

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

THE NIELSEN COMPANY (US), LLC,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. 22-1345-CJB
	)	
TVISION INSIGHTS, INC.,	)	
	)	
Defendant.	)	

**DEFENDANT TVISION INSIGHTS, INC.'S
INITIAL INVALIDITY CONTENTIONS REGARDING THE '243 PATENT**

Pursuant to Paragraph 7(e) of the Scheduling Order (D.I. 17), defendant TVision Insights, Inc. ("TVision") provides the following disclosure of initial invalidity contentions and related invalidating references for U.S. Patent No. 11,470,243 ("the '243 patent"). Pursuant to the Scheduling Order, these initial invalidity contentions are made only as to the asserted claims: 4–6, 8, 11–14, 18–20.

TVision makes this disclosure based upon its present understanding of the '243 patent and the prior art. TVision's investigation regarding the '243 patent and potential grounds for invalidity is ongoing, and TVision reserves the right to supplement these Initial Invalidity Contentions with prior art not included in this disclosure that may become relevant to invalidity as discovery progresses, additional research is conducted, and/or prior art is discovered. TVision further reserves the right to supplement or modify these Initial Invalidity Contentions to revise, amend, and/or supplement its contentions and/or assert additional defenses under 35 U.S.C. §§ 101, 102, 103, 112 and/or 116, including in response to Plaintiffs' infringement theories, Plaintiffs' contentions, any findings as to the priority or invention date of the Asserted Claims, expert discovery, or otherwise pursuant to the Federal Rules of Civil Procedure, Local Rules, the Default

Standard, and/or Court Orders.

These contentions are not an admission that any asserted claim is infringed by any of TVision's products, that any particular feature or aspect of any of the accused products practices any limitations of the asserted claims, or that any of the constructions implicit in Nielsen's Initial Claim Charts is reasonable, supportable, or proper.

Under any reasonable construction of the terms in the asserted claims, the '243 patent cannot read upon TVision's accused products or technology. Nothing herein should be construed as setting forth or limiting TVision's claim construction positions. To the extent that any of the prior art discloses the same functionality or feature of any of the accused products, TVision reserves the right to argue that said feature or functionality does not meet any limitation of any of the asserted claims, and to argue, in the alternative, that if said feature or functionality is found to meet any limitation of the asserted claims of the '243 patent, then the prior art reference demonstrates that said limitation (and/or the claim as a whole) is not novel, and thus that the alleged invention is not patentable.

TVision reserves the right to rely on admitted prior art and admissions made during prosecution of the '243 patent, both alone and in combination with the disclosures contained in the prior art references disclosed herewith.

I. IDENTIFICATION OF PRIOR ART FOR THE '243 PATENT

Pursuant to the Court's Scheduling Order, TVision lists in Tables A.1 and A.2 the prior art now known to it and which it contends invalidates, alone or in combination, the asserted claims of the '243 patent. TVision reserves the right to rely on the earliest publication or priority dates to which each of the prior art references are entitled, including dates on which a claim of priority may be based for patent references that are any of a divisional, continuation, or continuation-in-part of an earlier filed patent application.

Table A.1 – Patent References

Abbreviation	Patent/Publication No.	Date Filed	Date Issued/Published
Lu-577	US 2002/0059577	July 19, 2001.	May 16, 2002
Nielsen-372	US 2010/0274372	July 7, 2010	Oct. 28, 2010
Steinberg	US 2010/0066822	Sept. 4, 2009	Mar. 18, 2010
Lu-000	U.S. Patent No. 4,858,000	Sept. 14, 1988	Aug. 15, 1989
Lert	U.S. Patent No. 4,677,466	July 29, 1985	Jun. 30, 1987

Table A.2 – Publications

Title, Publication Information	Published
Ying-li Tian, <i>Evaluation of Face Resolution for Expression Analysis</i> , 2004 Conference on Computer Vision and Pattern Recognition Workshop, Washington, DC, USA, 2004, pp. 82-82, doi: 10.1109/CVPR.2004.334 (“Tian”)	no later than July 2, 2004

II. STATUTORY BASES FOR INVALIDITY

The asserted claims of the ’243 patent are anticipated pursuant to 35 U.S.C. § 102 and also invalid as obvious pursuant to 35 U.S.C. § 103 in view of the references cited above. Pursuant to the Court’s Scheduling Order, and in view of Nielsen’s Initial Claim Charts, TVision attaches hereto, as Exhibits A.1-A.4, exemplary claim charts that identify how the prior art references anticipate and/or render obvious the asserted claims of the ’243 patent. References cited in Exhibits A.1-A.4 may disclose the limitations of claims either explicitly or inherently and may be relied upon to show the state of the art in the relevant timeframes. All of these references qualify as prior art to the ’243 patent under at least the following sections:

Reference	Prior Art Section
Lu-577	35 U.S.C. § 102 (b)
Nielsen-372	35 U.S.C. § 102 (b)

Steinberg	35 U.S.C. § 102 (b)
Tian	35 U.S.C. § 102 (b)
Lu-577	35 U.S.C. § 102 (b)
Lert	35 U.S.C. § 102 (b)

By way of further disclosure, references and combinations that anticipate and/or render obvious claims 4–6, 8, 11–14, 18–20 are as follows:

Claims 4–6, 8, 11–14, 18–20 are invalid as anticipated by Lu-577 and as obvious over Lu-577 (incorporating Lu-000) in view of Tian, as shown in the chart attached as Exhibits A.1 and A.3.

