 11, 2025).

[43] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-

Making Pixie recommendations even more personalized

Despite its great success across multiple major product surfaces at Pinterest, Pixie currently faces several challenges that limit it from generating even more relevant content:

1. Pixie's "visit count" score sorts the generated pins purely on graph structure; it does not take any user preferences into account. At Pinterest, we've built a bunch of features that represent user interest and pin information that may help improve personalization.

58. Pinterest documents related to Pixie further describe how Pixie's generation technique is biased based on user features.[44]

> **(1) Biasing the Pixie Random Walk.** It is important to bias the random walk in a user-specific way. This way, even for the same query set Q, recommendations will be personalized and will differ from a user to user. For example, Pinterest graph contains pins and boards with different languages and topics and from the user engagement point of view it is important that users receive recommendations in their language and on the topic of interest.
>
> We solve the problem of biasing the random walk by changing the random edge selection to be biased based on user features. The random walk then prefers to traverse edges that are more relevant to that user. One can think of these edges as having higher weight/importance than the rest of the edges in the graph. This way we bias the random walk in a user-specific way towards a particular part of the graph and let it focus on a particular subset of pins. In practice, this modification turns out to be very important as it improves personalization, quality, and topicality of recommendations, which then leads to higher user engagement.

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the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

[44] Eksombatchai, et al., "Pixie: A System for Recommending 3+ billion items to 200+ million users in real time," April 23, 2018, https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf, (last accessed February 11, 2025).

59. Pinterest documents describe how after candidate generation, lightweight ranking of candidate pins occurs.[45]

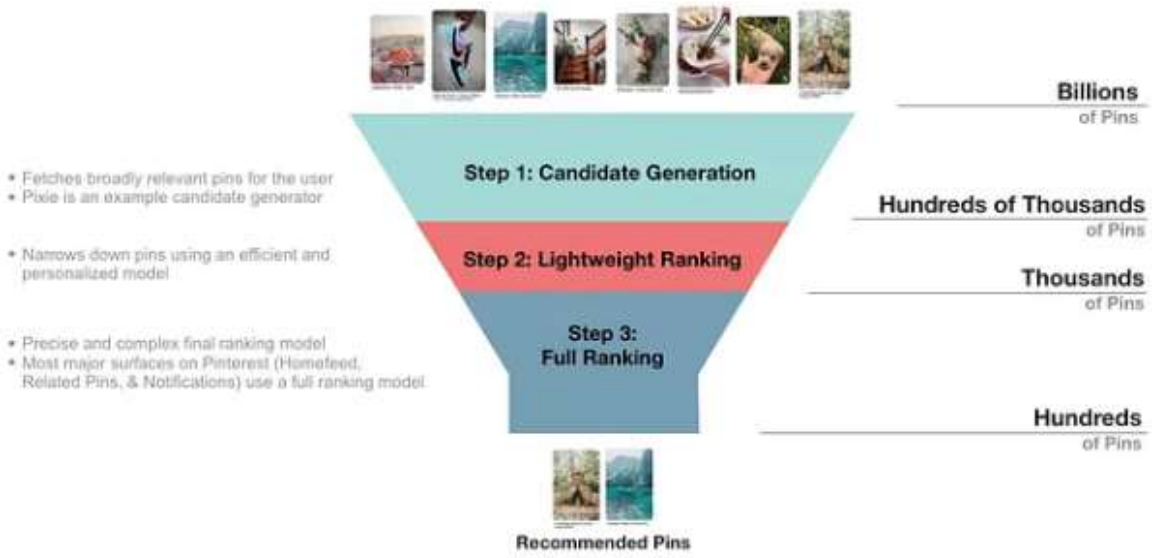

Figure 2. Recommendation Funnel after adding a Lightweight Ranking Step

60. Pinterest documents then describe how after a lightweight ranking, a full ranking occurs using ranking models.[46]

61. Pinterest describes its "Pinnability" ranking model as the collective name of the machine learning models it developed to help Pinners find the best content in their home feed.[47]

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[45] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[46] *Id.*
[47] *Id.*

62. At the full ranking stage, Pinterest explains that its Pinnability technology is "trained" based on the historical interaction of users with pins:[48]

Training instance generation

The basis of the Pinnability training data is the historical Pinner interaction with home feed Pins. For example, after viewing a Pin in home feed, a Pinner may choose to like, repin, click for a Pin closeup, clickthrough, comment, hide, or do nothing. We record some of the "positive actions" and "negative action" as training instances. Naturally the number of Pins viewed is often much larger than the number of Pins in which the Pinner made a positive action, so we sample the positive and negative instances at different rates. With these defined, we test thousands of informative features to improve Pinnability's prediction accuracy.

Figure 3 summarizes the three major components of our Pinnability workflow, namely training instance generation, model generation and home feed serving.

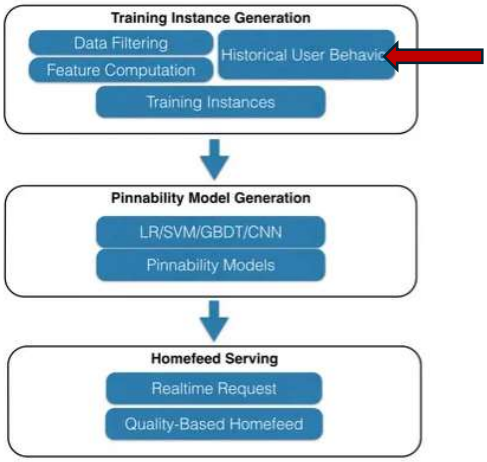

Fig 3: Pinnability pipeline overview.

[48] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

63. Pinterest explains that its ranking models analyze this data to assign value to Pins based on their historical popularity.[49]

> Our unique data set contains abundant human-curated content, so that Pin, board and user dynamics provide informative features for accurate Pinnability prediction. These features fall into three general categories: Pin features, Pinner features and interaction features:
>
> - Pin features capture the intrinsic quality of a Pin, such as historical popularity, Pin freshness and likelihood of spam. Visual features from Convolutional Neural Networks (CNN) are also included.
> - Pinner features are about the particulars of a user, such as how active the Pinner is, gender and board status.
> - Interaction features represent the Pinner's past interaction with Pins of a similar type.

64. Pinterest engineers describe how the Pinnability model uses pretrained user embedding to model user's interest and preference, capturing a user's long-term interest by leveraging their past interaction history on Pinterest.[50]

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[49] Pinterest Engineering, "Machine Learning in the Home Feed" (March 20, 2015) https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

[50] Pinterest Engineering, "How Pinterest Leverages Realtime User Actions in Recommendation to Boost Homefeed Engagement Volume," November 4, 2022, https://medium.com/pinterest-engineering/how-pinterest-leverages-realtime-user-actions-in-recommendation-to-boost-homefeed-engagement-volume-165ae2e8cde8 (last accessed February 11, 2025).

> The Pinnability model has been using some pretrained user embedding to model user's interest and preference. For example, we use PinnerFormer (PinnerSAGE V3), a static, offline-learned user representation that captures a user's long term interest by leveraging their past interaction history on Pinterest.

65. According to Pinterest, scores from the Pinnability models represent the personalized relevance between a Pinner and the candidate Pins.[51]

> With Pinnability launched, the candidate Pins for home feed are scored using the Pinnability models. The scores represent the personalized relevance between a Pinner and the candidate Pins. Pins in home feed are prioritized by the relevance score as illustrated in Figure 2.

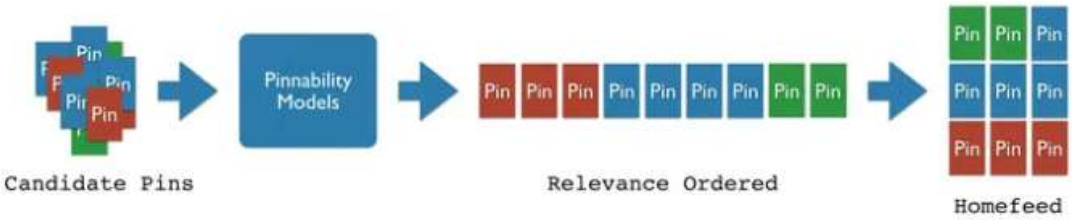

Fig 2: Home feed after Pinnability, where Pins are ordered by personalized relevance score.

66. Pinterest also describes analyzing content in the context "Group Boards," or other social contexts, wherein the data from other contributors to the Group Board (or a user's followers) are analyzed to recommend data to other members of the same board. For example, when pins are

[51] Pinterest Engineering, "Machine Learning in the Home Feed," March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

added to a group board, the pins might show up in the home feed of anyone who follows any of the members of the board.[52]

67. After retrieving and ranking content, Pinterest displays Pins in the user's home feed.[53] Pinterest describes how video pins play when at least 50% of the video Pin is in view.[54]

D. Pinterest's Website, Mobile Application, and Advertisement Recommendation Technologies

68. Pinterest monetizes its platform through a variety of ways, including advertising. As of 2022, Pinterest's ad serving system served more than 2 billion ad impressions per day and generated $2.8 billion in ad revenue.[55]

69. Pinterest offers a variety of advertising services to its business customers, including an "Ads Manager." Pinterest explains to its end-users that in order "[t]o help you see ads you're more likely to be interested in, Pinterest . . . may use information about your activity on and off Pinterest to personalize the ads you see." On the business side, Pinterest allows advertisers to "create individual ads or complex campaigns." Pinterest allows advertisers to "target [advertisements] based on people's interests, demographics, and keywords they're searching for or similarities to your existing audiences."[56]

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[52] Rachel Ngom, "Why You Need to Join Pinterest Group Boards (and how to easily get started)," January 22, 2018, https://rachelngom.com/pinterest-group-boards/, (last accessed November 24, 2025).

[53] Pinterest Engineering, "Representation Online Maters," Medium, May 25, 2023, https://medium.com/pinterest-engineering/representation-online-matters-practical-end-to-end-diversification-in-search-and-recommender-cb60b547f2e0, (last accessed February 11, 2025).

[54] Pinterest, Help Center, General, https://help.pinterest.com/en/article/video-on-pinterest (last accessed February 11, 2025); *see also* https://help.pinterest.com/en/business/article/promoted-video-with-autoplay.

[55] Pinterest Engineering, "Redesigning Pinterest's Ad Serving Systems with Zero Downtime," June 7, 2024, https://medium.com/pinterest-engineering/redesigning-pinterests-ad-serving-systems-with-zero-downtime-3253d2432a0c (last accessed February 11, 2025).

[56] Pinterest, Ads Manager, https://business.pinterest.com/getting-started-in-ads-manager/, (last accessed February 11, 2025).

70. Pinterest uses "the information [it] collect[s]" on users to "[d]ecide which ads to show [users] directly on Pinterest." For example, Pinterest employs an "Ads Engagement Modeling" team with the objective of building deep neural network ("DNN") models to continuously learn and adapt to user . . . behavior . . . [by] adopt[ing] users' real time behavior histories and applied deep learning algorithms to recommend appropriate ads to users."[57]

71. On information and belief, in or around 2014, Pinterest developed an ad- serving system called "Mohawk."[58] On further information and belief, in or around 2021, Pinterest rewrote the Mohawk ad-delivery systems into a Java-based ad-delivery system that, according to Pinterest, would improve various perceived deficiencies with Mohawk.[59] Pinterest describes how its ad delivery system consists of several different systems, each with its own responsibilities (candidate generation, trimming, scoring, bid/budget management, indexing, content safety filtering, etc.).[60]

72. Pinterest provides advertisers with an "Ads Manager," which allows advertisers to upload ads and select desired campaign behavior (*e.g.*, demographics, location, etc.).[61] Pinterest describes how its ad delivery service is at least in part supported by Mohawk: [62]

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[57] Pinterest Engineering, "User Action Sequence Modeling for Pinterest Ads Engagement Modeling," Medium, March 5, 2024, https://medium.com/pinterest-engineering/user-action-sequence-modeling-for-pinterest-ads-engagement-modeling-21139cab8f4e, (last accessed February 11, 2025).

[58] Pinterest Engineering, "Redesigning Pinterest's Ad Serving Systems with Zero Downtime," June 7, 2024, https://medium.com/pinterest-engineering/redesigning-pinterests-ad-serving-systems-with-zero-downtime-3253d2432a0c, (last accessed February 11, 2025).

[59] *Id.*

[60] Pinterest Engineering, "Debugging Ad Delivery At Pinterest," June 24, 2024, https://medium.com/pinterest-engineering/debugging-ad-delivery-at-pinterest-8b7b1f562afc, (last accessed February 11, 2025).

[61] Pinterest, Business, How to Use Pinterest Ads Manager, https://business.pinterest.com/getting-started-in-ads-manager/, (last accessed February 11, 2025).

[62] Pinterest Engineering, "Redesigning Pinterest's Ad Serving Systems with Zero Downtime," June 7, 2024, https://medium.com/pinterest-engineering/redesigning-pinterests-ad-serving-systems-with-zero-downtime-3253d2432a0c, (last accessed February 11, 2025).

Mohawk, implemented in 2014, was Pinterest's first ad serving system. During its eight-year lifespan, Mohawk became one of the most complex systems at Pinterest. As of 2022, Mohawk:

73. As part of the Ads Manager, Pinterest features its ad delivery process as providing value to both Pinners and advertising partners by serving the highest quality ads at the most relevant moments and optimizing business outcomes for its advertising partners:[63]

Ad delivery

Our ad auction allows us to provide value to both Pinners and advertising partners by serving the highest quality ads at the most relevant moments and optimizing business outcomes for our advertising partners.

For each available ad impression, our auction system selects the best ad for that position, based on the likelihood of a desired action occurring and how much that action is worth to you. The likelihood of the action occurring depends on factors like landing page quality and targeting relevance. Your bid tells us what you'd pay for the action you choose to optimize for.

You pay only what's needed to beat the next best ad in the auction. In some cases, you may pay less than your bid. However, setting bids that are too low may restrict the delivery of your ad. To learn more about setting bids, read this article.

74. Pinterest describes how every ad campaign has three levels: Campaign, ad group, and ad. Campaigns encompass ad groups, and each ad group contains a collection of ads.[64]

75. Pinterest allows advertisers to target ads specifically to mobile devices:[65]

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[63] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/ad-delivery (last accessed February 11, 2025).
[64] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/campaign-structure (last accessed February 11, 2025).
[65] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/set-up-device-targeting (last accessed February 11, 2025).

Add device targeting in Ads Manager

1. Log in to your Pinterest business account
2. Click ☰ at the top-left of the page
3. Under **Create**, click **Create campaign**
4. Click **Manual Campaign**, then **Get Started**
5. Click **New ad group** from the left-side navigation
6. Click **Targeting** from the left-side navigation and choose a targeting strategy
7. Select your **Budget & schedule**, **Optimization and delivery** and **Ads**
8. Review your information
9. Click **Publish**

76. Pinterest further allows ads to be targeted based on interests and keywords associated with a brand or product.[66] Additional ad targeting through Pinterest's platform is possible based on gender, location, and languages.[67]

77. Pinterest describes how "[a]udience targeting helps you reach a specific group of people by combining information about your customers with information about how people use Pinterest. You can target a group of people based on site visitors, an uploaded customer list of emails or mobile ad IDs (Android ad IDs), an engagement audience that interacted with Pins

[66] Ana Gotter, "Pinterest Ads: A Guide to Everything You Need to Know to Get Started," Ad Espresso, August 14, 2019, https://adespresso.com/blog/pinterest-ads-guide/ (last accessed February 11, 2025).
[67] *Id.*

from your confirmed domain or an actalike audience that behaves similarly to one you already have."[68]

78. Pinterest describes how automated campaigns may be set up to help advertisers deliver results with less manual work.[69] In the case of automated campaigns, "[b]idding and any additional targeting, outside of age and location requirements, are completely automated based on the Pins you select and Pinner behavior."[70]

79. Pinterest also provides advertisers with the option of setting up a "collections ad."[71] A collections ad is described as an ad format with a combination of "one large, hero asset followed by three smaller, secondary assets. The main asset is known as the hero creative and the smaller, secondary assets are known as the secondary creatives. Once someone taps into a collections ad, they'll be taken to a fullscreen experience where they can see the hero creative up close and up to 24 secondary creatives."[72] An engagement audience can be selected from people who have performed any engagement action (including Pin clicks, outbound clicks, saves, comments, and video views) or optimized engagement actions based on high intention actions such as saves and outbound clicks.[73]

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[68] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/audience-targeting (last accessed February 11, 2025).
[69] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/automated-campaigns, (last accessed February 11, 2025).
[70] *Id.*
[71] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/collections-ads-on-pinterest, (last accessed February 11, 2025).
[72] *Id.*
[73] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/audience-targeting, (last accessed February 11, 2025).

80. Pinterest informs its advertisers that "[o]nce [an ad is] approved, we'll start distributing your ad."[74]

Ad review process

Once you launch your campaign, we'll review it to make sure it follows our Advertising guidelines. The campaign review process can take up to 24 hours.

If your campaign targeting goes against our advertising guidelines, we'll send you a notification in Ads Manager letting you know what needs to change so that your ad can be reviewed again for approval. Once approved, we'll start distributing your ad.

81. Pinterest promotes its ability to optimize and deliver ads to run more efficient campaigns and get the most out of an advertisers' budget.[75]

Optimize and deliver

In this final step before you launch your campaign, you can turn on extra optimizations to make sure you're getting the best results. These optimizations help you run more efficient campaigns and get the most out of your budget. As you navigate through these final decisions, Ads Manager includes tips to help you choose the best fit for your campaign.

[74] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/device-targeting, (last accessed February 11, 2025).
[75] Pinterest, "How to use Pinterest Ads Manager," https://business.pinterest.com/getting-started-in-ads-manager/ (last accessed February 11, 2025).

82. Pinterest documentation describes how advertisers can set up "dynamic retargeting" technology, helping advertisers reach people on Pinterest who have already visited an advertiser's site or who have items sitting in their shopping cart.[76] Pinterest instructs users on how to set up dynamic retargeting campaign through the Ads Manager.[77]

> Dynamic retargeting helps you reach people on Pinterest who have already visited your site or who have items sitting in their shopping cart. You can retarget exact or similar products to those they engaged with while they browse on Pinterest.