Lu-577 teaches a television audience measurement system that identifies a television program based on an audio signature. Lu-000, which Lu-577 incorporates by reference, captures and analyzes images to locate the heads or faces of audience members and extracts and compares pattern image signatures with stored signatures to identify the audience members. Tian similarly teaches techniques for image processing and facial analysis. A POSITA would have found it obvious to combine Lu-577 and Tian because they are similarly directed to image processing and facial analysis, and to use Tian’s techniques to improve Lu-577. Employing the solutions of Tian in Lu-577’s system would have been obvious because Lu-577 explicitly invites employing “known head location and face recognition software.” A POSITA would further have been motivated to apply Tian’s teaching because performing facial analysis on a sequence of images can improve the confidence level of person identification and allow the selective performance of face recognition on suitable images (e.g., where a person opens her eyes and faces the camera). A POSITA further would have found it obvious to apply Tian’s teaching to Lu-577’s system to perform facial analysis on reduced-resolution images. Doing so can reduce the time and resource consumption of tasks such as face detection and pose estimation, without substantially reducing the accuracy of these

tasks. A POSITA would have been motivated to perform certain facial analysis techniques (e.g., face detection, head pose estimation) on reduced-resolutions images, while other techniques (e.g., face recognition) on full-quality images. A POSITA would have found it obvious and been motivated to apply the teachings of Tian to Lu-577 because this is an application of known techniques (e.g., facial analysis techniques) to a known system (e.g., audience measurement system) and method ready for improvement. Doing so would have improved accuracy of face recognition and saved processing resources, and would have yielded predictable results at least because Tian provides experimental assessments of its techniques. The combination simply uses Tian's teachings about image processing and facial analysis, in the manner taught by Tian, to implement functionalities in Lu-577, which a POSITA would have been more than capable of doing. A POSITA would have had a reasonable expectation of success in combining the references given the overlap between Lu-577 and Tian and because the combination uses well-known techniques that would not have changed the principle of operation for any of the references.

Claims 4–6, 8, 11–14, 18–20 are invalid as anticipated by Nielsen-372 and as obvious over Nielsen-372 in view of Steinberg and/or Tian, as shown in the chart attached as Exhibits A.2, A.3, and A.4.

Nielsen-372 teaches a local metering system that includes a metering unit or display device ON/OFF detector that identifies a presented television program and a people meter that identifies the persons viewing the program. The people meter takes an approach of “prompt[ing] the audience members to indicate that they are present in the viewing audience[.]” Steinberg is directed to “using face detection and face recognition techniques to identify the persons contained within a digital image[.]” Steinberg teaches detecting a face and its location in an image, determining a pose or orientation of a face, and identifying a person using face recognition. A

POSITA would have found it obvious to apply Steinberg's teachings to Nielsen-372, such that audience members are identified by face detection and recognition. Nielsen-372's system includes needed hardware (e.g., a computer and a camera) for implementing Steinberg's approach. Nielsen-372's approach of prompting and soliciting manual inputs from the individuals may create a negative audience experience and compromise the accuracy of data. Applying Steinberg's method to Nielsen-372 would have allowed identification of the audience members without interruptions to the entertainment experience and with improved accuracy. A POSITA would have been motivated to do so because these benefits are consistent with Nielsen-372's goal of collecting viewing information. A POSITA would have found it obvious and been motivated to apply the teachings of Steinberg to Nielsen-372 because this is a simple substitution of one known element (e.g., audience identification based on facial analysis) for another (e.g., audience identification based on user input) to obtain predictable results. Doing so would have yielded predictable results because the techniques of facial analysis were well known in the 2011 timeframe and applied to television audience measurement. A POSITA would have had a reasonable expectation of success given that Nielsen-372 provide the hardware architecture for performing Steinberg's method and that Steinberg's techniques were admittedly known. The combination simply implements Steinberg's teachings about facial analysis, in the manner taught by Steinberg, in Nielsen-372's system. The combination would have been nothing more than the use of a known technique to improve similar devices in the same way and would not have changed the principle of operation for any of the references.

A POSITA would have found it obvious to add Tian to the combination of Nielsen-372 and Steinberg because Steinberg and Tian are directed to similar functionalities (e.g., images process and facial analysis) and address similar software-based tasks (e.g., identifying a head in

an image). A POSITA would have found it obvious and been motivated to use Tian's techniques to improve Steinberg and to apply these techniques to the people meter of Nielsen-372. A POSITA would have found it obvious and been motivated to apply the teachings of Tian to the combination of Nielsen-372 and Steinberg because this is an application of known techniques (e.g., Tian's facial analysis techniques) to a known system (e.g., Nielsen-372's people meter) and method (e.g., Steinberg's facial analysis methods) ready for improvement. Doing so would have improved accuracy of face recognition and provided savings in processing resources and time, and would have yielded predictable results at least because Tian provides experimental assessments of its techniques. The combination simply uses Tian's teachings about image processing and facial analysis, in the manner taught by Tian, to implement functionality in Nielsen-372. A POSITA would have been motivated and would have had a reasonable expectation of success in combining the references given the overlap between Steinberg and Tian and because the combination uses well-known techniques that would not have changed the principle of operation for any of the references.

TVision reserves the right to amend and/or supplement its statutory bases for asserting each of these references as prior art as additional information becomes available through discovery.

A. Invalidity Under 35 U.S.C. §§ 101, 112

The asserted claims of the '243 patent are invalid pursuant to 35 U.S.C. § 101 for improperly claiming an abstract idea. The entirety of the asserted claims involves an abstract idea of generating and finding data based on the data collected from media data using generic computer equipment and devices. These are impermissibly abstract claims.

The asserted claims are invalid as indefinite under 35 U.S.C. § 112 for the following claim elements:

- “determine audience identification information based on a match of the head to a known person associated with the media exposure environment” (claim 1)
- “network interface circuitry to output a signal indicative of the content identifying data and the audience identification information to a data collection facility” (claim 1)
- “analyze a sequence of images of the media exposure environment to detect a head appearing in one or more of the images, the sequence of images obtained by a camera while the media content corresponding to the content identifying data is presented by the television” (claim 1)
- “determine audience identification information based on a match of the head to a known person associated with the media exposure environment” (claim 1)
- “reduce a resolution of a first image of the one or more of the images of the media exposure environment to obtain a reduced-resolution image” (claims 4, 11)
- “determine audience identification information based on an indication that the head matches a known person associated with the audience measurement system” (claim 9)
- “attempt to detect a head in the first image” (claim 9)
- “analyze a portion of a second image corresponding to the identified region to determine whether the head matches the known person” (claim 12)
- “analyzing, using an audience detector, the first image to attempt to detect a head in the first image” (claim 16)
- “determining, using the audience detector, audience identification information based on an indication that the head matches a known person associated with the audience detector” (claim 16)
- “reducing a resolution of the first image of the media exposure environment to obtain

a reduced-resolution image” (claim 18)

The asserted claims are invalid as lack of written description and non-enablement under 35 U.S.C. § 112 for the following claim elements:

- Audio signature (claims 1, 9, 16)
- Audience identification information (claims 1, 9, 16)

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CERTIFICATE OF SERVICE

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Exhibit A1

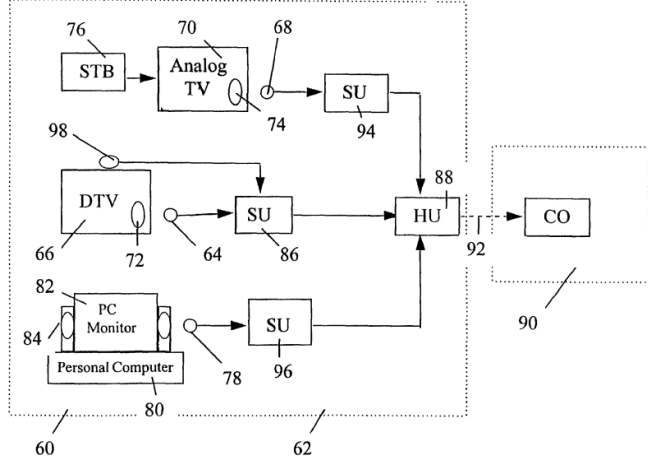
Exhibit A1 – Invalidity Claim Chart for U.S. Patent No. 11,470,243 ('243 Patent)

US Patent No. 2002/0059577 (“Lu-577”)