83. Pinterest describes its ads delivery funnel as a process involving candidate generation, blending and filtering, ranking, auction and allocation, and finally inserted into a user's homefeed.[78]

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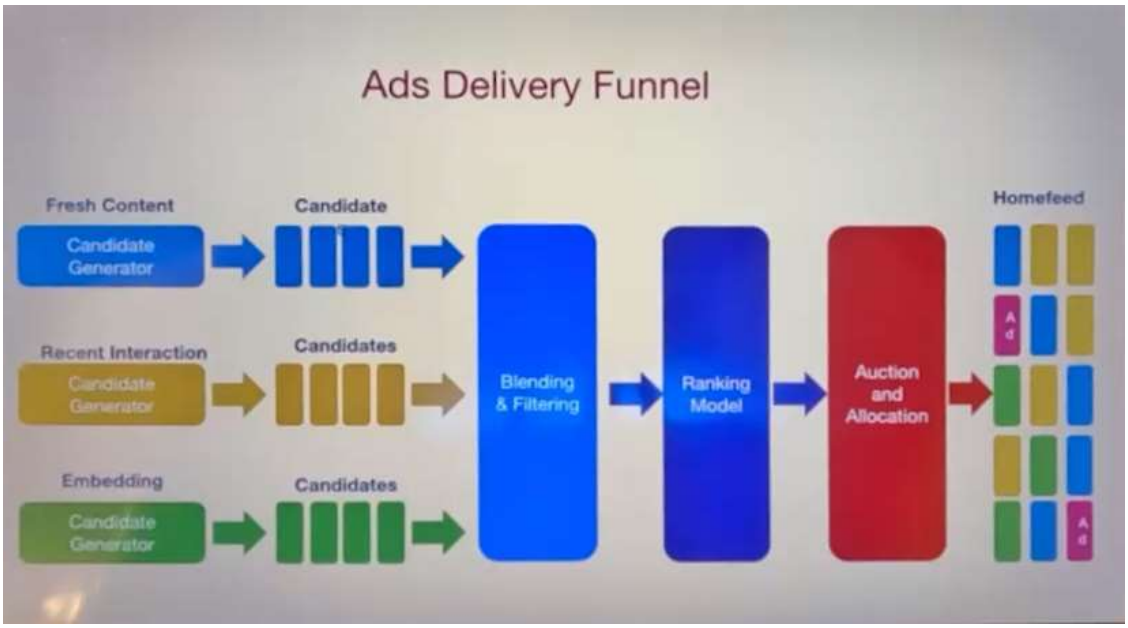
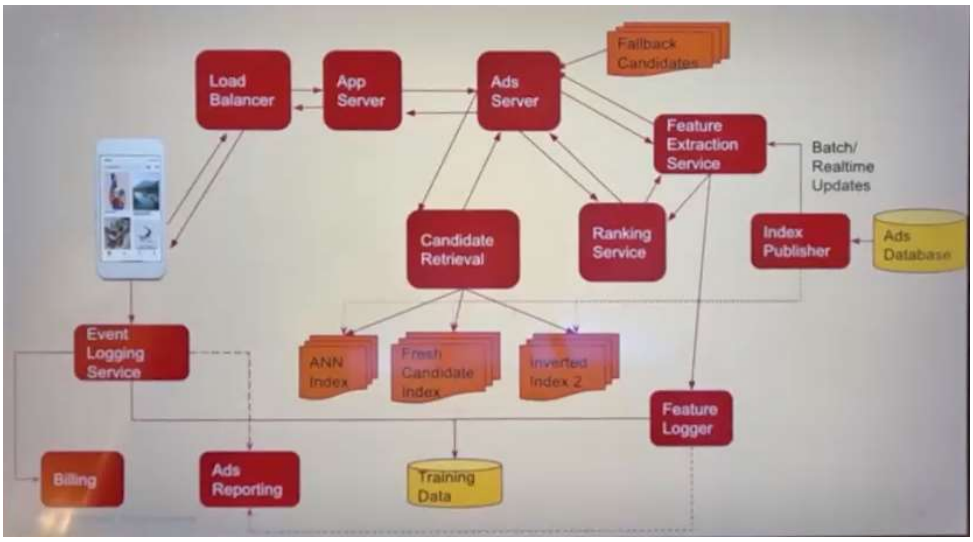
[76] Pinterest, Help Center, https://help.pinterest.com/en/business/article/set-up-dynamic-retargeting (last accessed February 11, 2025).
[77] *Id.*
[78] InfoQ, "Unpacking How Ads Ranking Works @Pinterest," https://www.infoq.com/presentations/pinterest-ads/ at 13:04 (last accessed February 11, 2025).



84. Pinterest describes how its ads delivery funnel begins by extracting features for a particular user, for example, the gender, location, and/or how the particular user has interacted in the past.[79] The next step is candidate retrieval where the system tries to find the best set of candidates that it can show to the user, followed by a ranking system.[80]

85. Once an ad is delivered, Pinterest describes how its advertisement delivery service logs a user's response to an ad.[81]

[79] *Id.*
[80] *Id.*
[81] *Id.*



86. Pinterest has described how as the user interacts with their feed, there is an event logging service, which uses a Kafka platform to log all of the events in real-time.[82]

87. Pinterest engineers describe how "[p]ersonalized recommendation is critical in the ads recommendation system because it can better capture users' interests, connect the users with the compelling products, and keep them engaged with the platform. To make the ads Click-through rate (CTR) predictions more personalized, [Pinterest's] team has adopted users' real time behavior histories and applied deep learning algorithms to recommend appropriate ads to users."[83] "To deliver a personalized and enjoyable ad experience for its users, the Engagement Modeling team built deep neural network (DNN) models to continuously learn and adapt to user feedback and behavior, ensuring that the ads shown are highly targeted and valuable to the user."[84]

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[82] *Id.*

[83] Pinterest Engineering, "User Action Sequence Modeling for Pinterest Ads Engagement Modeling," Medium, https://medium.com/pinterest-engineering/user-action-sequence-modeling-for-pinterest-ads-engagement-modeling-21139cab8f4e, Mar. 5, 2024, (last accessed February 11, 2025).

[84] *Id.*

Pinterest strives to deliver high-quality ads and maintain a positive user experience. The platform aims to show ads that align with the user's interests and intentions, while also providing them with inspiration and discovery. The Ads Engagement Modeling team at Pinterest plays a crucial role in delivering effective advertising campaigns and helping businesses reach their target audience in a meaningful way. The goal of the engagement modeling is to show users the most relevant and engaging ads based on their interests and preferences. To deliver a personalized and enjoyable ad experience for its users, the Engagement Modeling team built deep neural network (DNN) models to continuously learn and adapt to user feedback and behavior, ensuring that the ads shown are highly targeted and valuable to the user.

Personalized recommendation is critical in the ads recommendation system because it can better capture users' interests, connect the users with the compelling products, and keep them engaged with the platform. To make the ads Click-through rate (CTR) predictions more personalized, our team has adopted users' real time behavior histories and applied deep learning algorithms to recommend appropriate ads to users.

NOTICE

88. Pinterest and The Kudelski Group entities, including OpenTV, have engaged in licensing discussions for nearly four years. OpenTV, through The Kudelski Group, first informed Pinterest of its need to take a license as early as November 2020.

89. In or around May of 2021, The Kudelski Group met with Pinterest and shared claim charts and a licensing offer. The group of claim charts included a chart showing how Pinterest's video delivery system infringed U.S. Patent No. 7,055,169.

90. In or around March 15, 2023, The Kudelski Group met with Pinterest and identified Pinterest's exposure to a number of patents within The Kudelski Group patent portfolio, including

OpenTV's U.S. Patent No. 7,669,212. The Kudelski Group's presentation identified the '212 patent as relevant to Pinterest's Targeted Ad Delivery.

91. On July 24, 2024, OpenTV, through The Kudelski Group, sent letters via Certified U.S. Mail to Pinterest's San Francisco and Chicago offices, again putting Pinterest on notice of its past and ongoing infringement of OpenTV's patents and other patents that are part of The Kudelski Group (the "Notice Letters").

92. The Notice Letters indicated that "Pinterest's method for recommending user content (including without limitation, Pinterest's retrieval and ranking diversification through its 'pin' functionality and smart feed technology based on human-curated content) infringes at least OpenTV's U.S. Patent No. 10,419,817, Claim 1." The Notice Letters also indicated that "Pinterest's 'Ad Manager' and 'Ad Deliver' technology infringe at least OpenTV's U.S. Patent No. 7,669,212, Claim 44." The Notice Letters further indicated that Pinterest's Adaptive Streaming Content Delivery Platform (and correlating HTTP Live Streaming ("HLS")) infringed at least OpenTV's U.S. Patent No. 7,055,169, Claim 1.

93. Pinterest has been on notice of infringement of at least U.S. Patent No. 10,419,817 since at least July 30, 2024, upon receiving a Notice Letter asserting infringement of at least claim 1 of the '817 patent.

94. Pinterest has been on notice of infringement of at least U.S. Patent No. 7,669,212 as early as March 15, 2023, when OpenTV, through The Kudelski Group, identified the '212 patent as being relevant to Pinterest's Targeted Ad Delivery platform. Alternatively, Pinterest has been on notice of its infringement of the '212 patent no later than July 30, 2024, upon receiving a Notice Letter asserting infringement of at least claim 44 of the '212 patent.

95. Pinterest has been on notice of infringement of U.S. Patent No. 7,055,169 since at least May of 2021 when Pinterest was provided a claim chart showing how Pinterest's video delivery system infringed U.S. Patent No. 7,055,169

THE OPENTV PATENTS

96. OpenTV is the owner of all right, title, and interest in the '817 patent, the '503 patent, the '212 patent, and the '169 patent.

The '503 Patent and '817 Patent

97. The '503 patent, entitled "Smart Playlist," was duly and legally issued on July 4, 2017, from a patent application filed September 7, 2010, with Alex Fishman and Crx K. Chai as named inventors.

98. The '817 patent, entitled "Smart Playlist," was duly and legally issued on September 17, 2019, from a patent application filed on June 29, 2017, with Alex Fishman and Crx K. Chai as named inventors. The '817 patent claims priority to U.S Pat. App. No. 12/877,034 (later issuing as the '503 Patent), filed on September 7, 2010.

99. The '503 and '817 patents are directed to improvements in the fields of media and entertainment and in particular to a smart playlist system. *See* '503 patent, 2:5-9 and '817 patent, 2:11-15. The inventions disclosed in the '503 and '817 patents relate to the technical problem of curating viewable content today as found in social media, conventional media, and other online environments. This explosion of content has created what may be described as a "paradox of choice," where the excess of choices causes a viewer's inability to choose or discover relevant content. Ex. B ('503 patent), 1:29-33 and Ex. A ('817 patent), 1:37-39.

100. The '503 and '817 patents describe one approach to solving this technical problem by way of a smart playlist. The patents describe how "[d]ata is collected indiscriminately from the

entire accessible community of viewers may be accumulated in a repository termed a global bucket." *See*, *e.g.*, '817 patent, 2:28-30. The patents then describe how "[d]ata from the global bucket may be analyzed to determine programs that appear to be most popular at the time of the analyzing, i.e., appear to be of heightened interest to viewers." *Id*. at 2:31-34. "A certain number of programs that have been determined as most popular are compiled into a so-called hot list. The hot list may be made available to viewers, e.g., by communicating the list to the viewers' client devices or providing an access link that can be invoked from the user's devices." *Id*. at 2:34-38.

101. The patents describe how "[b]efore a hot list is provided to a viewer, it may be personalized for the viewer by determining how relevant the items in the hot list are to that particular viewer and presenting the viewer only those programs that have been determined to be of high relevance to the viewer. *Id*. at 2:39-49. The patents further describe how "[t]he relevancy of a particular program to a particular viewer may be determined by associating each item in the hot list with a score based on the viewer's profile, on the viewer's content viewing history and patterns, as well as based on information collected from the client devices of a subset of viewers who are members of the particular viewer's social network." *Id*. at 2:43-49.

102. The claims of the '817 patent overcame rejections by the examiner under 35. U.S.C. § 101. For example, in a Final Rejection, the USPTO examiner found, *inter alia*, that the claims were "directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract ideas [sic]) without significantly more. In general the claims are directed [to] abstract ideas of accessing database information (content, viewer and social network), generating a list of popular content, customizing the list to generate a playlist for individual user, and sending the playlist to

display on user [a] user device ("the playlist is a subset of video content items in the database, the items are not modified nor transformed by the above processes)[.]"[85]

103. In response to the USPTO examiner's Final Rejection under 35 U.S.C. § 101, the applicants asserted the claims were not directed to an abstract idea. The applicants explained how the claimed steps were "integrated into a practical application that 'causes the client device to perform an operation for an item of the items included in the playlist.'"[86] Ex. F. The applicants further described how the claims "solve a technological problem of, for example, processing content utilization data of a plurality of client devices associated with a plurality of viewers to generate playlist data for a specific viewer and, based on generating the playlist data, automatically sending an instruction that causes a client device to perform an operation." *Id*. at 9. The applicants stated how "[t]his is a problem rooted in computer technology and arising particularly in the realm of computer networks and automation." *Id*.

104. The USPTO examiner issued a Notice of Allowance based on, *inter alia*, the Patent Board's January 3, 2017 decision of the '817 patent parent application (now the '503 patent), and the 2019 Revised Patent Subject Matter Eligibility Guidance.[87]

105. According to the USPTO examiner, the claims of the '503 patent issued because, among other reasons, the prior art did not disclose "generating a score for each item from the list of popular content items based on the viewing history of the target viewer and on the viewing history of the viewers who are identified as social connections of the target viewer."[88]

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[85] Excerpts of the '817 patent file history are attached as **Ex. E**.
[86] Excerpts of the '817 patent file history are attached as **Ex. F.**
[87] Excerpts of the '817 patent file history are attached as **Ex. G.**
[88] Excerpts of the '503 patent file history are attached as **Ex. H**.

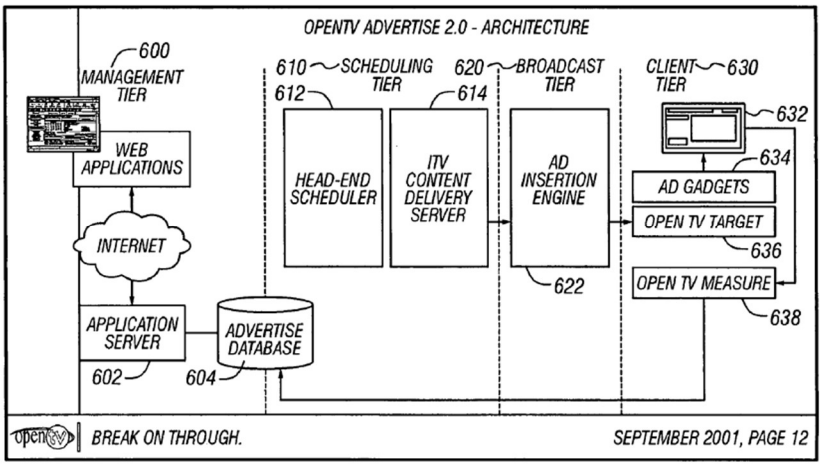
II. The ’212 patent

106. The ’212 patent, entitled “Service Platform Suite Management System,” was duly and legally issued on February 23, 2010, from a patent application filed on February 1, 2002, with Rachad Alao, Jose Henrard; Alain Delpuch; Vincent Dureau; Vahid Koussari-Amin; Adam Benson; Nicholas Fishwick, Waiman Lam, and Matthew Huntington as named inventors.

107. The patent describes how “[i]nteractive television systems can be used to provide a wide variety of services to viewers. Interactive television systems are capable of delivering typical video program streams, interactive television applications, text and graphic images, web pages and other types of information. Interactive television systems are also capable of registering viewer actions or responses and can be used for such purposes as marketing, entertainment and education.” ’212 patent at 1:48-55.

108. The inventions described in the ’212 patent are directed to solving the technical problem of the “need for an architecture that provides a comprehensive management solution for regulation of content, advertising, and E-Commerce . . . [and the] need for a comprehensive architecture that provides adaptive control of access, content, and scheduling in an interactive television environment.” ’212 patent, 2:28-34.

109. In one example embodiment, the ’212 patent describes an “Advertise Architecture,” which “operates across four tiers of a broadcast platform.” ’212 patent, 25:64-65. Figure 6 illustrates the novel structure of reciprocal data provision to create an adaptive advertising solution:



110. The first tier is labeled the "Management Tier," which uses a "Web Application Server." The Web Application Server stores information received from sales representatives from different advertisement entities in an Advertisement Database. '212 patent, 26:1-4.

111. The second tier is labeled "the Scheduling Tier." '212 patent, 26:32-34. The Scheduling Tier is comprised of a "Head-End Scheduler ("HES")" and "ITV Content Delivery Server." Advertising information, such as information on the number of subscribers watching in a specific time frame and sold advertising spots, are fed into the HES, which creates a high-level delivery plan stored in the Advertise Database. '212 patent, 26:38-40. When queried for what ads to display next, the Real Time Server of the ITV Content Delivery Server reads the delivery plan on the Advertise Database and returns a list of advertisements for the application to display next. '212 patent, 26:42-46. Advertisements are then weighted and prioritized based on certain factors including the advertisement target. '212 patent, 26:46-59.

112. The third tier is labeled the "Broadcast Tier." '212 patent, 27:15-16. The Broadcast Tier comprises an Advertisement Insertion Engine, which requests advertisements and inserts those advertisements into a broadcast stream of advertisement-enabled applications. '212 patent, 27:16-20. The advertisement can be any form such as video or audio insert into or replace any

currently displayed image of active audio track. ’212 patent, 27:20-22. Advertisements are requested regularly to provide rotation at the required frequency. ’212 patent, 27:27-28.

113. The fourth tier is labeled the “Client Tier.” ’212 patent, 27:64. This tier comprises an Ad Gadget Kit, Target, and Measure. The advertisements are sent to the Target, which selects advertisements that match a viewer profile. ’212 patent, 27:64-28:2. Selected advertisements are transferred to the Ad Gadget Kit, and displayed to the viewer. ’212 patent, 28:2-3. The Ad Gadget Kit enables applications to display a rotation of advertisements with click-through capabilities. ’212 patent, 28:3-5. The viewer may interact with the advertisement by clicking an item in the advertisement. ’212 patent, 28:5-6. “Measure” samples viewer activity for items of interest to advertisers and the sends the results to the Advertisement Database. ’212 patent, 28:10-12.

114. The ’212 patent further describes how “[a] positive response to the banner advertisement or at the user's request might trigger a partial or whole replacement of the currently executing image/audio data, for a ‘commercial’. Ad Gadget enables insertion of imagery and audio data currently being displayed and/or heard at a client device.” ’212 patent at 27:60-64.

115. The ’212 patent thus claims particular solutions to solving the technical problem of the “need for an architecture that provides a comprehensive management solution for regulation of content, advertising, and E-Commerce . . . [and the] need for a comprehensive architecture that provides adaptive control of access, content, and scheduling in an interactive television environment.” *See* ’212 patent, 2:28-34.

116. Following the applicants’ argument and amendment of the pending claims to add the limitation of “apply one or more rules to a client device user response to the selected one or more advertisements to predict further user interests; generate a new campaign rule based on the predicted further user interests; based on the new campaign rule, select a new advertisement to be

delivered to the target", the claims were allowed by the USPTO examiner.[89] The applicants argued, for example, that the advertising manager "is configured to make a prediction and select a new advertisement based on user responses to one or more selected advertisements," by "appl[ying] rules to user responses to ads." *Id*. The USPTO examiner did not provide a reason for allowing the claims of the '212 patent.

III. The '169 patent

117. The '169 patent, entitled "Supporting common interactive television functionality through presentation engine syntax," was duly and legally issued on May 30, 2006, from a patent application filed on April 21, 2003, with Alain Delpuch, James Whitledge, Jean-Rene Menand, Emmanuel Barbier, Kevin Hausman, Debra Hengsen, and Dongmin Su as named inventors. The '169 patent claims priority to Provisional application No. 60/373,883, filed on April 19, 2002.

118. The patent describes broadcast television having an inefficient cyclical or repeating format, referred to as a "carousel." *See*, *e.g.*, '169 patent at 1:43-67. The patent describes how pieces of information, or data objects, in a carousel may be intended to be combined in a single object data stream to form a program. This program may also contain streaming data such as audio or video. *Id*. at 2:1-15. The patent is directed to fulfilling a need for a "more flexible scheme" for addressing technical problems related to access of ever-wider range of data and resources, especially on networks that define different or even proprietary signaling formats. *Id*. at 2:16-29.

119. The '169 patent describes a method and mechanism which "enable[s] content authors to use directives, such as HTML, scripting languages, or other languages[.]" *Id*. at 2:33-38. The patent further describes how "[i]n one embodiment, the directives are received by a

[89] Excerpts of the '212 patent file history are attached as **Ex. I.**

centrally located proxy server which may be configured to receive, transcode and convey transcoded web based content to client devices." *Id*. at 2:48-52.

120. The '169 patent thus claims particular solutions to solving technical problems related to the proper (or any) presentation of digital audio, video and/or graphic information. In particular, the '169 patent uses an innovative, specially programmed computer system to determine whether a digital audio, video and/or graphic presentation requires other computer-implemented resources for its presentation. If the innovative, specially programmed computer system determines that the digital audio, video and/or graphic presentation does not require other resources, it permits the presentation to be initiated. If, on the other hand, the innovative specially programmed computer system determines that additional resources are required by the digital audio, video and/or graphic presentation, it prohibits initiation of the presentation until the additional computer-implemented resources are present.

121. According to the USPTO examiner, the claims of the '169 patent issued because, among other reasons, the prior art did not disclose all of the steps of "determining whether said one or more directives includes a prerequisite directive which indicates that acquisition of a subset of said set of resources is a prerequisite for initiating the presentation; initiating said presentation in response to determining the one or more directives do not include said prerequisite directive; and prohibiting initiation of said presentation until said subset of resources are acquired in response to determining the one or more directives include said prerequisite directive."[90] *See* November 28, 2005 Notice of Allowance.

[90] Excerpts of the '169 patent file history are attached as **Ex. J**.

COUNT I: INFRINGEMENT OF U.S. PATENT NO. 9,699,503

122. The allegations of paragraphs 1-121 of this Complaint are repeated, re-alleged, and incorporated by reference as if fully set forth herein.

123. OpenTV is the owner of all rights, title, and interest in and to the ’503 patent.

124. Pursuant to 35 U.S.C § 282, the ’503 patent is presumed valid and enforceable.

125. Pinterest has infringed, either literally or under the doctrine of equivalents, and is currently infringing, the ’503 patent in violation of 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing in or into the United States without authority products, software, and/or services, including through the operation of its web-based application at www.pinterest.com, through the operation of its mobile application and/or through its content delivery methods and home feed Pin recommendation system for the same.

126. Pinterest infringes at least claim 1 of the ’503 patent because, for example, Pinterest’s Pin Recommendation System as described at ¶¶ 48-67 satisfies each of the claim limitations either literally or under the doctrine of equivalents.

127. Claim 1 of the ’503 patent recites:

> 1. A computer-implemented method comprising:
> obtaining content utilization data from a plurality of client devices associated with a respective plurality of viewers, wherein the content utilization data for a viewer from the plurality of viewers is indicative of the viewer's interest in respective content items, and wherein the plurality of viewers comprises other viewers who are not identified as social connections of the viewer;
> automatically generating, at a server computer system, a list of popular content items that are currently popular among the plurality of viewers based on the obtained content utilization data;
> for a target viewer from the plurality of viewers, customizing the list of popular content items to generate a customized playlist, the customizing based on a viewing history of the target viewer and on a viewing history

of viewers who are identified as social connections of the target viewer, wherein the customizing comprises:
generating a score for each item from the list of popular content items based on the viewing history of the target viewer and on the viewing history of the viewers who are identified as social connections of the target viewer; and
including items in the customized playlist based on the respective scores of the items from the list of popular content items; and
communicating the customized playlist to a client device of the target viewer.

128. Based on the publicly available evidence cited below in ¶¶ 129-171, it is plausible that Pinterest's Pin Recommendation System infringes each of the limitations of at least claim 1 of the '503 patent.

129. Pinterest's Pin Recommendation System performs a computer-implemented method. For example, the Pin Recommendation System uses computer hardware and software-implemented services including candidate generators, such as Pixie, and ranking models, such as Pinnability, to provide home feed recommendations to a user.[91]

[91] Pinterest Engineering, "Pinterest Home Feed Unified Lightweight Scoring: A Two-tower Approach," Medium, September 9, 2021, https://medium.com/pinterest-engineering/pinterest-home-feed-unified-lightweight-scoring-a-two-tower-approach-b3143ac70b55 (February 11, 2025).

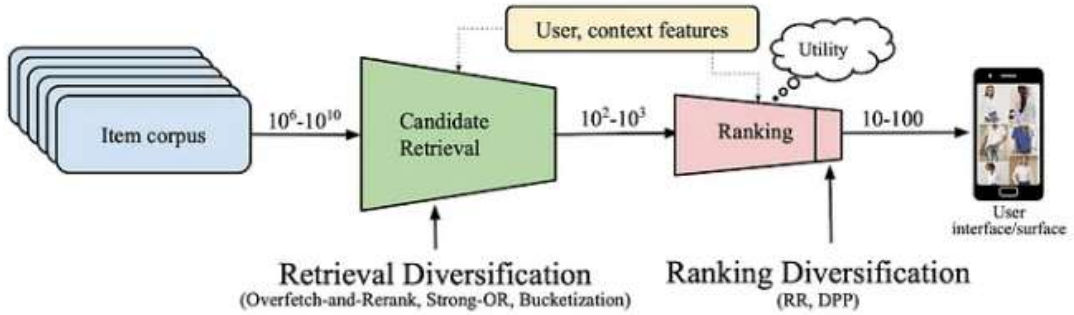


Fig. 2. Large-scale recommender systems can broadly be categorized into two stages going from an item corpus to recommendations: retrieval and ranking.

130. Pinterest's Pin Recommendation System obtains content utilization data from a plurality of client devices associated with a respective plurality of viewers.

131. For example, Pinterest describes how it collects data from users, such as their viewing history, location, IP address associated with a client device, platform and client device type (i.e., iOS, Windows), browser, content engagement, search queries, actions on Pins, actions on Boards, and ad engagement.[92]

132. Pinterest informs its users it "store[s] [a user's] information," for various purposes, including, without limitation, the ability to recommend new content to users. For example, Pinterest explains that it uses the stored information to "[r]ecommend Pins, boards, or content [a user] might like [based on that user's] activity on [Pinterest's] services and [the user's] offsite behavior."[93]

133. On information and belief, candidate generators, such as Pixie, and ranking models, such as Pinnability, obtain content utilization data of a plurality of client devices, each client device associated with a respective viewer of a plurality of viewers. For example, Pinterest describes how

[92] "Privacy Policy, Pinterest, https://policy.pinterest.com/en/privacy-policy, (last accessed February 11, 2025).
[93] *Id.*

at the candidate generation stage, candidate generators narrow the set of candidates from a large corpus of items to a much narrower set based on some predicted scores, such as the relevance of the items to the query and the user.[94] Pinterest documentation further describes how a bipartite graph is used, capturing "a huge amount of rich data from our users" where "each edge shows that a person saved a Pin to a board." On information and belief, the "huge amount of rich data" in the bipartite graph contains at least the data Pinterest collects from the devices associated with its users.

134. As another example, Pinterest describes how ranking models, such as Pinnability, are trained based on "Historical User Behavior." Pinterest describes how the basis of its Pinnability training data is the historical Pinner interaction with home feed Pins:

> **Training instance generation**
>
> The basis of the Pinnability training data is the historical Pinner interaction with home feed Pins. For example, after viewing a Pin in home feed, a Pinner may choose to like, repin, click for a Pin closeup, clickthrough, comment, hide, or do nothing. We record some of the "positive actions" and "negative action" as training instances. Naturally the number of Pins viewed is often much larger than the number of Pins in which the Pinner made a positive action, so we sample the positive and negative instances at different rates. With these defined, we test thousands of informative features to improve Pinnability's prediction accuracy.

135. As another example, Pinterest describes how it uses a "real-time user signal service that acts as a platform for consuming user engagement data, as well as computing and serving user

[94] *Id.*

features."[95] Pinterest describes how it utilizes an "Event Store" containing "a user's historical events."[96]

136. As part of Pinterest's Pin Recommendation System, the content utilization data for a viewer from the plurality of viewers is indicative of the viewer's interest in respective content items.

137. For example, Pinterest describes how candidate generators, such as Pixie, use a bipartite graph, capturing "a huge amount of rich data from our users" where "each edge shows that a person saved a Pin to a board."[97]

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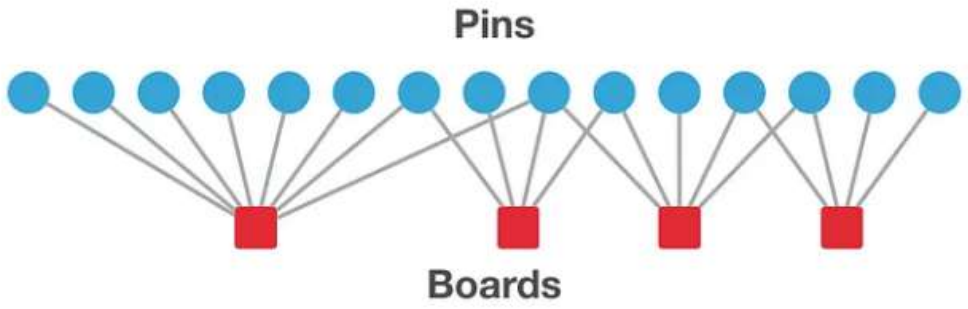
[95] Pinterest Engineering, "Real-time User Signal Serving for Feature Engineer," Medium, Dec. 5, 2019https://medium.com/pinterest-engineering/real-time-user-signal-serving-for-feature-engineering-ead9a01e5b, (last accessed February 11, 2025).
[96] *Id*.
[97] Pinterest Engineering, "Introducing Pixie, an advanced graph-based recommendation system," March 31 2017, https://medium.com/pinterest-engineering/introducing-pixie-an-advanced-graph-based-recommendation-system-e7b4229b664b (last accessed February 11, 2025)

Pixie

We started from a bipartite graph where each edge shows that a person saved a Pin to a board.



This graph captures a huge amount of rich data from our users, and is quite large, with more than 100 billion edges and several billion nodes. Thankfully, RAM today is incredibly cheap, and big data like this is small enough to fit on readily available AWS machines. Before terabyte-scale RAM machines were available, complex distributed systems like Hadoop or Spark were needed to compute algorithms for data of this scale. Fortunately, in a way big data is actually getting smaller! Now we can load the entire graph into a single machine and traverse all of it without making any network calls. This makes real-time algorithms on densely connected graphs much easier to develop and deploy at scale, and allows us to make recommendations in real-time the moment a Pinner opens our app (instead of computing them in batch jobs the night before).

138. Publications describe how Pinterest uses a biased random walk of the graph such that "recommendations will be personalized."[98] This same publication acknowledges that "it is important that users receive recommendations . . . on the topic of interest."[99]

[98] Eksombatchai *et al*., Pixie: A System for Recommending 3+ billion items to 200+ million users in real time https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf, (last accessed February 11, 2025).
[99] *Id.*

139. As another example, ranking models, such as Pinnability, use data that is indicative of the interests of a particular user such as a pinner's reaction to a Pin in their homefeed.[100]

Training instance generation

The basis of the Pinnability training data is the historical Pinner interaction with home feed Pins. For example, after viewing a Pin in home feed, a Pinner may choose to like, repin, click for a Pin closeup, clickthrough, comment, hide, or do nothing. We record some of the "positive actions" and "negative action" as training instances. Naturally the number of Pins viewed is often much larger than the number of Pins in which the Pinner made a positive action, so we sample the positive and negative instances at different rates. With these defined, we test thousands of informative features to improve Pinnability's prediction accuracy.

[101]

140. Pinterest further describes how the Pinnability model uses pretrained user embedding to model user's interest and preference, capturing a user's long-term interest by leveraging their past interaction history on Pinterest.[102]

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[100] Pinterest Engineering, "Pinterest Home Feed Unified Lightweight Scoring: A Two-tower Approach," Medium, September 9, 2021, https://medium.com/pinterest-engineering/pinterest-home-feed-unified-lightweight-scoring-a-two-tower-approach-b3143ac70b55 (February 11, 2025).

[101] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

[102] Pinterest Engineering, "How Pinterest Leverages Realtime User Actions in Recommendation to Boost Homefeed Engagement Volume," November 4, 2022, https://medium.com/pinterest-engineering/how-pinterest-leverages-realtime-user-actions-in-recommendation-to-boost-homefeed-engagement-volume-165ae2e8cde8 (last accessed February 11, 2025).

> The Pinnability model has been using some pretrained user embedding to model user's interest and preference. For example, we use PinnerFormer (PinnerSAGE V3), a static, offline-learned user representation that captures a user's long term interest by leveraging their past interaction history on Pinterest.

141. According to Pinterest, scores from the Pinnability models represent the personalized relevance between a Pinner and the candidate Pins.[103]

> With Pinnability launched, the candidate Pins for home feed are scored using the Pinnability models. The scores represent the personalized relevance between a Pinner and the candidate Pins. Pins in home feed are prioritized by the relevance score as illustrated in Figure 2.

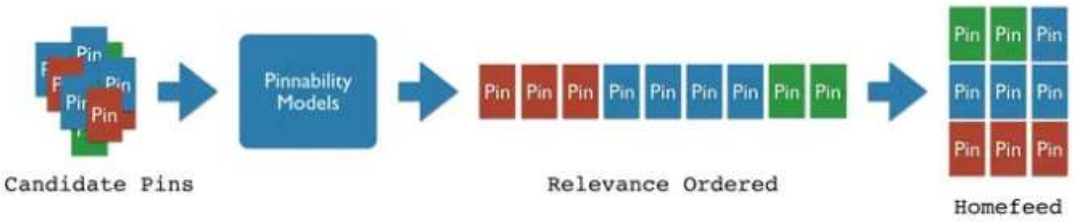

Fig 2: Home feed after Pinnability, where Pins are ordered by personalized relevance score.

142. And as another example, Pinterest describes how its "real-time user signal service" "acts as a platform for consuming user engagement data, as well as computing and serving user features."[104]

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[103] Pinterest Engineering, "Machine Learning in the Home Feed," March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

[104] Pinterest Engineering, "Real-time User Signal Serving for Feature Engineer," Medium, Dec. 5, 2019, https://medium.com/pinterest-engineering/real-time-user-signal-serving-for-feature-engineering-ead9a01e5b, (last accessed February 11, 2025).

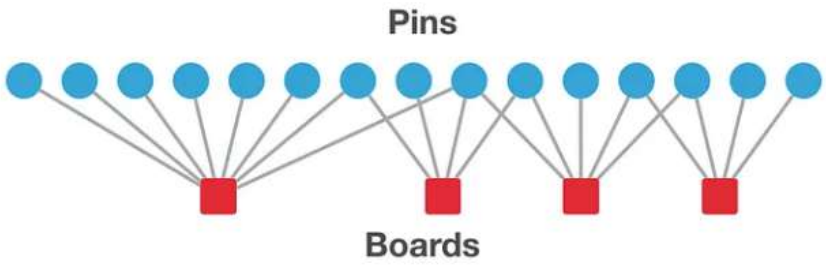
143. As part of Pinterest's Pin Recommendation System, the plurality of viewers comprises other viewers who are not identified as social connections of the viewer.[105] Given the number of Pinterest users, it can be inferred that there are those who are not a "social connection" of the first. For example, Pinterest engineers explain Pixie's content generation technology by referring to the "100 billion edges and several billion nodes" arising from the "rich data from [Pinterest's] users": [106]

[105] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

[106] Pinterest Engineering, "Introducing Pixie, an advanced graph-based recommendation system," March 31 2017, https://medium.com/pinterest-engineering/introducing-pixie-an-advanced-graph-based-recommendation-system-e7b4229b664b (last accessed February 11, 2025).

Pixie

We started from a bipartite graph where each edge shows that a person saved a Pin to a board.



This graph captures a huge amount of rich data from our users, and is quite large, with more than 100 billion edges and several billion nodes. Thankfully, RAM today is incredibly cheap, and big data like this is small enough to fit on readily available AWS machines. Before terabyte-scale RAM machines were available, complex distributed systems like Hadoop or Spark were needed to compute algorithms for data of this scale. Fortunately, in a way big data is actually getting smaller! Now we can load the entire graph into a single machine and traverse all of it without making any network calls. This makes real-time algorithms on densely connected graphs much easier to develop and deploy at scale, and allows us to make recommendations in real-time the moment a Pinner opens our app (instead of computing them in batch jobs the night before).

144. Pinterest's Pin Recommendation System automatically generates, at a server computer system, a list of popular content items that are currently popular among the plurality of viewers based on the obtained content utilization data.

145. Pinterest describes how candidate generators, such as Pixie, and ranking models, such as Pinnability, provide home feed recommendations to a user.[107]

[107] Pinterest Engineering, "Pinterest Home Feed Unified Lightweight Scoring: A Two-tower Approach," Medium, September 9, 2021, https://medium.com/pinterest-engineering/pinterest-home-feed-unified-lightweight-scoring-a-two-tower-approach-b3143ac70b55 (February 11, 2025).