Lu-577 was filed July 19, 2001 and published May 16, 2002. Therefore, Lu-577 is prior art under pre-AIA §102(b) because it was published over one year before December 15, 2011. The below exemplary disclosure shows how Lu-577 anticipates and/or renders obvious claims 4–6, 8, 11–14, 18–20 of the '243 Patent.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
1.pre	1. An audience measurement system to obtain exposure data for a media exposure environment, the audience measurement system comprising:	Lu-577 discloses an audience measurement system to obtain exposure data for a media exposure environment. Lu-577 at Fig. 2 [0014]-[0017]: “A television audience measurement system...” [0017]: ““[A] television audience measurement system measures viewing of a television program viewed on digital television located in a statistically selected site[.]”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0017]: “The extracting means extracts an audio signature from the television program in order to identify the television program.” [Abstract], [0017], [0035]: “[M]easures viewing of a television program viewed on digital television located in a statistically selected site[.]” [Abstract], [0017], [0035], [0040]: “[E]xtract[s] an audio signature from the television program in order to identify the television program[.]” [0039]: “[K]nown head location and face recognition software ... for the identification of the viewing persons[.]” [0039]: “Notable among teachings in this area is that by Lu in U.S. Pat. No. 4,858,000. The teaching of this patent is herein incorporated by reference.” [0039]: “The person identifier 98 may be video camera, an IR camera, or the like.” [0039]: “[T]o identify the persons watching television programming” “in the statistically selected monitoring site.” [0050]: “[T]elevision audience data[.]” [0089]: (“[A] statistically selected monitoring site ... includes certain viewing equipment as well as certain monitoring equipment.” Lu-577 at [Abstract], [0014]-[0017], [0039], [0040], [0050], and [0089].
1.a.	memory; machine readable instructions; and processor circuitry to execute the machine readable instructions to;	Lu-577 discloses memory; machine readable instructions; and processor circuitry to execute the machine readable instructions. Lu-577 at Fig. 2

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		 The diagram shows a system architecture. A dashed box 60 contains an STB (76) connected to an Analog TV (70). The Analog TV (70) has an antenna input (74) and is connected to a site unit (SU) 94 via a line with a detector (68). A DTV (66) has an antenna input (72) and is connected to a site unit (SU) 86 via a line with a detector (64). A PC (80) with a monitor (82) and keyboard (84) is connected to a site unit (SU) 96 via a line with a detector (78). All three site units (94, 86, 96) are connected to a central head unit (HU) 88. The HU (88) is connected to a data collection central office (CO) 90 via a line with a detector (92). A person identifier (98) is also connected to the HU (88). A dashed box 62 encloses the PC (80) and its associated SU (96). A dashed box 90 encloses the CO (90). [0035]: “This audio portion is detected by a detector 64 in the case of a digital television set 66, and by a detector 68 in the case of an analog television set 70.” [0039]: “Moreover, a person identifier 98 may be provided in order to identify the persons watching television programming on the digital television set 66.” [0039]: “[K]nown head location and face recognition software ... for the identification of the viewing persons[.]” [0039]: “[T]he site unit 86 may employ known head location and face recognition software (e.g., as taught by Lu in U.S. Pat. No. 4,858,000) for the identification of the viewing persons and for the collection of other demographic data.” [0037]: “[T]he audio portion picked up by the detector 64 can be analyzed at a remotely located data collection central office 90 in order to determine if the audio portion from the digital television set 66 contains such television program identification codes.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Claim 14: “The television audience measurement System of claim 13 wherein the digital television equipment comprises a receiver having a tuner, a microprocessor, memory, an operating System, and a Video display unit.” [0003]: “This approach [of extracting a characteristic feature signature] is taught by Lert and Lu in U.S. Pat. No. 4,677,466. The teaching of U.S. Pat. No. 4,677,466 is herein incorporated by reference.” [0039]: “The person identifier 98 may be video camera, an IR camera, or the like.” Lu-577 at Claim 14, [0003], [0035], [0037], and [0039]. Lu-577, by way of incorporating Lert, teaches using processor circuitry (e.g., audio processing circuitry, signature recognition computer) for extracting and comparing audio signatures and memory for storing audio signatures. Lert at 3:57-4:42, 4:61-5:19, FIGs. 1-2.
1.b	generate an audio signature of media content presented by a television within the media exposure environment;:	Lu-577 discloses that the audience measurement system generates an audio signature of media content presented by a television within the media exposure environment. [Abstract]: “A television audience measurement system measures viewing of a television program viewed on digital television located in a statistically selected site by ... (iii) extracting an audio signature from the television program in order to identify the television program...” [0017]: “A television audience measurement system measures viewing of a television program ... in a statistically selected site by ... (iii) extracting an audio signature from the television program in order to identify the television program...”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0035]: “[E]xtracting signatures from the audio portion of the television signal to which a received is tuned.” [0035]: “[M]easure[] tuning to digital television programming received in a statistically selected monitoring site.” [0040]: “The first embodiment 60 measures such tuning by detecting program identification codes and/or extracting signatures from the audio portion of the television signal to which a receiver is tuned.” [0040]: “[C]haracteristic signatures can be extracted from these representations for subsequent comparison, either in the statistically selected monitoring site.” [0041]: “[B]y extracting characteristic signatures from these programs and by matching the extracted signatures to reference signatures stored in a reference signature database based on the audio signature...[T]he embodiments of the present invention described herein can determine the programs being viewed, when the tapes are played, by extracting characteristic signatures from these programs....” Lu-577 at [Abstract], [0017], [0035], and [0040]-[0041].
1.c	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature of the media content presented by the television within the media exposure environment;;	Lu-577 discloses that its television audience measurement system obtains content identifying data corresponding to the presented media content, the content identifying data based on the audio signature of the media content presented by the television within the media exposure environment. [Abstract]: “A television audience measurement system measures viewing of a television program viewed on digital television located in a statistically selected site by ... (iii) extracting an audio signature from the television program in order to identify the television program[.]”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0017]: “[A] television audience measurement system measures viewing of a television program viewed on digital television located in a statistically selected site and comprises ... extracting means ... The extracting means extracts an audio signature from the television program in order to identify the television program.” [0035]: “[M]easure[] tuning to digital television programming received in a statistically selected monitoring site.” [0035]: “A first embodiment 60 of the present invention, which measures tuning to digital television programming received in a statistically selected monitoring site 62, is depicted schematically in FIG. 2. The first embodiment 60 measures such tuning by ... extracting signatures from the audio portion of the television signal to which a receiver is tuned.” [0040]: “[C]haracteristic signatures can be extracted from these representations for subsequent comparison, either in the statistically selected monitoring site 62 or in the central office 90, with previously collected reference signatures in order to identify the television programs to which the digital television set 66, the analog television set 70, and the personal computer 80 are tuned.” [0041]: “[T]he embodiments of the present invention described herein can determine the programs being viewed, when the tapes are played, by extracting characteristic signatures from these programs and by matching the extracted signatures to reference signatures stored in a reference signature database.” [0044]: “The second embodiment 100 measures tuning to digital television programming in connection with a statistically selected monitoring site 102.” [0045]: “[T]uning data, and possibly demographic data, are collected from digital television reception equipment.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0050]: “The software agents 112, 118, and 122 may be telecommunication enabled so that television audience data from all the viewing sites in the statistically selected monitoring site 102 can be communicated....” Lu-577 at [Abstract], [0017], [0035], [0040]-[0041], [0044]-[0045], and [0050].
1.d	analyze a sequence of images of the media exposure environment to detect a head appearing in one or more of the images, the sequence of images obtained by a camera while the media content corresponding to the content identifying data is presented by the television:	Lu-577 discloses analyzing a sequence of images of the media exposure environment to detect a head appearing in one or more of the images, the sequence of images obtained by a camera while the media content corresponding to the content identifying data is presented by the television. [Abstract]: “A television audience measurement system measures viewing of a television program viewed on digital television located in a statistically selected site by ... (iii) extracting an audio signature from the television program in order to identify the television program[.]” [0013]: “Additionally, it is well known in the audience measurement arts to use computer-based image recognition in order to identify members of a viewing audience. Notable among teachings in this area is that by Lu in U.S. Pat. No. 4,858,000. The teaching of this patent is herein incorporated by reference.” [0017]: “The extracting means extracts an audio signature from the television program in order to identify the television program.” [0035]: “A first embodiment 60 of the present invention, which measures tuning to digital television programming received in a statistically selected monitoring site 62, is depicted schematically in FIG. 2. The first embodiment 60 measures such tuning by ... extracting signatures from the audio portion of the television signal to which a receiver is tuned.” [0039]: “Moreover, a person identifier 98 may be provided in order to identify the persons watching television programming on the digital television set 66. ...

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Similarly, person identifiers may be provided in order to identify the persons watching television programming on the analog television set 70 and on the personal computer 80.” [0039]: “[T]he site unit 86 may employ known head location and face recognition software (e.g., as taught by Lu in U.S. Pat. No. 4,858,000) for the identification of the viewing persons and for the collection of other demographic data.”). [0039]: “The person identifier 98 may be video camera, an IR camera, or the like.” [0040]: “[C]haracteristic signatures can be extracted from these representations for subsequent comparison, either in the statistically selected monitoring site 62 or in the central office 90, with previously collected reference signatures in order to identify the television programs to which the digital television set 66, the analog television set 70, and the personal computer 80 are tuned.” [0041]: “[T]he embodiments of the present invention described herein can determine the programs being viewed, when the tapes are played, by extracting characteristic signatures from these programs and by matching the extracted signatures to reference signatures stored in a reference signature database.” [0044]: “The second embodiment 100 measures tuning to digital television programming in connection with a statistically selected monitoring site 102.” [0045]: “According to this second embodiment 100, tuning data, and possibly demographic data, are collected from digital television reception equipment...” [0050]: “The software agents 112, 118, and 122 may be telecommunication enabled so that television audience data from all the viewing sites in the statistically selected monitoring site 102 can be communicated....”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Lu-577 at [Abstract], [0013], [0017], [0035], [0038]-[0041], [0044]-[0045], and [0050].
1.e	determine an orientation of the head with respect to the camera; and,	
1.f	determine audience identification information based on a match of the head to a known person associated with the media exposure environment; and	Lu-577 teaches determining audience identification information based on a match of the head to a known person associated with the media exposure environment. [0013]: “Additionally, it is well known in the audience measurement arts to use computer-based image recognition in order to identify members of a viewing audience. Notable among teachings in this area is that by Lu in U.S. Pat. No. 4,858,000. The teaching of this patent is herein incorporated by reference.” [0039]: “Moreover, a person identifier 98 may be provided in order to identify the persons watching television programming on the digital television set 66. ... Similarly, person identifiers may be provided in order to identify the persons watching television programming on the analog television set 70 and on the personal computer 80.” [0039]: “[T]he site unit 86 may employ known head location and face recognition software (e.g., as taught by Lu in U.S. Pat. No. 4,858,000) for the identification of the viewing persons and for the collection of other demographic data.”). Lu-577 at [0013] and [0039].
1.g	network interface circuitry to output a signal indicative of the content identifying data and the audience identification information to a data collection facility	Lu-577 teaches network interface circuitry to output a signal indicative of the content identifying data and the audience identification information to a data collection facility.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0040]: “[C]haracteristic Signatures can be extracted from these representations for Subsequent comparison, either in the Statistically Selected monitoring Site 62.” [0039]: “When such equipment is available in the statistically selected monitoring site 62, the site unit 86 may employ known head location and face recognition software ... for the identification of the viewing persons and for the collection of other demographic data.” [0050]: “The software agents 112, 118, and 122 may be telecommunication enabled so that television audience data from all the viewing sites in the statistically selected monitoring site 102 can be communicated, via the Internet, a public telephone system, or the like, to a locally located or remotely located intermediate data collector 128 and then to a remotely located central office 130 through a communication channel 170.” [0037]: “The remotely located data collection central office 90 is schematically depicted as a computer based data collection central office that interchanges data with the home unit 88 over a communication network 92, such as a public switched telephone network, the Internet, or the like.” [0015]: “The interface and communication apparatus is adapted to transmit the identification datum to a remotely located central office.” Claim 29: “[I]nterface and communication apparatus includes a serial port[.]” Claim 33: “[T]he interface and communication apparatus is arranged to send the identification datum to an Internet service provider via the Internet.” Lu-577 at [0015], [0037], [0039]-[0040] and [0050] and claims 29 and 33.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
4.pre	4. The audience measurement system of claim 1, wherein the processor circuitry is to:.	
4.a	reduce a resolution of a first image of the one or more of the images of the media exposure environment to obtain a reduced-resolution image, and.	
4.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	
5.pre	The audience measurement system of claim 4, wherein the processor circuitry is to determine the audience identification information by	Lu-577 discloses determining the audience identification information. [0039]: “[A] person identifier 98 may be provided in order to identify the persons watching television programming on the digital television set 66.” Lu-577 at [0039].
5.a	generating a facial signature from a region of a second image of the one or more of the images corresponding to a location of the head in the reduced-resolution image, and	Lu-577, by way of incorporating U.S. Patent No. 4,858,000 (“Lu-000”), discloses generating a facial signature from a region of a second image of the one or more of the images corresponding to a location of the head in the reduced-resolution image. Lu-000 teaches that “[a] pattern image signature is extracted from [a] captured image.” Lu-000, Abstract, 2:20-38. The pattern image signature is a facial signature because it is extracted from a “head location” and is alternatively called a “face pattern image signature.” Lu-000, 6:49-51, 7:25-27,