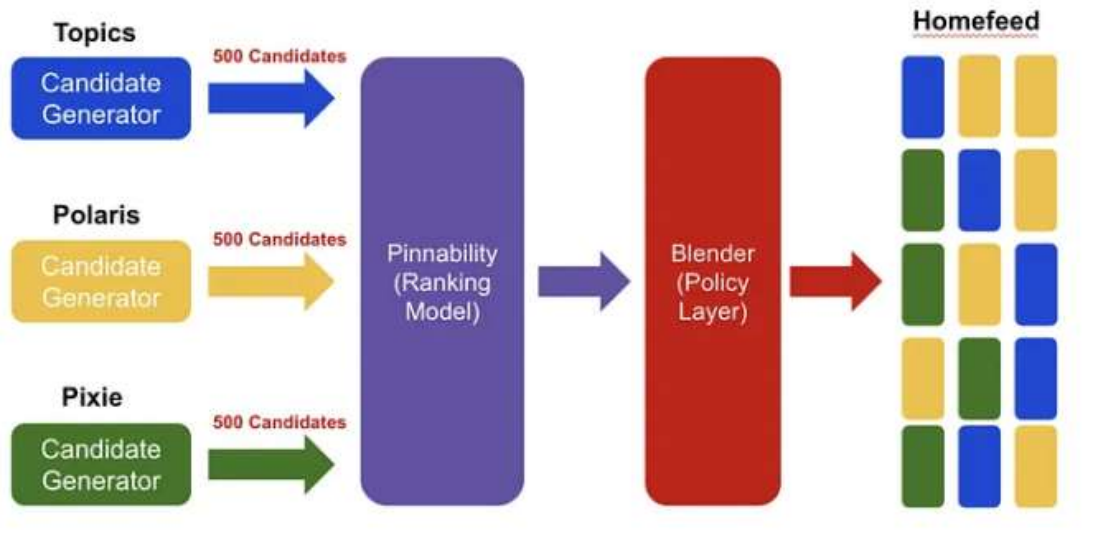


Fig. 1. Overview of current home feed recommendation pipeline. Home feed recommendation is powered by many different candidate generators. Each of them serves a unique role and has its own light-weight ranking layer.

146. For example, Pinterest describes how candidate generators, such as Pixie, are a first step in the Pin recommendation process that "aims to efficiently fetch a set of broadly relevant Pins."[108] Pinterest describes how candidate pins "are quickly scored based on simple heuristics (in Pixie's case, this is the visit count score)[.]"[109] Pinterest explains that "Pixie's 'visit count' score sorts the generated pins purely on graph structure; it does not take any user preferences into account."[110]

147. As another example, Pinterest describes how ranking models, such as Pinnability, rely on Pinterest's "unique data set [that] contains abundant human-curated content, so that Pin, board, and user dynamics provide informative features for accurate Pinnability prediction." For

[108] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[109] *Id.*
[110] *Id.*

example, as described below, Pin features capture the intrinsic quality of a Pin, "such as historical popularity, Pin freshness and likelihood of spam."

> Our unique data set contains abundant human-curated content, so that Pin, board and user dynamics provide informative features for accurate Pinnability prediction. These features fall into three general categories: Pin features, Pinner features and interaction features:
>
> - Pin features capture the intrinsic quality of a Pin, such as historical popularity, Pin freshness and likelihood of spam. Visual features from Convolutional Neural Networks (CNN) are also included.

148. For a target viewer from the plurality of viewers, Pinterest's Pin Recommendation System customizes the list of popular content items to generate a customized playlist, the customizing based on a viewing history of the target viewer and on a viewing history of viewers who are identified as social connections of the target viewer.

149. For example, Pinterest describes how candidate generators, such as Pixie, are a first step in the Pin recommendation process that "aims to efficiently fetch a set of broadly relevant Pins."[111] Pinterest describes how candidate pins "are quickly scored based on simple heuristics (in Pixie's case, this is the visit count score)[.]"[112] Pinterest explains that "Pixie's 'visit count' score sorts the generated pins purely on graph structure; it does not take any user preferences into account."[113] On information and belief, the "visit count" score would encompass counts associated with Pinners who are part of a shared Group Board or are a user's followers. Pinterest then goes

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[111] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[112] *Id.*
[113] *Id.*

on to describe how candidate lists are customized by designing its candidate Pin generation algorithm "to be biased based on user features."[114]

150. Pinterest further describes how Pinterest's Pin Recommendation System uses a "Lightweight Ranking" which "Narrows down pins [from the candidate generation step] using an efficient and personalized model."[115]

151. As another example, Pinterest describes how ranking models, such as Pinnability, rely on Pinterest's "unique data set [that] contains abundant human-curated content, so that Pin, board, and user dynamics provide informative features for accurate Pinnability prediction." For example, as described below, Pin features capture the intrinsic quality of a Pin, "such as historical popularity, Pin freshness and likelihood of spam."

> Our unique data set contains abundant human-curated content, so that Pin, board and user dynamics provide informative features for accurate Pinnability prediction. These features fall into three general categories: Pin features, Pinner features and interaction features:
>
> - Pin features capture the intrinsic quality of a Pin, such as historical popularity, Pin freshness and likelihood of spam. Visual features from Convolutional Neural Networks (CNN) are also included.

152. On information and belief, such historical popularity of a Pin would encompass its popularity with Pinners who are part of a shared Group Board or are a user's followers.

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[114] Eksombatchai et al., Pixie: A System for Recommending 3+ billion items to 200+ million users in real time https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf, (last accessed February 11, 2025).

[115] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025)

153. Pinterest describes how using ranking models, such as Pinnability, "candidate Pins for home feed are scored using the Pinnability models. The scores represent the personalized relevance between a pinner and the candidate Pins. Pins in home feed are prioritized by the relevance score[.]"[116]

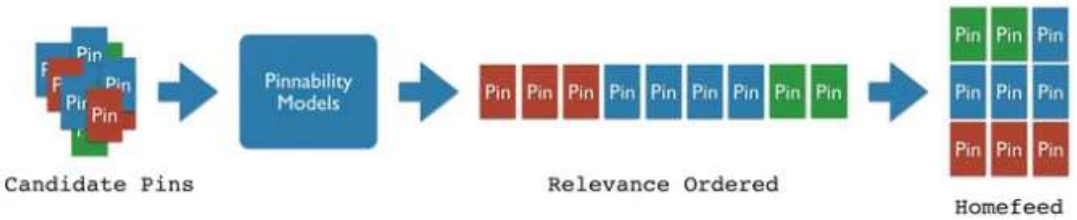

Fig 2: Home feed after Pinnability, where Pins are ordered by personalized relevance score.

[117]

154. As another example, when Pins are added to a group board, the Pins might show up in the home feed of anyone who follows any of the members of the board.[118]

155. In these ways, Pinterest's Pin Recommendation System customizes the list of popular content items to generate a customized playlist, the customizing based on a viewing history of the target viewer and on a viewing history of viewers who are identified as social connections of the target viewer.

156. Pinterest's Pin Recommendation System generates a customized playlist by generating a score for each item from the list of popular content items based on the viewing history

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[116] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025)
[117] *Id.*
[118] Rachel Ngom, "Why You Need to Join Pinterest Group Boards (and how to easily get started)," January 22, 2018, https://rachelngom.com/pinterest-group-boards/, (last accessed February 11, 2025).

of the target viewer and on the viewing history of the viewers who are identified as social connections of the target viewer.

157. For example, as explained above, Pinterest describes how candidate generators, such as Pixie, use a "visit count."[119] On information and belief, the count would encompass counts associated with Pinners who are part of a shared Group Board or are a user's followers. Pinterest goes on to describe how Pixie biases its candidate generation to prefer edges within the Pinterest Pin graph that match users features/preferences such as language or topic.[120] Pinterest describes how "The Pins with the highest score are then passed to the next step of the funnel."[121]

158. As another example, explained above, Pinterest describes how its lightweight ranking allows it to fetch more relevant and personalized recommendations earlier on in the Pin recommendation funnel:[122] On information and belief, this ranking of candidate Pins generates a score for Pin recommendations.

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[119] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025)
[120] *Id*.
[121] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[122] *Id.*

Impact to the user: improved quality of recommendations

On the user side, lightweight ranking allows us to fetch more relevant and personalized recommendations earlier on in the funnel. Below is one such example of this.

Figure 4. Comparing recommendations from old heuristic-based sorting versus those with lightweight ranking.

159. As another example, Pinterest describes how ranking models, such as Pinnability, score candidate Pins for a user's home feed based on "the personalized relevance between a Pinner and the candidate Pins." Pins in home feed are prioritized by the relevance score as illustrated in figure 2:[123]

[123] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

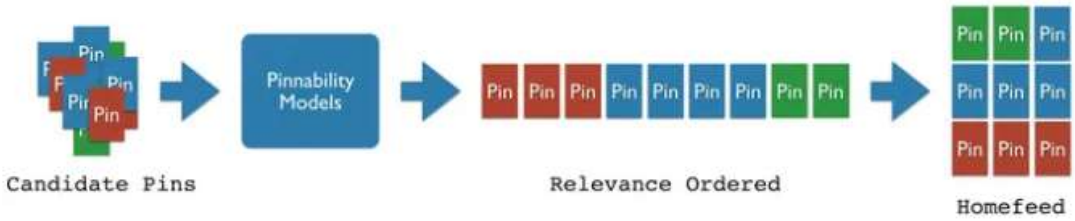

Fig 2: Home feed after Pinnability, where Pins are ordered by personalized relevance score.

160. As detailed above, Pinterest describes how ranking models, such as Pinnability, rely on information such as Pin features that capture the intrinsic quality of a Pin, "such as historical popularity, Pin freshness and likelihood of spam."

> Our unique data set contains abundant human-curated content, so that Pin, board and user dynamics provide informative features for accurate Pinnability prediction. These features fall into three general categories: Pin features, Pinner features and interaction features:
>
> - Pin features capture the intrinsic quality of a Pin, such as historical popularity, Pin freshness and likelihood of spam. Visual features from Convolutional Neural Networks (CNN) are also included.

161. Pinterest describes how its Pinnability technology contains a "smart feed," which "estimates the relevance score of how likely a Pinner will interact with a Pin. With accurate predications, [Pinterest] prioritize[s] those Pins with high relevance scores and show them at a top of home feed [sic]."[124]

[124] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

> Pinnability is the collective name of the machine learning models we developed to help Pinners find the best content in their home feed. It's part of the technology powered by smart feed, which we introduced last August, and estimates the relevance score of how likely a Pinner will interact with a Pin. With accurate predictions, we prioritize those Pins with high relevance scores and show them at the top of home feed.

162. On information and belief, such historical popularity of a Pin and/or relevance would encompass its popularity or relevance with Pinners who are part of a shared Group Board or are a user's followers.

163. As another example, when Pins are added to a group board, the Pins might show up in the home feed of anyone who follows any of the members of the board.[125] On information and belief, this would require scoring of a Pin at the candidate generation stage or ranking stages to reflect the history of a user identified as a social connection of the target Pinner.

164. Pinterest's Pin Recommendation System includes items in the customized playlist based on the respective scores of the items from the list of popular content items.

165. For example, Pinterest describes how candidate generators, such as Pixie, generate a candidate list of Pins based on Pin popularity (e.g., visit count score):[126]

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[125] Rachel Ngom, "Why You Need to Join Pinterest Group Boards (and how to easily get started)," January 22, 2018, https://rachelngom.com/pinterest-group-boards/, (last accessed February 11, 2025).
[126] *Id.*

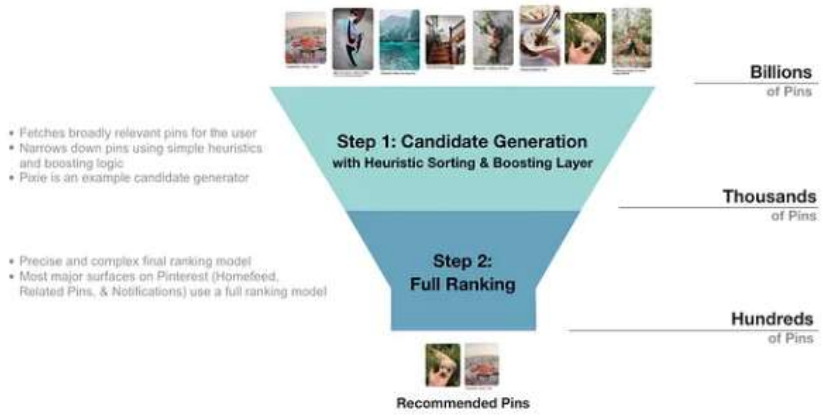

Figure 1. Number of Pins at each stage of the current Recommendation Funnel

The first step, "Candidate Generation", is a recall-driven step that aims to efficiently fetch a set of broadly relevant Pins. Pixie is one such candidate generator. This step uses recent user engagement to formulate an input representative of the Pinner's interests. The input Pin is used to fetch similar Pins, which are quickly scored based on simple heuristics (in Pixie's case, this is the visit count score), with additional boosting logic applied for specific business needs. The Pins with the highest score are then passed to the next step of the funnel. [127]

166. As another example, Pinterest describes how ranking models, like Pinnability, rely on Pinterest's "unique data set [that] contains abundant human-curated content, so that Pin, board, and user dynamics provide informative features for accurate Pinnability prediction." For example, as described below, Pin features capture the intrinsic quality of a Pin, "such as historical popularity, Pin freshness and likelihood of spam."

[127] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

> Our unique data set contains abundant human-curated content, so that Pin, board and user dynamics provide informative features for accurate Pinnability prediction. These features fall into three general categories: Pin features, Pinner features and interaction features:
>
> - Pin features capture the intrinsic quality of a Pin, such as historical popularity, Pin freshness and likelihood of spam. Visual features from Convolutional Neural Networks (CNN) are also included.

167. As yet another example, Pinterest describes how ranking models, like Pinnability, use candidate lists generated by, for example, Pixie, to populate Pins on a user's Homefeed.[128] Thus the Homefeed recommendations generated by ranking models are based on at least some of the Pin popularity considered at candidate generation.

168. And as another example, Pinterest describes how lightweight ranking models are used after candidate Pins are generated. This lightweight ranking model therefore is based on at least some of the Pin popularity considered at candidate generation.[129]

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[128] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[129] *Id.*

Impact to the user: improved quality of recommendations

On the user side, lightweight ranking allows us to fetch more relevant and personalized recommendations earlier on in the funnel. Below is one such example of this.

Figure 4. Comparing recommendations from old heuristic-based sorting versus those with lightweight ranking.

169. Pinterest's Pin Recommendation System communicates the customized playlist to a client device of the target viewer.

170. For example, Pinterest generates a home feed of Pins and communicates such "playlist" to the Mobile Application or Pinterest website or application on the user's mobile phone or desktop computer.[130]

171. Pinterest's Pin Recommendation System thus includes each and every limitation of at least claim 1 of the '503 patent; accordingly, Pinterest literally infringes this claim.

172. During discovery and development of its infringement contentions, Plaintiff may provide additional theories under which Pinterest infringes the '503 patent besides the examples provided above, including for the same system and using the same components identified above,

[130] Pinterest Hep Center, Pinterest, https://help.pinterest.com/en/article/explore-the-home-feed, (last accessed on February 17, 2025), (Informing users that their "[h]ome feed is a feed of Pins that have been picked for you . . . [b]rowse your Home feed to discovery Pins" and further instructing users can "customize what appears on [their] home feed" through "web," "Android," and "iOS" software).

and nothing in the example above is meant to limit the infringement allegations of Plaintiff or limit the interpretations of the claims or their terms.

173. Pinterest's infringement has caused and continues to cause damage to OpenTV, and OpenTV is entitled to recover damages sustained as a result of Pinterest's wrongful acts in an amount subject to proof at trial.

174. OpenTV has suffered and continues to suffer damages and irreparable harm as a result of Pinterest's past and ongoing infringement in an amount to be determined at trial.

175. Unless Pinterest's infringement is enjoined, OpenTV will continue to be damaged and irreparably harmed.

176. OpenTV meets the criteria for, and is entitled to, a permanent injunction.

COUNT II: INFRINGMENT OF U.S. PATENT NO. 10,419,817

177. The allegations of paragraphs 1-176 of this Complaint are repeated, re-alleged, and incorporated by reference as if fully set forth herein.

178. OpenTV is the owner of all rights, title, and interest in and to the '817 patent.

179. Pursuant to 35 U.S.C § 282, the '817 patent is presumed valid and enforceable.

180. Pinterest has had knowledge of the '817 patent and its infringement since at least July 30, 2024 by way of Plaintiff's July 24, 2024 letter to Pinterest. Pinterest has had actual notice of its infringement of the '817 patent under 35 U.S.C. § 287(a) since at since at least July 30, 2024.

181. Pinterest has infringed, either literally or under the doctrine of equivalents, and is currently infringing, the '817 patent in violation of 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing in or into the United States without authority products, software, and/or services, including through the operation of its web-based application at

www.pinterest.com, through the operation of its mobile application and/or through its content delivery methods and home feed Pin recommendation system for the same.

182. Pinterest infringes at least claim 1 of the ’817 patent because, for example, Pinterest’s Pin Recommendation System as described at ¶¶ 48-67 satisfies each of the claim limitations either literally or under the doctrine of equivalents.

183. Claim 1 of the ’817 patent recites:

1. A computer-implemented method comprising:
accessing a database to obtain content utilization data of
a plurality of client devices, each client device
associated with a respective viewer of a plurality of viewers,
wherein the content utilization data for a first viewer
from the plurality of viewers is indicative of an interest
of the first viewer in respective content items, and
wherein the plurality of viewers comprises a second
viewer who is not identified as a social connection of
the first viewer;
automatically generating, by a computer system, a list of
popular content items that are currently popular among
the plurality of viewers based on the content utilization
data;
customizing, by the computer system, the list of popular
content items to generate a playlist, the customizing
based on profile data of the first viewer , wherein the
customizing is performed by the computer system and
comprises:
generating a score for each item from the list of popular
content items based on the profile data of the first
viewer; and
including items in the playlist based on at least some of the scores of
the items from the list of popular content items;
and
based on the generating of the playlist, automatically
sending, by the computer system, to a client device of
the first viewer, an instruction that causes the client
device to perform an operation for an item of the items
included in the playlist.

184. Based on the publicly available evidence cited below in ¶¶ 185-221, it is plausible that Pinterest's Pin Recommendation System infringes each of the limitations of at least claim 1 of the '817 patent.

185. Pinterest's Pin Recommendation System performs a computer-implemented method. For example, the Pin Recommendation System uses computer hardware and software-implemented services including candidate generators, such as Pixie, and ranking models, such as Pinnability, to provide home feed recommendations to a user.[131]

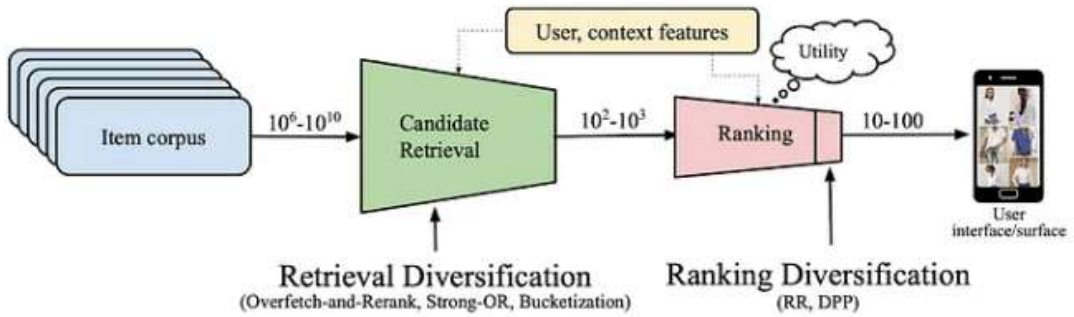

Fig. 2. Large-scale recommender systems can broadly be categorized into two stages going from an item corpus to recommendations: retrieval and ranking.

186. Pinterest's Pin Recommendation System accesses a database to obtain content utilization data of a plurality of client devices, each client device associated with a respective viewer of a plurality of viewers.

187. For example, Pinterest describes how it collects data from users, such as their viewing history, location, IP address associated with a client device, platform and client device

[131] Pinterest Engineering, "Pinterest Home Feed Unified Lightweight Scoring: A Two-tower Approach," Medium, September 9, 2021, https://medium.com/pinterest-engineering/pinterest-home-feed-unified-lightweight-scoring-a-two-tower-approach-b3143ac70b55 (February 11, 2025).

type (i.e., iOS, Windows), browser, content engagement, search queries, actions on Pins, actions on Boards, and ad engagement.[132]

188. Pinterest informs its users it "store[s] [a user's] information," for various purposes, including, without limitation, the ability to recommend new content to users. For example, Pinterest explains that it uses the stored information to "[r]ecommend Pins, boards, or content [a user] might like [based on that user's] activity on [Pinterest's] services and [the user's] offsite behavior."[133]

189. On information and belief, candidate generators, such as Pixie, and ranking models, such as Pinnability, access a database to obtain content utilization data of a plurality of client devices, each client device associated with a respective viewer of a plurality of viewers. For example, Pinterest describes how at the candidate generation stage, candidate generators narrow the set of candidates from a large corpus of items to a much narrower set based on some predicted scores, such as the relevance of the items to the query and the user.[134] Pinterest documentation further describes how a bipartite graph is used, capturing "a huge amount of rich data from our users" where "each edge shows that a person saved a Pin to a board."[135]

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[132] Pinterest Engineering, "Real-time User Signal Serving for Feature Engineer," Medium, https://medium.com/pinterest-engineering/real-time-user-signal-serving-for-feature-engineering-ead9a01e5b (last accessed February 6, 2025).
[133] Pinterest, "Privacy Policy," https://policy.pinterest.com/en/privacy-policy, (last accessed February 11, 2025).
[134] Pinterest Engineering, "Representation online Matters: practical end-to-end diversification in search and recommender systems," Medium, https://medium.com/pinterest-engineering/representation-online-matters-practical-end-to-end-diversification-in-search-and-recommender-cb60b547f2e0 (last accessed February 11, 2025).
[135] Pinterest Engineering, "Introducing Pixie, an advanced graph-based recommendation system," March 31, 2017, https://medium.com/pinterest-engineering/introducing-pixie-an-advanced-graph-based-recommendation-system-e7b4229b664b (last accessed February 11, 2025).

190. As another example, Pinterest describes how ranking models, such as Pinnability, are trained based on "Historical User Behavior."[136] Pinterest describes how the basis of its Pinnability training data is the historical Pinner interaction with home feed Pins:

> **Training instance generation**
>
> The basis of the Pinnability training data is the historical Pinner interaction with home feed Pins. For example, after viewing a Pin in home feed, a Pinner may choose to like, repin, click for a Pin closeup, clickthrough, comment, hide, or do nothing. We record some of the "positive actions" and "negative action" as training instances. Naturally the number of Pins viewed is often much larger than the number of Pins in which the Pinner made a positive action, so we sample the positive and negative instances at different rates. With these defined, we test thousands of informative features to improve Pinnability's prediction accuracy.

191. As another example, Pinterest describes how it uses a "real-time user signal service that acts as a platform for consuming user engagement data, as well as computing and serving user features."[137] Pinterest describes how it utilizes an "Event Store" containing "a user's historical events."[138]

192. As part of Pinterest's Pin Recommendation System, the content utilization data for a first viewer from the plurality of viewers is indicative of an interest of the first viewer in respective content items.

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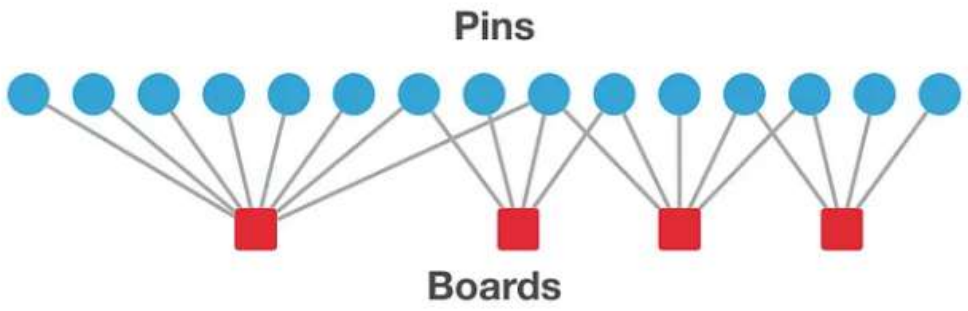
[136] Pinterest Engineering, "Real-time User Signal Serving for Feature Engineer," Medium, Dec. 5, 2019, https://medium.com/pinterest-engineering/real-time-user-signal-serving-for-feature-engineering-ead9a01e5b, (last accessed February 11, 2025).
[137] Pinterest Engineering, "Real-time User Signal Serving for Feature Engineer," Medium, Dec. 5, 2019, https://medium.com/pinterest-engineering/real-time-user-signal-serving-for-feature-engineering-ead9a01e5b, (last accessed February 11, 2025).
[138] *Id*.

193. For example, Pinterest describes how candidate generators, such as Pixie, use a bipartite graph, capturing "a huge amount of rich data from our users" where "each edge shows that a person saved a Pin to a board."[139]

Pixie

We started from a bipartite graph where each edge shows that a person saved a Pin to a board.



This graph captures a huge amount of rich data from our users, and is quite large, with more than 100 billion edges and several billion nodes. Thankfully, RAM today is incredibly cheap, and big data like this is small enough to fit on readily available AWS machines. Before terabyte-scale RAM machines were available, complex distributed systems like Hadoop or Spark were needed to compute algorithms for data of this scale. Fortunately, in a way big data is actually getting smaller! Now we can load the entire graph into a single machine and traverse all of it without making any network calls. This makes real-time algorithms on densely connected graphs much easier to develop and deploy at scale, and allows us to make recommendations in real-time the moment a Pinner opens our app (instead of computing them in batch jobs the night before).

[139] Pinterest Engineering, "Introducing Pixie, an advanced graph-based recommendation system," March 31, 2017, https://medium.com/pinterest-engineering/introducing-pixie-an-advanced-graph-based-recommendation-system-e7b4229b664b (last accessed February 11, 2025).

194. Publications describe how Pinterest uses a biased random walk of the graph such that "recommendations will be personalized."[140] This same publication acknowledges that "it is important that users receive recommendations . . . on the topic of interest."[141]

195. As another example, ranking models, such as Pinnability, uses data that is indicative of the interests of a particular user such has a pinner's reaction to a Pin in their homefeed.[142]

Training instance generation

The basis of the Pinnability training data is the historical Pinner interaction with home feed Pins. For example, after viewing a Pin in home feed, a Pinner may choose to like, repin, click for a Pin closeup, clickthrough, comment, hide, or do nothing. We record some of the "positive actions" and "negative action" as training instances. Naturally the number of Pins viewed is often much larger than the number of Pins in which the Pinner made a positive action, so we sample the positive and negative instances at different rates. With these defined, we test thousands of informative features to improve Pinnability's prediction accuracy. [143]

[140] Eksombatchai *et al*., Pixie: A System for Recommending 3+ billion items to 200+ million users in real time https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf, (last accessed February 11, 2025).
[141] *Id.*
[142] Pinterest Engineering, "Pinterest Home Feed Unified Lightweight Scoring: A Two-tower Approach," Medium, September 9, 2021, https://medium.com/pinterest-engineering/pinterest-home-feed-unified-lightweight-scoring-a-two-tower-approach-b3143ac70b55 (February 11, 2025).
[143] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

196. Pinterest further describes how the Pinnability model uses pretrained user embedding to model user's interest and preference, capturing a user's long-term interest by leveraging their past interaction history on Pinterest.[144]

> The Pinnability model has been using some pretrained user embedding to model user's interest and preference. For example, we use PinnerFormer (PinnerSAGE V3), a static, offline-learned user representation that captures a user's long term interest by leveraging their past interaction history on Pinterest.

197. According to Pinterest, scores from the Pinnability models represent the personalized relevance between a Pinner and the candidate Pins.[145]

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[144] Pinterest Engineering, "How Pinterest Leverages Realtime User Actions in Recommendation to Boost Homefeed Engagement Volume," November 4, 2022, https://medium.com/pinterest-engineering/how-pinterest-leverages-realtime-user-actions-in-recommendation-to-boost-homefeed-engagement-volume-165ae2e8cde8 (last accessed February 11, 2025).

[145] Pinterest Engineering, "Machine Learning in the Home Feed," March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

With Pinnability launched, the candidate Pins for home feed are scored using the Pinnability models. The scores represent the personalized relevance between a Pinner and the candidate Pins. Pins in home feed are prioritized by the relevance score as illustrated in Figure 2.

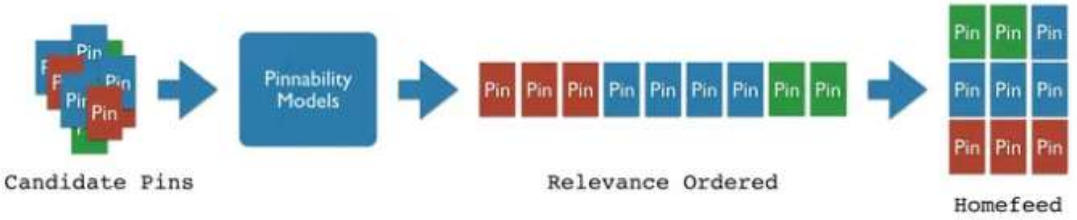


Fig 2: Home feed after Pinnability, where Pins are ordered by personalized relevance score.

198. And as another example, Pinterest describes how its "real-time user signal service" "acts as a platform for consuming user engagement data, as well as computing and serving user features."[146]

199. As part of Pinterest's Pin Recommendation System, the plurality of viewers comprises a second viewer who is not identified as a social connection of the first viewer.[147] Given the number of Pinterest users, it can be inferred that there are those who are not a "social connection" of the first. For example, Pinterest engineers explain Pixie's content generation

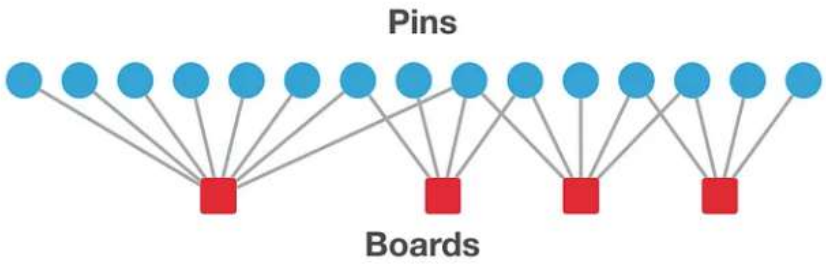
[146] Pinterest Engineering, "Real-time User Signal Serving for Feature Engineer," Medium, Dec. 5, 2019, https://medium.com/pinterest-engineering/real-time-user-signal-serving-for-feature-engineering-ead9a01e5b, (last accessed February 11, 2025).

[147] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

technology by referring to the "100 billion edges and several billion nodes" arising from the "rich data from [Pinterest's] users": [148]

Pixie

We started from a bipartite graph where each edge shows that a person saved a Pin to a board.



This graph captures a huge amount of rich data from our users, and is quite large, with more than 100 billion edges and several billion nodes. Thankfully, RAM today is incredibly cheap, and big data like this is small enough to fit on readily available AWS machines. Before terabyte-scale RAM machines were available, complex distributed systems like Hadoop or Spark were needed to compute algorithms for data of this scale. Fortunately, in a way big data is actually getting smaller! Now we can load the entire graph into a single machine and traverse all of it without making any network calls. This makes real-time algorithms on densely connected graphs much easier to develop and deploy at scale, and allows us to make recommendations in real-time the moment a Pinner opens our app (instead of computing them in batch jobs the night before).

200. Pinterest's Pin Recommendation System automatically generates, by a computer system, a list of popular content items that are currently popular among the plurality of viewers based on the content utilization data.

[148]Pinterest Engineering, "Introducing Pixie, an advanced graph-based recommendation system," March 31 2017, https://medium.com/pinterest-engineering/introducing-pixie-an-advanced-graph-based-recommendation-system-e7b4229b664b (last accessed February 25, 2024).

201. For example, Pinterest describes how candidate generators, such as Pixie, are a first step in the Pin recommendation process that "aims to efficiently fetch a set of broadly relevant Pins."[149] Pinterest describes how candidate pins "are quickly scored based on simple heuristics (in Pixie's case, this is the visit count score)[.]"[150] Pinterest explains that "Pixie's 'visit count' score sorts the generated pins purely on graph structure; it does not take any user preferences into account."[151]

202. As another example, Pinterest describes how ranking models, such as Pinnability, rely on Pinterest's "unique data set [that] contains abundant human-curated content, so that Pin, board, and user dynamics provide informative features for accurate Pinnability prediction." For example, as described below, Pin features capture the intrinsic quality of a Pin, "such as historical popularity, Pin freshness and likelihood of spam."

> Our unique data set contains abundant human-curated content, so that Pin, board and user dynamics provide informative features for accurate Pinnability prediction. These features fall into three general categories: Pin features, Pinner features and interaction features:
>
> - Pin features capture the intrinsic quality of a Pin, such as historical popularity, Pin freshness and likelihood of spam. Visual features from Convolutional Neural Networks (CNN) are also included.

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[149] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[150] *Id.*
[151] *Id.*

203. Pinterest's Pin Recommendation System customizes, by the computer system, the list of popular content items to generate a playlist, the customizing based on profile data of the first viewer, wherein the customizing is performed by the computer system.

204. Pinterest's customization method occurs in multiple locations: (1) the biasing of the candidate generation based on certain user information; (2) lightweight ranking occurring before Pinnability; and (3) full ranking occurring at the Pinnability machine learning stage. Pinterest illustrates these stages as follows:

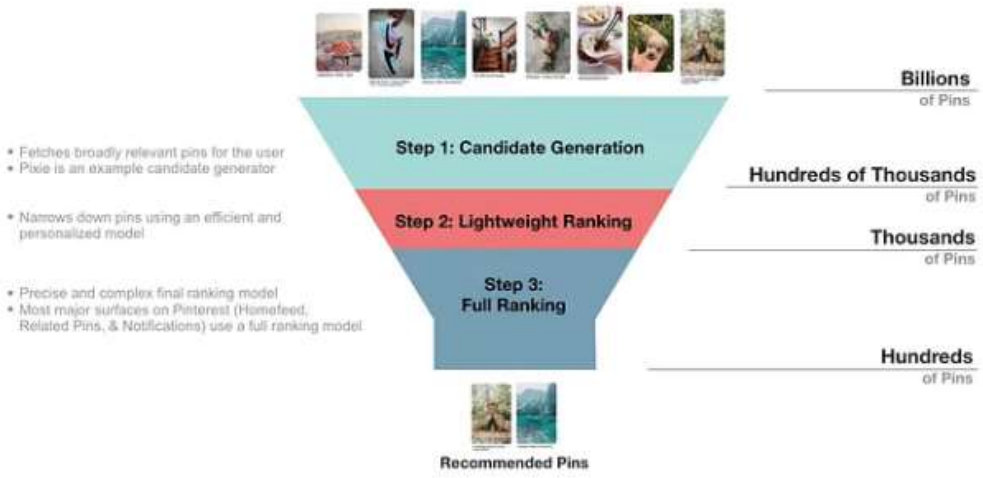

Figure 2. Recommendation Funnel after adding a Lightweight Ranking Step

205. For example, Pinterest describes how candidate generators, such as Pixie, begin with the Pinterest graph of pins and boards indicative of Pin popularity, but then design its candidate Pin generation algorithm "to be biased based on user features."[152]

[152] Eksombatchai et al., Pixie: A System for Recommending 3+ billion items to 200+ million users in real time https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf, (last accessed February 11, 2025).

206. As another example, Pinterest describes how Pinterest's Pin Recommendation System uses a "Lightweight Ranking" which "Narrows down Pins using an efficient and personalized model."[153]

207. As another example, Pinterest describes how using ranking models, such as Pinnability, "candidate Pins for home feed are scored using the Pinnability models. The scores represent the personalized relevance between a pinner and the candidate Pins. Pins in home feed are prioritized by the relevance score[.]"[154]

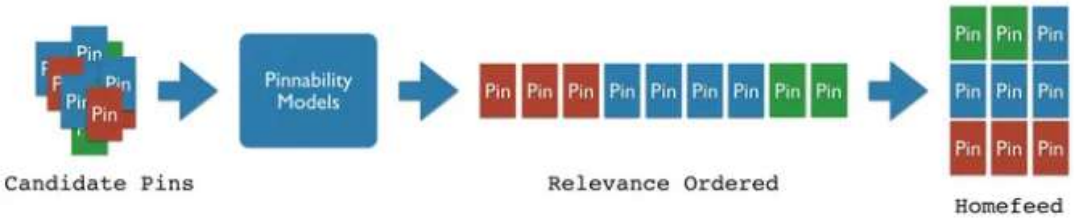

Fig 2: Home feed after Pinnability, where Pins are ordered by personalized relevance score.

[155]

208. Pinterest's Pin Recommendation System generates a score for each item from the list of popular content items based on the profile data of the first viewer.

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[153] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[154] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).
[155] *Id.*

209. For example, as explained above, Pinterest describes how candidate generators, such as Pixie, bias candidate generation based on the Pinterest Pin graph user features.[156] Pinterest describes how Pixie biases its candidate generation to prefer edges within the Pinterest Pin graph that match users features/preferences such as language or topic.[157] Pinterest describes how "The Pins with the highest score are then passed to the next step of the funnel."[158]

210. As another example, explained above, Pinterest describes how its lightweight ranking allows it to fetch more relevant and personalized recommendations earlier on in the Pin recommendation funnel:[159] On information and belief, this ranking generates a score for Pin recommendations.