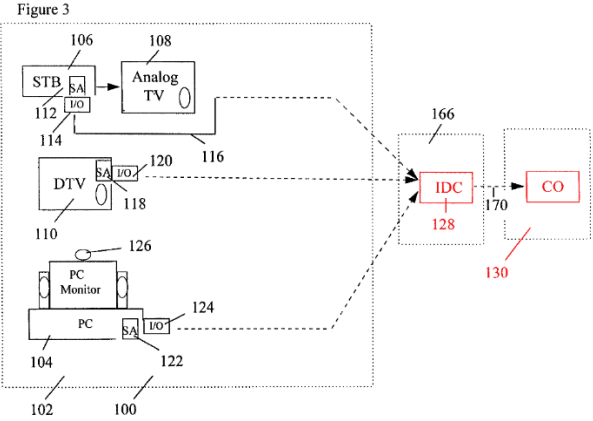
Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		7:39-8:6. Lu-000 's extraction of a pattern image signature teaches generating a facial signature.
5.b	comparing the generated facial signature to a database of facial signatures	Lu-577, by way of incorporating Lu-000, discloses comparing the generated facial signature to a database of facial signatures. Lu-000 teaches that “[t]he extracted ... image feature signature is compared with each of the pattern image signatures stored in the individual face library.” Lu-000, 7:39-8:6, FIG. 7; see also Lu-000, 8:46-9:31, FIGs. 8B, 8E, 8G; Lu-000's individual face storage library is a database because it includes a structured collection of data (e.g., pattern image signatures) stored in memory. Lu-000, 7:25-38.
6.pre	The audience measurement system of claim 4, wherein the processor circuitry is to	
6.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained	Lu-577, by way of incorporating Lu-000, discloses analyzing images to detect a region corresponding to the head. Lu-000 teaches analyzing images to detect a head appearing in an image and to determine the location of the head based on a “search raw picture for heads subroutine” and a “search head(s) subroutine.” Lu-000, 7:39-47 (“The digital representation of the infrared image signal from the image acquisition block 88 corresponding to an identified direction of an audience member by the processor subsystem 14 is applied to a zooming and head location block 104. A gray-level subimage output G-Sub of the zooming and head location block 104 is applied to a normalization block