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[156] Eksombatchai *et al*., Pixie: A System for Recommending 3+ billion items to 200+ million users in real time https://cs.stanford.edu/people/jure/pubs/pixie-www18.pdf, (last accessed February 11, 2025).
[157] *Id*.
[158] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).
[159] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

Impact to the user: improved quality of recommendations

On the user side, lightweight ranking allows us to fetch more relevant and personalized recommendations earlier on in the funnel. Below is one such example of this.

Figure 4. Comparing recommendations from old heuristic-based sorting versus those with lightweight ranking.

211. As another example, Pinterest describes how ranking models, such as Pinnability, score candidate Pins for a user's home feed based on "the personalized relevance between a Pinner and the candidate Pins." Pins in home feed are prioritized by the relevance score as illustrated in figure 2:[160]

[160] Pinterest Engineering, "Pinnability Machine Learning in the Home Feed," Medium, March 20, 2015, https://medium.com/pinterest-engineering/pinnability-machine-learning-in-the-home-feed-64be2074bf60, (last accessed February 11, 2025).

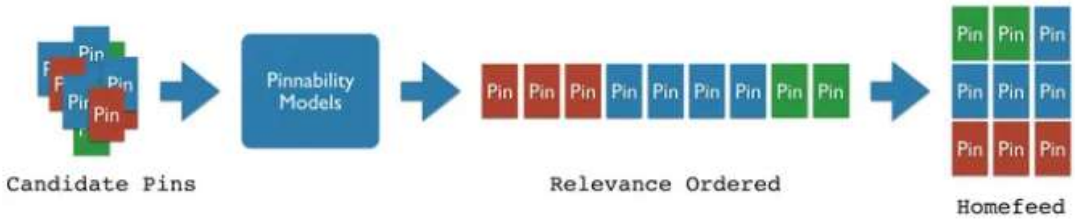

Fig 2: Home feed after Pinnability, where Pins are ordered by personalized relevance score.

212. Pinterest's Pin Recommendation System includes items in the playlist based on at least some of the scores of the items from the list of popular content items.

213. For example, Pinterest describes how candidate generators, such as Pixie, generate a candidate list of Pins based on Pin popularity (e.g., visit count score):[161]

[161] *Id.*

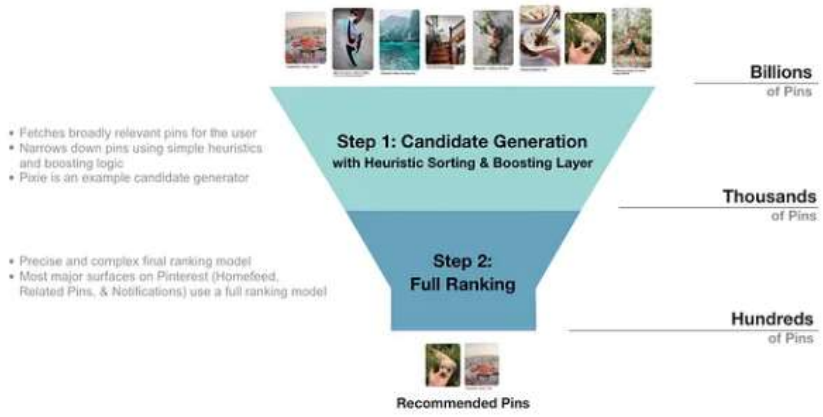

Figure 1. Number of Pins at each stage of the current Recommendation Funnel

The first step, "Candidate Generation", is a recall-driven step that aims to efficiently fetch a set of broadly relevant Pins. Pixie is one such candidate generator. This step uses recent user engagement to formulate an input representative of the Pinner's interests. The input Pin is used to fetch similar Pins, which are quickly scored based on simple heuristics (in Pixie's case, this is the visit count score), with additional boosting logic applied for specific business needs. The Pins with the highest score are then passed to the next step of the funnel. [162]

214. As another example, Pinterest describes how ranking models, like Pinnability, rely on Pinterest's "unique data set [that] contains abundant human-curated content, so that Pin, board, and user dynamics provide informative features for accurate Pinnability prediction." For example, as described below, Pin features capture the intrinsic quality of a Pin, "such as historical popularity, Pin freshness and likelihood of spam.

[162] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

> Our unique data set contains abundant human-curated content, so that Pin, board and user dynamics provide informative features for accurate Pinnability prediction. These features fall into three general categories: Pin features, Pinner features and interaction features:
>
> - Pin features capture the intrinsic quality of a Pin, such as historical popularity, Pin freshness and likelihood of spam. Visual features from Convolutional Neural Networks (CNN) are also included.

215. As yet another example, Pinterest describes how ranking models, like Pinnability, use candidate lists generated by, for example, Pixie, to populate Pins on a user's Homefeed.[163] Thus the Homefeed recommendations generated by ranking models are based on at least some of the Pin popularity considered at candidate generation.

216. And as another example, Pinterest describes how lightweight ranking models are used after candidate Pins are generated. This lightweight ranking model therefore is based on at least some of the Pin popularity considered at candidate generation.[164]

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[163] *Id.*

[164] Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

Impact to the user: improved quality of recommendations

On the user side, lightweight ranking allows us to fetch more relevant and personalized recommendations earlier on in the funnel. Below is one such example of this.

Figure 4. Comparing recommendations from old heuristic-based sorting versus those with lightweight ranking.

217. Based on the generating of the playlist, Pinterest's Pin Recommendation System automatically sends, by the computer system, to a client device of the first viewer, an instruction that causes the client device to perform an operation for an item of the items included in the playlist.

218. For example, Pinterest generates a "playlist" of Pins to the user with software instructions to cause the Mobile Application or Pinterest website or application to display the Pins on the user's mobile phone or desktop computer.[165]

[165] Pinterest Help Center, "Add a Pinterest widget," https://help.pinterest.com/en/article/add-a-pinterest-widget, (last accessed on February 17, 2025) ("Pinterest . . . allow[s] you to see your favorite Pins at a glance your device's home screen."); *see also*, Pinterest Engineering, "Improving the Quality of Recommended Pins with Lightweight Ranking," Medium, September 10, 2020, https://medium.com/pinterest-engineering/improving-the-quality-of-recommended-pins-with-lightweight-ranking-8ff5477b20e3, (last accessed February 11, 2025).

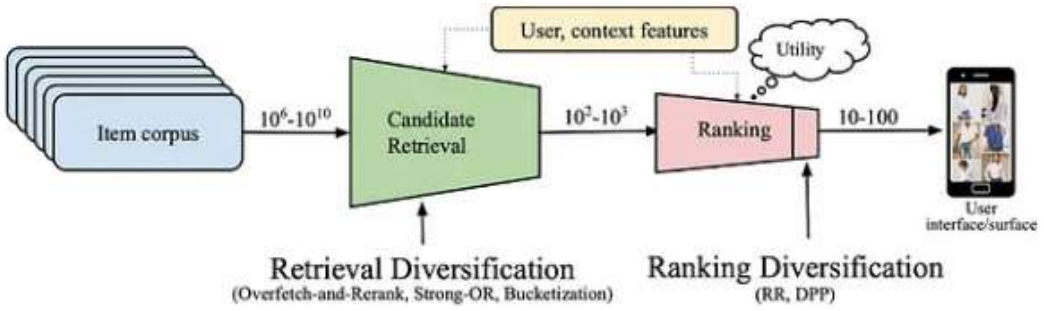


Fig. 2. Large-scale recommender systems can broadly be categorized into two stages going from an item corpus to recommendations: retrieval and ranking.

219. In addition, after retrieving and ranking content, Pinterest describes how video Pins play when at least 50% of the video Pin is in view.[166]

220. Pinterest's Pin Recommendation System thus includes each and every limitation of at least claim 1 of the '817 patent; accordingly, Pinterest literally infringes this claim.

221. During discovery and development of its infringement contentions, Plaintiff may provide additional theories under which Pinterest infringes the '817 patent besides the examples provided above, including for the same system and using the same components identified above, and nothing in the example above is meant to limit the infringement allegations of Plaintiff or limit the interpretations of the claims or their terms.

222. Upon information and belief, since at least the above-mentioned date when Pinterest was on notice of its infringement, Pinterest has actively induced, under U.S.C. § 271(b), third-party manufacturers, distributors, importers and/or consumers that purchase, sell, or use the accused Pin Recommendation System that includes all of the limitations of one or more claims of

[166] Pinterest, Help Center, General, https://help.pinterest.com/en/article/video-on-pinterest (last accessed February 11, 2025); *see also* Pinterest Business, "Video ads", https://help.pinterest.com/en/business/article/promoted-video-with-autoplay, (last accessed February 11, 2025).

the ’817 patent by making, having made, using, offering for sale, selling, and/or importing the accused Pin Recommendation System. Since at least the notice provided on the above-mentioned date, Pinterest has been and continues to encourage the induced acts with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the ’817 patent. Upon information and belief, Pinterest intends to cause, and has taken affirmative steps to induce, infringement by these third-party manufacturers, distributors, importers, and/or consumers by, *inter alia*, creating advertisements that promote the infringing use of the accused Pin Recommendation System, creating established distribution channels for the Pinterest mobile and web-based client into and within the United States knowing that the use of such clients results in use of the accused Pin Recommendation System, distributing or making available instructions or manuals for its mobile and web-based client to users, and/or providing technical support or services for its mobile and web-based clients in the United States. For example, Pinterest makes the use of its Pin Recommendation System accessible through its client application in the form of its Mobile Application or website. Pinterest publishes the Mobile Application on the Apple App Store at https://apps.apple.com/us/app/pinterest/id429047995 and Android Store here: https://play.google.com/store/apps/details?id=com.pinterest&hl=en_US&pli=1, and advertises the Mobile Application on the Website here: https://help.pinterest.com/en/article/use-pinterest-in-a-mobile-browser. As described above, Pinterest continues to advertise its mobile and web-based client as well as the accused Pin Recommendation System and publish specifications and promotional literature regarding the accused Pin Recommendation System and encouraging users to operate the Pinterest client necessarily resulting in the use of the accused Pin Recommendation System, knowing that the operation of the Pin Recommendation System infringes the ’817 patent since at least July 30, 2024.

223. Users, pursuant to Pinterest's instructions, each directly infringe the '817 patent by, for example, using the accused Pin Recommendation System. Further, Pinterest encourages, facilitates or otherwise causes its users to infringe the '817 patent by providing and causing access to video content using Pinterest services, products, and/or features. Therefore, Pinterest is also inducing the direct infringement of the '817 patent by users of Pinterest's services, products, and/or features.

224. Pinterest also contributes to infringement of the '817 patent in violation of 35 U.S.C. § 271(c). Pinterest contributes to infringement of the '817 patent by making, using, selling, offering to sell and/or importing software components incorporated with third-party content to facilitate the recommendation and delivery of content in user's home feed with knowledge that use of that software would infringe the '817 patent. For example, the components of Pinterest's Pin Recommendation System constitute a material part of the invention claimed by the '817 patent at least because they work in conjunction with third-party products or services, and they are specifically made to operate in a manner that infringes the '817 patent by providing the recommendation and delivery of content in user's home feed using, for example, its web-based application at www.pinterest.com, its mobile application, and back-end platforms designed with Pinterest's Pin Recommendation System. The accused software components are separable from Pinterest's products and are not staple articles or commodities of commerce suitable for substantial non-infringing use because they necessarily operate in a manner that infringes the '817 patent. Moreover, Pinterest publishes or has published information about infringing aspects of its web-based application at www.pinterest.com, its mobile application and back-end platforms designed with Pinterest's Pin Recommendation System that are practiced using the software components that Pinterest provides. As stated above, Pinterest knew of the '817 patent and knew that its actions

would lead to infringement of that patent. Therefore, Pinterest is also contributing to the direct infringement of the ’817 patent by users of Pinterest’s services, products, and/or features.

225. Pinterest’s infringement has been and continues to be willful because, as explained above in ¶¶ 184-220 (incorporated herein by reference) Pinterest continued to practice each limitation of at least Claim 1 of the ’817 patent even after obtaining knowledge of the ’817 patent by at least July 30, 2024.

226. Pinterest’s infringement has caused and continues to cause damage to OpenTV, and OpenTV is entitled to recover damages sustained as a result of Pinterest’s wrongful acts in an amount subject to proof at trial.

227. OpenTV has suffered and continues to suffer damages and irreparable harm as a result of Pinterest’s past and ongoing infringement in an amount to be determined at trial.

228. Unless Pinterest’s infringement is enjoined, OpenTV will continue to be damaged and irreparably harmed.

229. OpenTV meets the criteria for, and is entitled to, a permanent injunction.

COUNT III: INFRINGMENT OF U.S. PATENT NO. 7,669,212

230. The allegations of paragraphs 1-230 of this Complaint are repeated, re-alleged, and incorporated by reference as if fully set forth herein.

231. OpenTV is the owner of all rights, title, and interest in and to the ’212 patent.

232. Pursuant to 35 U.S.C § 282, the ’212 patent is presumed valid and enforceable.

233. Pinterest has had knowledge of the ’212 patent and its infringement since at least March 15, 2023, when Plaintiff presented the ’212 patent to Pinterest.

234. Pinterest has had actual notice of its infringement of the ’212 patent under 35 U.S.C. § 287(a) since at least March 15, 2023.

235. Pinterest has infringed, either literally or under the doctrine of equivalents, and is currently infringing, the ’212 patent in violation of 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing in or into the United States without authority products, software, and/or services, including through the operation of its web-based application at www.pinterest.com, through the operation of its mobile application and/or through its content delivery methods for the same.

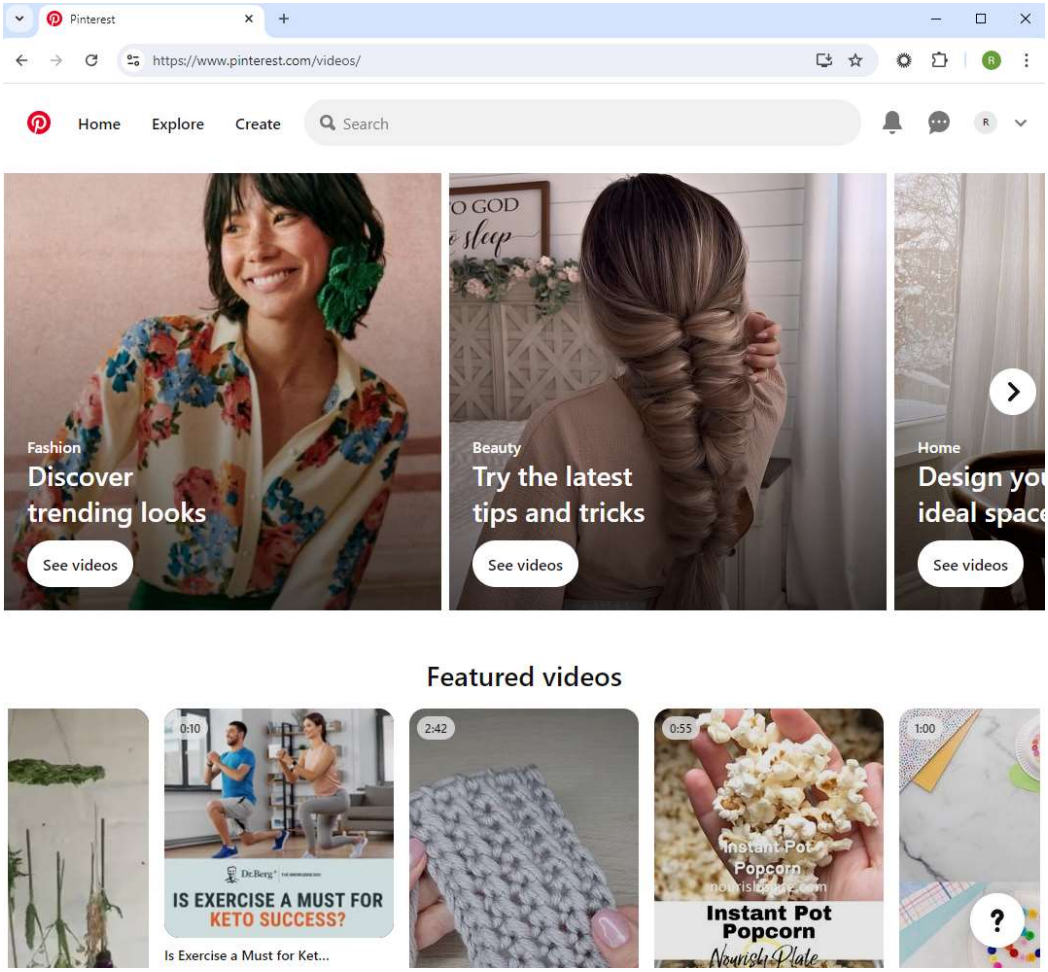
236. Pinterest infringes at least claim 44 of the ’212 patent because, for example, Pinterest’s Advertisement Recommendation Technologies as described at ¶¶ 68-87 satisfies each of the claim limitations either literally or under the doctrine of equivalents.

237. Claim 44 of the ’212 patent recites:

> A service platform for use in an interactive television system, the service platform comprising:
> an advertising manager; and
> a delivery manager;
> wherein the advertising manager is configured to:
> access a campaign rule, wherein the campaign rule specifies which one or more advertisements of a plurality of advertisements are to be delivered to a target, said target comprising at least one client device;
> based on the campaign rule, select one or more advertisements for delivery to the target;
> send the selected one or more advertisements to the delivery manager for delivery to the client device;
> apply one or more rules to a client device user response to the selected one or more advertisements to predict further user interests;
> generate a new campaign rule based on the predicted further user interests;
> based on the new campaign rule, select a new advertisement to be delivered to the target; and
> trigger the delivery manager to include the new advertisement in the one or more advertisements for delivery to the target.

238. Based on the publicly available evidence cited below in ¶¶ 240-266, it is plausible that Pinterest's Advertisement Recommendation Technologies infringes each of the limitations of at least claim 44 of at least the '212 patent.

239. Pinterest is a service platform. Pinterest delivers video program streams, text and graphic images, web pages and other types of information on its platform.[167]



240. Pinterest has an advertising manager.

[167] Pinterest, Pinterest Video, https://www.pinterest.com/ideas/pinterest-video/928397394202/, (last accessed February 11, 2025).

241. For example, Pinterest's Website informs users that Pinterest offers an "Ads Manager" service:[168]

> Ads Manager is where you create, manage and report on your Pinterest campaigns. Think of it as your Pinterest advertising hub: a one-stop shop to set up campaigns, track results and improve your performance over time.

242. Pinterest has a delivery manager.

243. For example, Pinterest's Website informs users that Pinterest offers "Ad Delivery" technology:[169]

[168] Pinterest, Ads Manager, https://business.pinterest.com/getting-started-in-ads-manager/, (last accessed February 11, 2025).
[169] Pinterest, Ads Manager, https://business.pinterest.com/getting-started-in-ads-manager/, (last accessed February 11, 2025).