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		106.”), 9:47-52 (“FIG. 8H is a flow chart illustrating an operational function or mode 4 logical steps performed to locate the faces. The sequential steps begin with a search raw picture for heads subroutine illustrated in FIG. 8I. Next a locate and search head(s) subroutine illustrated in FIG. 8J is performed.”).
6.b	analyze a portion corresponding to the identified region of a second image; and	Lu-577, by way of incorporating Lu-000, discloses analyzing a portion corresponding to the identified region of the head or face. Lu-000 teaches that the newly extracted pattern image signature is generated based on a “B-Sub image” that corresponds to the head region of a person: A gray-level subimage output G-Sub of the zooming and head location block 104 is applied to a normalization block 106. The normalized output of block 106 is applied to a thresholding block 108 to provide a thresholding, binary level image output B-Sub. A feature signature is extracted from the B-Sub image at a feature signature extraction block 110. Lu-000, 7:39-8:6
6.c	based on the analysis of the region of the second image, determine that the head matches the known person	Lu-577, by way of incorporating Lu-000, discloses determining that the head matches the known person based on the analysis. Lu-000 teaches that the newly extracted pattern image signature is generated based on a “B-Sub image” that corresponds to the head region of a person: A gray-level subimage output G-Sub of the zooming and head location block 104 is applied to a normalization block 106. The normalized output of block 106 is applied to a

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		thresholding block 108 to provide a thresholding, binary level image output B-Sub. A feature signature is extracted from the B-Sub image at a feature signature extraction block 110. Lu-000, 7:39-8:6
8.	The audience measurement system of claim 6, wherein the audience identification information includes an identifier associated with the known person and the processor circuitry is to, responsive to a determination that the head matches the known person, cause the identifier associated with the person to be stored in the memory.	<i>The combination teaches claim 6. It would have been obvious to use the processor circuitry to perform the operations of claim 8.</i> Lu-577, by way of incorporating Lu-000, discloses determining audience identification information based on a match of the head to a known person and storing data storing data related to facial recognition using a memory. Lu-000 teaches outputting the identification information as an output signal and storing “identified individual viewing member data.” Lu-000, 7:67-8:6 (“An output signal at a line 116 is then stored corresponding to the particular identified individual member of the viewing audience. The thus identified individual viewing member data can be stored together with other parameter data of a television data collection system, such as channel reception of a monitored receiver.”). Lu-577 discloses that the audience measurement system includes a memory. Claim 14: “The television audience measurement System of claim 13 wherein the digital television equipment comprises a receiver having a tuner, a microprocessor, memory, an operating System, and a Video display unit.” Lu-577 at Claim 14.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
9.pre	An audience measurement system, comprising:	<i>See claim 1.pre.</i>
9.a	an audience measurement device at a media exposure environment, the audience measurement device to	Lu-577 discloses an audience measurement system includes components such as audio detectors, cameras, and site unit/home unit implemented in a media exposure environment. <i>See claim limitation 1.pre.</i> [0035]: “A first embodiment 60 of the present invention, which measures tuning to digital television programming received in a statistically selected monitoring site 62, is depicted schematically in FIG. 2. The first embodiment 60 measures such tuning by ... extracting signatures from the audio portion of the television signal to which a receiver is tuned.” [0037]: “[T]he representation of the audio portion picked up by the detector 64 can be analyzed at a remotely located data collection central office 90 in order to determine if the audio portion from the digital television set 66 contains such television program identification codes” [0038]: “[T]he representation of the audio portions picked up by the detectors 68 and 78 can be analyzed at the remotely located data collection central office 90 in order to determine if the audio portions from the analog television set 70 and the personal computer 80 contain television program identification codes.” [0039]: “The person identifier 98 may be video camera, an IR camera, or the like.” [0040]: “[E]xtract[s] an audio signature from the television program in order to identify the television program[.]” Lu-577 at [0035] and [0037]-[0040].