Ad delivery

Our ad auction allows us to provide value to both Pinners and advertising partners by serving the highest quality ads at the most relevant moments and optimizing business outcomes for our advertising partners.

For each available ad impression, our auction system selects the best ad for that position, based on the likelihood of a desired action occurring and how much that action is worth to you. The likelihood of the action occurring depends on factors like landing page quality and targeting relevance. Your bid tells us what you'd pay for the action you choose to optimize for.

You pay only what's needed to beat the next best ad in the auction. In some cases, you may pay less than your bid. However, setting bids that are too low may restrict the delivery of your ad. To learn more about setting bids, read this article.

244. Pinterest describes how its ad delivery system consists of several different systems, each with its own responsibilities (candidate generation, trimming, scoring, bid/budget management, indexing, content safety filtering, etc.).[170]

245. Pinterest's advertising manager is configured to access a campaign rule.

246. For example, Pinterest describes how every ad campaign has three levels: Campaign, ad group, and ad. Campaigns encompass ad groups, and each ad group contains a collection of ads.[171]

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[170] Pinterest Engineering, "Debugging Ad Delivery At Pinterest," June 24, 2024, https://medium.com/pinterest-engineering/debugging-ad-delivery-at-pinterest-8b7b1f562afc, (last accessed February 11, 2025).

[171] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/campaign-structure (last accessed February 11, 2025).

Every ad campaign has three levels: Campaign, ad group, and ad. Campaigns house ad groups, and each ad group contains a collection of ads.

Campaigns

Campaigns are the highest level of the campaign hierarchy. At the campaign level, you can select a campaign objective and set an optional campaign spend limit. If you're running a campaign with the consideration objective, you can also set your budget at the campaign level. Each campaign can contain more than one ad group.

Add device targeting in Ads Manager

1. Log in to your Pinterest business account
2. Click ☰ at the top-left of the page
3. Under **Create**, click **Create campaign**
4. Click **Manual Campaign**, then **Get Started**
5. Click **New ad group** from the left-side navigation
6. Click **Targeting** from the left-side navigation and choose a targeting strategy
7. Select your **Budget & schedule**, **Optimization and delivery** and **Ads**
8. Review your information
9. Click **Publish**

247. Accordingly, Pinterest's advertising manager practices this limitation of the '212 patent by being configured to access campaign rules set by end users.

248. As part of Pinterest's Advertisement Recommendation Technologies, the campaign rule specifies which one or more advertisements of a plurality of advertisements are to be delivered to a target.

249. For example, Pinterest allows ads to be targeted based on interests and keywords associated with a brand or product.[172] Additional ad targeting through Pinterest's platform is possible based on gender, location, and languages.[173]

250. At the Ad group level, Pinterest allows a user to choose where their ads will show on Pinterest and set the budget, bid, run dates, and targeting for all the ads housed within them.[174] Pinterest describes how Ad groups let a user target audiences that may be a part of a single campaign. They also allow a user to test the performance of various targeting and objective strategies without creating multiple campaigns.[175]

251. Pinterest also provides advertisers with the option of setting up a "collections ad."[176] A collections ad is described as an ad format with a combination of "one large, hero asset followed by three smaller, secondary assets. The main asset is known as the hero creative and the smaller, secondary assets are known as the secondary creatives. Once someone taps into a collections ad, they'll be taken to a fullscreen experience where they can see the hero creative up close and up to 24 secondary creatives."[177] An engagement audience can be selected from people

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[172] Ana Gotter, "Pinterest Ads: A Guide to Everything You Need to Know to Get Started," Ad Espresso, August 14, 2019, https://adespresso.com/blog/pinterest-ads-guide/ (last accessed February 11, 2025).
[173] *Id.*
[174] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/campaign-structure (last accessed February 11, 2025).
[175] *Id.*
[176] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/collections-ads-on-pinterest, (last accessed February 11, 2025).
[177] *Id.*

who have performed any engagement action (including Pin clicks, outbound clicks, saves, comments, and video views) or optimized engagement actions based on high intention actions such as saves and outbound clicks.[178]

252. As part of Pinterest's Advertisement Recommendation Technologies, the target comprises at least one client device.

253. For example, Pinterest identifies that Android and iPhone mobile devices, iPads, laptops, and desktops are all available for ad targeting.[179] Additionally, Pinterest allows advertisers to target their "ad to people on one or multiple different devices."[180]

[178] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/audience-targeting, (last accessed February 11, 2025).
[179] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/set-up-device-targeting (last accessed February 11, 2025).
[180] *Id.*

Devices available for targeting

- **Android Mobile:** People browsing Pinterest using the app on an Android mobile device.
- **Android Tablet:** People browsing Pinterest using the app on an Android tablet device.
- **iPad:** People browsing Pinterest using the app on an iPad tablet device.
- **iPhone:** People browsing Pinterest using the app on an iPhone mobile device.
- **Web:** People browsing the internet using a desktop or laptop device.
- **Mobile Web:** People browsing the internet using a mobile device, but not using the Pinterest app.

Device targeting helps you get your ad in front of people using specific devices to browse Pinterest. You can choose to target your ad to people on one or multiple different devices.

254. Pinterest's advertising manager is configured to, based on the campaign rule, select one or more advertisements for delivery to the target.

255. For example, Pinterest promotes its ability to optimize and deliver ads to run more efficient campaigns and get the most out of an advertisers' budget.[181]

[181] Pinterest, "How to use Pinterest Ads Manager," https://business.pinterest.com/getting-started-in-ads-manager/ (last accessed February 11, 2025).

Optimize and deliver

In this final step before you launch your campaign, you can turn on extra optimizations to make sure you're getting the best results. These optimizations help you run more efficient campaigns and get the most out of your budget. As you navigate through these final decisions, Ads Manager includes tips to help you choose the best fit for your campaign.

256. Pinterest further describes how for each available ad impression, its auction system "selects the best ad for that position, based on the likelihood of a desired action occurring and how much that action is worth to you. The likelihood of the action occurring depends on factors like landing page quality and targeting relevance."[182] Pinterest goes on to state that "[y]our bid tells us what you'd pay for the action you choose to optimize for."[183]

257. Pinterest's advertising manager is configured to send the selected one or more advertisements to the delivery manager for delivery to the client device.

258. For example, Pinterest describes its ads delivery funnel as a process involving candidate generation, blending and filtering, ranking, auction and allocation, and finally inserted into a user's home feed.[184]

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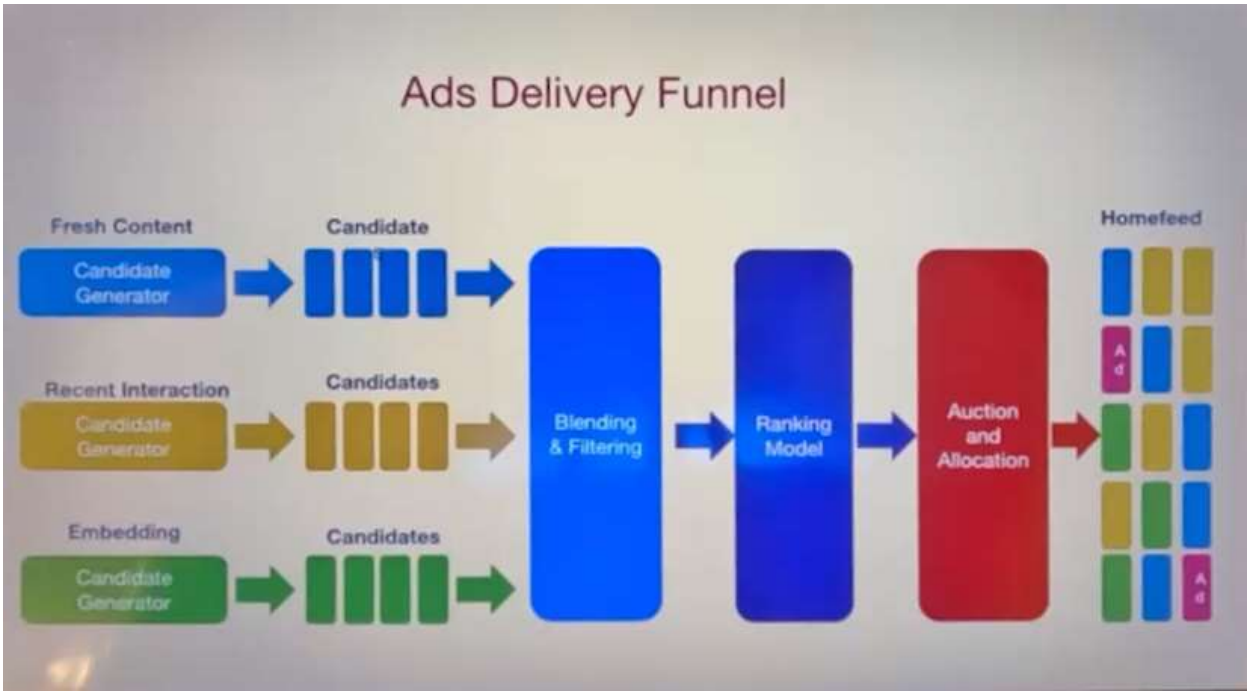
[182] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/ad-delivery (last accessed February 11, 2025).
[183] *Id*.
[184] InfoQ, "Unpacking How Ads Ranking Works @Pinterest," https://www.infoq.com/presentations/pinterest-ads/ at 13:04 (last accessed February 11, 2025).



259. Pinterest informs its advertisers that "[o]nce [an ad is] approved, we'll start distributing your ad."[185]

Ad review process

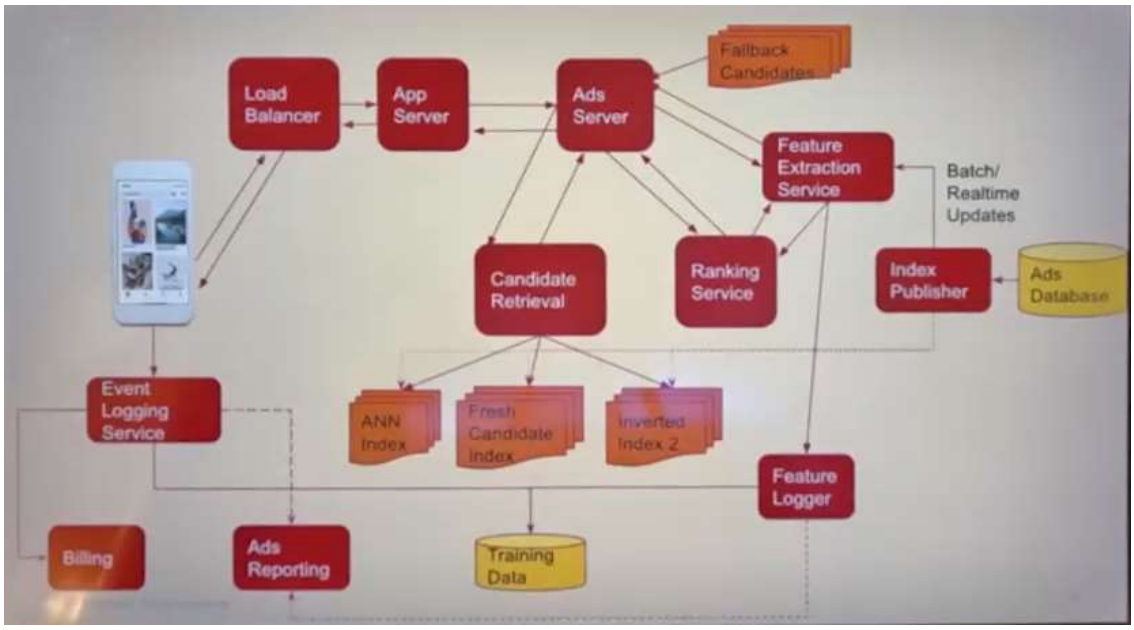
Once you launch your campaign, we'll review it to make sure it follows our Advertising guidelines. The campaign review process can take up to 24 hours.

If your campaign targeting goes against our advertising guidelines, we'll send you a notification in Ads Manager letting you know what needs to change so that your ad can be reviewed again for approval. Once approved, we'll start distributing your ad.

[185] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/device-targeting, (last accessed February 11, 2025).

260. Pinterest's advertising manager is configured to apply one or more rules to a client device user response to the selected one or more advertisements to predict further user interests and generate a new campaign rule based on the predicted further user interests.

261. For example, once an ad is delivered, Pinterest describes how its advertisement delivery service logs a user's response to an ad.[186]



262. Pinterest has described how as the user interacts with their feed, there is an event logging service, which uses a Kafka platform to log all of the events in real-time. Pinterest engineers describe how "[p]ersonalized recommendation is critical in the ads recommendation system because it can better capture users' interests, connect the users with the compelling products, and keep them engaged with the platform. To make the ads Click-through rate (CTR) predictions more personalized, [Pinterest's] team has adopted users' real time behavior histories and applied deep learning algorithms to recommend appropriate ads to users." "To deliver a personalized and enjoyable ad experience for its users, the Engagement Modeling team built deep

[186] *Id.*

neural network (DNN) models to continuously learn and adapt to user feedback and behavior, ensuring that the ads shown are highly targeted and valuable to the user."[187]

> Pinterest strives to deliver high-quality ads and maintain a positive user experience. The platform aims to show ads that align with the user's interests and intentions, while also providing them with inspiration and discovery. The Ads Engagement Modeling team at Pinterest plays a crucial role in delivering effective advertising campaigns and helping businesses reach their target audience in a meaningful way. The goal of the engagement modeling is to show users the most relevant and engaging ads based on their interests and preferences. To deliver a personalized and enjoyable ad experience for its users, the Engagement Modeling team built deep neural network (DNN) models to continuously learn and adapt to user feedback and behavior, ensuring that the ads shown are highly targeted and valuable to the user.
>
> Personalized recommendation is critical in the ads recommendation system because it can better capture users' interests, connect the users with the compelling products, and keep them engaged with the platform. To make the ads Click-through rate (CTR) predictions more personalized, our team has adopted users' real time behavior histories and applied deep learning algorithms to recommend appropriate ads to users.

263. Pinterest also describes how users may set up collections ads whereby an ad format using one large hero asset followed by smaller secondary assets may be used.[188] Pinterest describes how "[o]nce someone taps into a collections ad, they'll be taken to a fullscreen experience where they can see the hero creative up close and up to 24 secondary creatives."[189] "When using the

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[187] Pinterest Engineering, "User Action Sequence Modeling for Pinterest Ads Engagement Modeling," Medium, https://medium.com/pinterest-engineering/user-action-sequence-modeling-for-pinterest-ads-engagement-modeling-21139cab8f4e, Mar. 5, 2024, (last accessed February 11, 2025).
[188] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/collections-ads-on-pinterest, (last accessed February 11, 2025).
[189] *Id*.

collections ad format under the catalog sales objective, secondary creatives are selected and organized based on relevance to the person viewing the collections ad."[190]

264. Pinterest's advertising manager is configured to, based on the new campaign rule, select a new advertisement to be delivered to the target and trigger the delivery manager to include the new advertisement in the one or more advertisements for delivery to the target.

265. Pinterest describes how its ads delivery funnel begins by extracting features for a particular user, for example, the gender, location, and/or how the particular user has interacted in the past.[191] The next step is candidate retrieval where the system tries to find the best set of candidates that it can show to the user, followed by a ranking system.[192]

266. Pinterest documentation further describes how advertisers can set up "dynamic retargeting" technology, helping advertisers reach people on Pinterest who have already visited an advertiser's site or who have items sitting in their shopping cart.[193] Pinterest instructs users on how to set up dynamic retargeting campaign through the Ads Manager.[194]

> Dynamic retargeting helps you reach people on Pinterest who have already visited your site or who have items sitting in their shopping cart. You can retarget exact or similar products to those they engaged with while they browse on Pinterest.

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[190] *Id*.
[191] *Id.*
[192] *Id*.
[193] Pinterest, Help Center, https://help.pinterest.com/en/business/article/set-up-dynamic-retargeting (last accessed February 11, 2025).
[194] *Id.*

267. Pinterest further explains how automated campaigns "automate the ad campaign creation process by combining an advertiser's goals with Pinterest best practice recommendations to help you deliver results with less manual work."[195]

268. Pinterest's advertising manager thus includes each and every limitation of at least claim 44 of the '212 patent; accordingly, Pinterest literally infringes this claim.

269. Upon information and belief, since at least the above-mentioned date when Pinterest was on notice of its infringement, Pinterest has actively induced, under U.S.C. § 271(b), third-party manufacturers, distributors, importers and/or consumers that purchase or sell, or use the Advertisement Recommendation Technologies that includes all of the limitations of one or more claims of the '212 patent by making, having made, using, offering for sale, selling, and/or importing the Advertisement Recommendation Technologies. Since at least the notice provided on the above-mentioned date, Pinterest has been and continues to encourage the induced acts with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the '212 patent. Upon information and belief, Pinterest intends to cause, and has taken affirmative steps to induce, infringement by these third-party manufacturers, distributors, importers, and/or consumers by, *inter alia*, creating advertisements that promote the infringing use of the accused advertising manager, creating established distribution channels for the Pinterest mobile and/or web-based client into and within the United States knowing that the use of such clients results in the use of the Advertisement Recommendation Technologies, distributing or making available instructions or manuals for its mobile and/or web-based client (and the advertising capabilities of the Pinterest Advertisement Recommendation Technologies) to users, and/or providing technical

[195] Pinterest, Help Center, Business, https://help.pinterest.com/en/business/article/automated-campaigns, (last accessed February 11, 2025).

support or services for its mobile and/or web-based clients in the United States. For example, Pinterest makes the use of its Advertisement Recommendation Technologies accessible through its client application in the form of its Mobile Application or website. Pinterest publishes the Mobile Application on the Apple App Store at https://apps.apple.com/us/app/pinterest/id429047995 and Android Store here: https://play.google.com/store/apps/details?id=com.pinterest&hl=en_US&pli=1, and advertises the Mobile Application on the Website here: https://help.pinterest.com/en/article/use-pinterest-in-a-mobile-browser. As described above, Pinterest continues to advertise its mobile and web-based client as well as the Advertisement Recommendation Technologies and publish specifications and promotional literature regarding the Advertisement Recommendation Technologies encouraging users to operate the Pinterest client necessarily resulting in the use of the accused Advertisement Recommendation Technologies, knowing that the operation of the Advertisement Recommendation Technologies infringes the '212 patent since at least March 15, 2023.

270. For example, Pinterest provides advertisers with instructions on how to set up advertising campaigns using Pinterest' infringing advertising campaign methods and technology. Pinterest encourages users to set up a new ad account:[196]

[196] Pinterest Help Center, "Create and advertiser account," https://help.pinterest.com/en/business/article/pinterest-product-specs, (last accessed on February 17, 2025).

Set up a new ad account

Web Android iOS

1. Log in to your Pinterest business account
2. Click the ☰ at the top-left of the page
3. Under **Business**, select **Business Manager**
4. Click **Ad accounts** in the left hand menu
5. Click the **Create ad account** button
6. Enter an **Ad account name**, select your **Country**, then click **Create**
7. Click **Assign people** to add people to your new ad account or **Maybe later** to close the window.

271. Additionally, Pinterest encourages its advertisers to establish certain campaign rules[197]:

For each ad group you create on Pinterest, you can target your ads to reach people who are interested in your products and ideas. You can combine targeting criteria to create an audience as narrow or as broad as you like. To see the predicted number of people you may be able to reach with your selected targeting, look at the "Potential audience size" bar at the right-side of your screen.

[197] Pinterest Help Center, "Review and select targeting options," https://help.pinterest.com/en/business/article/targeting-overview, (last accessed on February 17, 2025).

272. Users, pursuant to Pinterest's instructions, each directly infringe the '212 patent by, for example, using the Advertisement Recommendation Technologies. Further, Pinterest encourages and facilitates its users to infringe the '212 patent by instructing users on how to use Pinterest services, products, and/or features to set up, configure, and maintain advertising campaigns. Therefore, Pinterest is also inducing the direct infringement of the '212 patent by users of Pinterest's services, products, and/or features.

273. Pinterest also contributes to infringement of the '212 patent in violation of 35 U.S.C. § 271(c). Pinterest contributes to infringement of the '212 patent by making, using, selling, offering to sell and/or importing software components incorporated with third-party content to facilitate the setup, configuration, and maintenance of advertising campaigns with knowledge that use of that software would infringe the '212 patent. The accused software components constitute a material part of the invention claimed by the '212 patent at least because they work in conjunction with third-party products or services, and they are specifically made to operate in a manner that infringes the '212 patent by allowing advertisers to set up, configure, and maintain advertising campaigns using, for example, its web-based application at www.pinterest.com, its mobile application, and back-end platforms designed with Pinterest's Advertisement Recommendation Technologies. The accused software components are separable from Pinterest's products and are not staple articles or commodities of commerce suitable for substantial non-infringing use because they necessarily operate in a manner that infringes the '212 patent. Moreover, Pinterest publishes or has published information about infringing aspects of its web-based application at www.pinterest.com, its mobile application and back-end platforms designed with Pinterest's Advertisement Recommendation Technologies that are practiced using the software components that Pinterest provides. As stated above, Pinterest knew of the '212 patent and knew that its actions would lead to infringement of

that patent. Therefore, Pinterest is also contributing to the direct infringement of the ’212 patent by users of Pinterest’s services, products, and/or features.

274. Pinterest’s infringement has been and continues to be willful because, as explained above in ¶¶ 240-268 (incorporated herein by reference), Pinterest continued to practice each limitation of at least Claim 44 of the ’212 patent even after obtaining knowledge of the ’212 patent by at least March 15, 2023.

275. Pinterest’s infringement has caused and continues to cause damage to OpenTV, and OpenTV is entitled to recover damages sustained as a result of Pinterest’s wrongful acts in an amount subject to proof at trial.

276. OpenTV has suffered and continues to suffer damages and irreparable harm as a result of Pinterest’s past and ongoing infringement in an amount to be determined at trial.

277. Unless Pinterest’s infringement is enjoined, OpenTV will continue to be damaged and irreparably harmed.

278. OpenTV meets the criteria for, and is entitled to, a permanent injunction.

COUNT IV: INFRINGMENT OF U.S. PATENT NO. 7,055,169

279. The allegations of paragraphs 1-277 of this Complaint are repeated, re-alleged, and incorporated by reference as if fully set forth herein.

280. OpenTV is the owner of all rights, title, and interest in and to the ’169 patent.

281. Pursuant to 35 U.S.C § 282, the ’169 patent is presumed valid and enforceable.

282. Pinterest has had the knowledge of the ’169 patent and its infringement since at least May 2021, when Plaintiff presented a claim chart of the ’169 patent to Pinterest.

283. Pinterest has had actual notice of its infringement of the ’169 patent under 35 U.S.C. § 287(a) since at least May of 2021.

284. Pinterest has infringed, either literally or under the doctrine of equivalents, and is currently infringing, the ’169 patent in violation of 35 U.S.C. § 271(a) by making, using, offering for sale, selling, and/or importing in or into the United States without authority products, software, and/or services, including through the operation of its web-based application at www.pinterest.com, through the operation of its mobile application and/or through its content delivery methods for the same.

285. Pinterest has infringed at least claim 1 of the ’169 patent because, for example, Pinterest’s use of adaptive bitrate streaming as described at ¶¶ 44-47 satisfies each of the claim limitations either literally or under the doctrine of equivalents.

286. Claim 1 of the ’169 patent recites:

1. A method comprising:

receiving one or more directives, wherein said directives are indicative of an audio, video and/or graphic presentation which requires a set of resources;

determining whether said one or more directives includes a prerequisite directive which indicates that acciuisition (sic) of a subset of said set of resources is a prerequisite for initiating the presentation;

initiating said presentation, in response to determining the one or more directives do not include said prerequisite directive; and

prohibiting initiation of said presentation until said subset of resources are acquired, in response to determining the one or more directives include said prerequisite directive.

287. Based on the publicly available evidence cited below in ¶¶ 285-300, it is plausible that Pinterest’s mobile and/or web-based client infringes each of the limitations of at least claim 1 of the ’169 patent.

288. Pinterest performs a method for video, audio and/or image presentation.

289. Pinterest built its native video platform in or around 2016.[198] Pinterest describes that it optimized "video streams for multiple scenarios by using Adaptive Bitrate Streaming."[199] Pinterest further describes how it uses both HTTP Live Streaming (HLS) and Dynamic Adaptive Streaming over HTTP (MPEG-DASH).[200] Pinterest indicates that MPEG-DASH is supported by its Android mobile application through Android's ExoPlayer.[201]

290. The Pinterest platform, including but not limited to the Pinterest client for Windows and Android receives one or more directives, wherein said directives are indicative of an audio, video and/or graphic presentation which requires a set of resources.

291. For example, when using HLS, the Pinterest client receives a set of directives specified in a ".m3u8" file associated with a particular video pin. The ".m3u8" file for a particular video Pin includes directives distinguished by the different bit rates (bandwidth) in accordance with the HTTP Live Streaming (HLS) protocol. Specifically, in HLS, directives are identified by the tag EXT-XSTREAM-INF within the ".m3u8" manifest file. Alternative segments each defined by an EXT-XSTREAM-INF have a set of resources required, including bandwidth.

292. For example, when using MPEG-DASH, the Pinterest client receives a set of directives specified in a Media Presentation Description (MPD) file associated with a particular video pin. *See* ISO/IEC 23009-1:2019(E), § 5.2. Specifically, in MPEG-DASH, directives are at least identified at least by the Representation element. See ISO/IEC 23009-1:2019(E), § 5.3.5.2.

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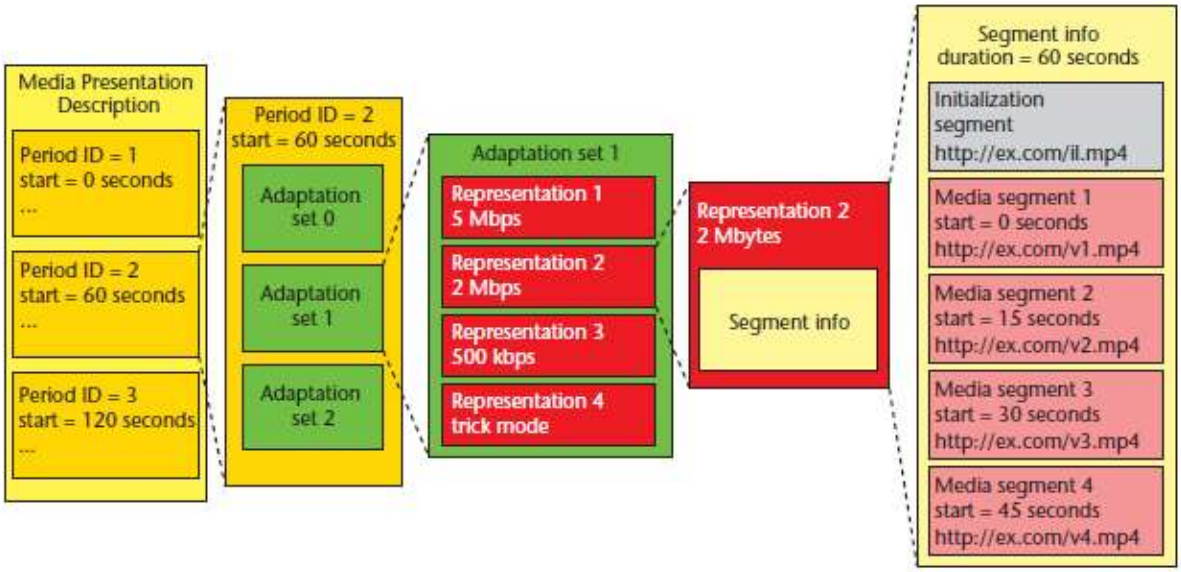
[198] *Id*.
[199] Pinterest Engineering, "Building Pinterest's video platform," Medium, https://medium.com/pinterest-engineering/building-pinterests-video-platform-2338dd1d213#id_token=eyJhbGciOiJSUzI1NiIsImtpZCI6IjMzZmY1YWYx%E2%80%A6, Jan. 27, 2017 (last accessed February 11, 2025).
[200] Pinterest Engineering, "Optimizing video playback performance," Medium, https://medium.com/pinterest-engineering/optimizing-video-playback-performance-caf55ce310d1 (last accessed November 26, 2024)
[201] *Id*.

Alternative segments identified by different Representations have a set of resources required, including bandwidth.



Iraj Sodagar, "The MPEG-DASH Standard for Multimedia Streaming Over the Internet", IEEE MultiMedia 2011.

293. The Pinterest platform, including, but not limited to, the Pinterest client for Windows and Android determines whether said one or more directives includes a prerequisite directive which indicates that acquisition of a subset of said set of resources is a prerequisite for initiating the presentation.

294. For example, the Pinterest client determines the user's bandwidth and adapts the streaming quality to use the stream or segment with the highest bitrate possible.

295. In the context of HLS, the Pinterest client determines whether one or more of the directives (as defined by the EXT-X-STREAM-INF class) includes a prerequisite directive (e.g., a bandwidth constraint).

296. In the context of MPEG-DASH, the Pinterest client determines whether one or more of the directives (as defined by the Representation element) includes a prerequisite directive (e.g., a bandwidth constraint).

297. The Pinterest platform, including, but not limited to, the Pinterest client for Windows and Android initiates said presentation, in response to determining the one or more directives do not include said prerequisite directive.

298. For example, Pinterest has described that its platform uses a medium-quality stream for the first four seconds of playback instead of going with a high-quality one.[202] Higher quality segments are not available until the prerequisite bandwidth is available.

299. The Pinterest platform, including, but not limited to, the Pinterest client for Windows and Android prohibit initiation of said presentation until said subset of resources are acquired, in response to determining the one or more directives include said prerequisite directive.

300. Pinterest describes how higher quality segments for both HLS and MPEG-DASH are presented when, for example, bandwidth constraints are satisfied. For example, Pinterest explains how a source video file for a Pin is encoded "into multiple streams with different bitrate. Then those streams split into smaller segments with similar duration times (e.g., few seconds). The video player then seamlessly switches between the streams depending on the available bandwidth and other factors. This allows the video to still play (at a lower quality) when the signal is poor and jump to the higher quality stream when the signal strengthens."[203]

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[202] Pinterest Engineering, "Optimizing video playback performance," Medium, https://medium.com/pinterest-engineering/optimizing-video-playback-performance-caf55ce310d1 (last accessed February 11, 2025).
[203] *Id*.

301. The Pinterest platform thus includes each and every limitation of at least claim 1 of the ’169 patent; accordingly, Pinterest literally infringes this claim.

302. Upon information and belief, since at least the above-mentioned date when Pinterest was on notice of its infringement, Pinterest has actively induced, under U.S.C. § 271(b), third-party manufacturers, distributors, importers and/or consumers that purchase, sell, or use its mobile and/or web-based client that includes all of the limitations of one or more claims of the ’169 patent by making, having made, using, offering for sale, selling, and/or importing its mobile and/or web-based client. Since at least the notice provided on the above-mentioned date, Pinterest has been and continues to encourage the induced acts with knowledge, or with willful blindness of the fact, that the induced acts constitute infringement of the ’169 patent. Upon information and belief, Pinterest intends to cause, and has taken affirmative steps to induce, infringement by these third-party manufacturers, distributors, importers, and/or consumers by, *inter alia*, creating advertisements that promote the infringing use of its mobile and/or web-based client, creating established distribution channels for its mobile and/or web-based client into and within the United States knowing that the use of such clients results in the use of the accused adaptive bitrate streaming technology, designing the its mobile and/or web-based client in conformity with standard protocols such as HLS and MPEG-DASH, distributing or making available instructions or manuals for its mobile and/or web-based client (and the streaming capabilities of its mobile and/or web-based client) to users, and/or providing technical support or services for its mobile and/or web-based clients in the United States. For example, Pinterest makes the use of the accused adaptive bitrate streaming technology accessible through its client application in the form of its Mobile Application or website. Pinterest publishes the Mobile Application on the Apple App Store at https://apps.apple.com/us/app/pinterest/id429047995 and Android Store here:

https://play.google.com/store/apps/details?id=com.pinterest&hl=en_US&pli=1, and advertises the Mobile Application on the Website here: https://help.pinterest.com/en/article/use-pinterest-in-a-mobile-browser. As described above, Pinterest continues to advertise its mobile and/or web-based clients and publish specifications and promotional literature regarding its adaptive bitrate streaming technology encouraging users to operate the Pinterest client necessarily resulting in the use of the accused adaptive bitrate streaming technology, knowing that the use of the accused adaptive bitrate streaming technology infringes the '169 patent since at least May 2021.

303. For example, to support the creation and enablement of video Pins on the Pinterest platform, Pinterest provides online help to users for uploading video content and creating video Pins[204]:

Create a video Pin

1. Log in to your Pinterest account.
2. Click **Create** at the top-left of your screen.
   - If you have a business account, select ☰. Under **Create**, select **Create Pin.**
3. Click ⬆ to select a video from your computer (or drag and drop into the upload window).
   - You can select up to 10 videos. Each video will create a new Pin.
   - To combine multiple images and videos in one video Pin, create a Pin with the Pinterest app.

[204] Help Center, Pinterest, "Create a Pin from an image or video," https://help.pinterest.com/en/article/create-a-pin-from-an-image-or-video, (last accessed February 13, 2025).

304. Users, pursuant to Pinterest's instructions, each directly infringed the '169 patent by, for example, using the accused adaptive bitrate streaming technology. Further, Pinterest encouraged and facilitated its users to infringe the '169 patent by indicating that they could upload and access video content using Pinterest services, products, and/or features. Therefore, Pinterest also induced the direct infringement of the '169 patent by users of Pinterest's services, products, and/or features.

305. Pinterest also contributed to infringement of the '169 patent in violation of 35 U.S.C. § 271(c). Pinterest contributed to infringement of the '169 patent by making, using, selling, offering to sell and/or importing software components incorporated with third-party content to facilitate the download and streaming of content with knowledge that use of that software would infringe the '169 patent. The accused software components constitute a material part of the invention claimed by the '169 patent at least because they work in conjunction with third-party products or services, and they are specifically made to operate in a manner that infringes the '169 patent by allowing content to be downloaded and streamed using, for example, its web-based application at www.pinterest.com and its mobile application designed to facilitate streaming of video content. The accused software components are separable from Pinterest's products and are not staple articles or commodities of commerce suitable for substantial non-infringing use because they necessarily operate in a manner that infringes the '169 patent. Moreover, Pinterest publishes or has published information about infringing aspects of its web-based application at www.pinterest.com and its mobile application that are practiced using the software components that Pinterest provides. As stated above, Pinterest knew of the '169 patent and knew that its actions would lead to infringement of that patent. Therefore, Pinterest also contributed to the direct infringement of the '169 patent by users of Pinterest's services, products, and/or features.

306. Pinterest's infringement has been willful because, as explained above in ¶¶ 288-300 (incorporated herein by reference) Pinterest continued to practice each limitation of at least Claim 1 of the '169 patent even after obtaining knowledge of the '169 patent since at least May of 2021.

307. Pinterest's infringement has caused damage to OpenTV, and OpenTV is entitled to recover damages sustained as a result of Pinterest's wrongful acts in an amount subject to proof at trial.

308. OpenTV has suffered damages and irreparable harm as a result of Pinterest's past infringement in an amount to be determined at trial.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for the following relief:

A. A judgment that Pinterest has infringed one or more claims of the '817 Patent literally and/or under the doctrine of equivalents directly and/or indirectly by inducing infringement and/or by contributory infringement;

B. A judgment that Pinterest has infringed one or more claims of the '503 patent literally and/or under the doctrine of equivalents directly;

C. A judgment that Pinterest has infringed one or more claims of the '212 patent literally and/or under the doctrine of equivalents directly and/or indirectly by inducing infringement and/or by contributory infringement;

D. A judgment that Pinterest has infringed one or more claims of the '169 patent literally and/or under the doctrine of equivalents directly and/or indirectly by inducing infringement and/or by contributory infringement;

E. That for each Asserted Patent infringed by Pinterest, an award of monetary damages, including lost profits and/or a reasonable royalty pursuant to 35 U.S.C. § 284, including supplemental damages for any post-verdict infringement up until entry of the final judgment with an accounting as needed;

F. An order finding this an exceptional case under 35 U.S.C. § 285 and that Plaintiff be awarded its costs, disbursements, and reasonable attorneys' fees incurred in this action under 35 U.S.C. § 285 or any other applicable law;

G. An award of enhanced damages up to treble damages for willful infringement of the '212, '817, and '169 patents as provided by 35 U.S.C. § 284;

H. An award of prejudgment and post-judgment interest on Plaintiff's damages;

I. An order permanently enjoining Pinterest and its officers, agents, employees, and those acting in privity with them, from using, offering for sale, selling, or importing any product that infringes, or induces or contributes to the infringement of, the Asserted Patents;

J. That Plaintiff be granted their reasonable attorneys' fees in this action; under 35 U.S.C. § 285 and all other applicable statutes and rules in common law as may apply; and

K. That this Court award Plaintiff such other and further relief as the Court deems proper.

DEMAND FOR JURY TRIAL

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure and D. Del. LR 38.1, Plaintiff hereby demands a trial by jury for all issues so triable.

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Dated: February 18, 2025

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on February 18, 2025, a copy of the foregoing document was served on the counsel listed below in the manner indicated:

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