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
9.b	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature;	<i>See claim limitations 1.b, 1.c, and 9.a.</i>
9.c	while the media content corresponding to the content identifying data is presented by the television, collect a first image of the media exposure environment with a camera;	<i>See claim limitations 1.c and 9.a.</i>
9.d	attempt to detect a head in the first image;	<i>See claim limitations 1.d and 9.a.</i>
9.e	determine an orientation of the head with respect to the camera	<i>See claim limitations 1.e and 9.a.</i>
9.f	determine audience identification information based on an indication that the head matches a known person associated with the audience measurement system; and	<i>See claim limitations 1.f and 9.a.</i> Lu-577, by way of incorporating Lu-000, discloses outputting and storing a signal and displaying a result after a match of signatures is found. “The extracted B-Sub image feature signature is compared with each of the pattern image signatures stored in the individual face library as illustrated at a block 112 to identify a match. A particular audience member is identified when the compared signatures exceed a predetermined correlation threshold value corresponding to the best matching rate or highest correlation with an individual face pattern image signature in the individual face library is identified at a conclusion block 114.” Lu-000 at 7:39-8:6.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
9.g	a data collection facility to obtain the content identifying data and the audience identification information from the audience measurement device.	Lu-577 discloses a data collection facility to obtain the content identifying data and the audience identification information from the audience measurement device. <i>See claim limitation 1.g.</i> Lu-577 at Fig. 3  [0050]: “[R]emotely located intermediate data collector 128 and then to a remotely located central office 130 through a communication channel 170.” Lu-577 at [0050].
11.pre	The audience measurement system of claim 9, wherein the audience measurement device is to	<i>See claim 9.</i>
11.a	reduce a resolution of the first image of the media exposure environment	<i>See claim limitations 4.a and 9.a.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	to obtain a reduced-resolution image, and	
11.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	<i>See claim limitations 4.b and 9.a.</i>
12.pre	The audience measurement system of claim 11, wherein the audience measurement device is to	<i>See claim 11.</i>
12.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained; and	<i>See claim limitations 6.a and 9.a.</i>
12.b	analyze a portion of a second image corresponding to the identified region to determine whether the head matches the known person.	<i>See claim limitations 6.b and 9.a.</i> Lu-577, by way of incorporating Lu-000, discloses comparing a signature with stored signatures of different individuals to determine whether there is a match with any of the individuals. “An image recognition method and system ... for identifying predetermined individual members of a viewing audience in a monitored area.” Lu-000, Abstract.
13.	The audience measurement system of claim 12, wherein the audience identification information includes an identifier associated with the known person and the audience measurement device is to, responsive to the indication that the head	Lu-577 discloses representing the match with an indication that the head matches the known person. <i>See claim 8 and limitation 9.a.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	matches the known person, cause recordation of the identifier associated with the known person in a memory.	[0039]: “[T]he site unit 86 may employ known head location and face recognition software (e.g., as taught by Lu in U.S. Pat. No. 4,858,000) for the identification of the viewing persons and for the collection of other demographic data.” Lu-577 at [0039].
14.pre	The audience measurement system of claim 11, wherein the audience measurement device is to determine the audience identification information by:	<i>See claim 11.</i>
14.a	generating a facial signature from a region of a second image corresponding to a location of the head in the reduced-resolution image, and	<i>See claim 11, claim limitations 5.a.</i>
14.b	comparing the generated facial signature to a database of facial signatures	<i>See claim 11, claim limitations 5.b.</i>
16.pre	A method for obtaining exposure data for a media exposure environment, the method comprising:	Lu-577 discloses methods that includes operations they teach. <i>See claim 1.</i> [0080]: “The balance of the measurement System (e.g., the audio Signal methods employed by any of the other embodiments 60, 200, and 300 described above).” Lu-577 at [0080].

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
16.a	generating, using a program detector, an audio signature of media content presented by a television within the media exposure environment	Lu-577 discloses generating, using a program detector, an audio signature of media content presented by a television within the media exposure environment. <i>See claim limitation 1.b.</i> Lu-577 teaches that the audience measurement system, including an audio detector and a site unit/home unit, generates an audio signature of media content presented by a television within the media exposure environment. [0037]: “[T]he representation of the audio portion picked up by the detector 64 can be analyzed at a remotely located data collection central office 90 in order to determine if the audio portion from the digital television set 66 contains such television program identification codes[.]” [0038]: “[T]he representation of the audio portions picked up by the detectors 68 and 78 can be analyzed at the remotely located data collection central office 90 in order to determine if the audio portions from the analog television set 70 and the personal computer 80 contain television program identification codes.” Lu-577 at [0037]-[0038].
16.b	obtaining, based on the audio signature, content identifying data corresponding to the presented media content	<i>See claim limitations 1.c, 9.b, and 16.pre.</i>
16.c	while the media content corresponding to the content identifying data is presented by the television, capturing first and second images of the media exposure environment with a camera	<i>See claim limitations 1.d and 9.c.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
16.d	analyzing, using an audience detector, the first image to attempt to detect a head in the first image	<i>See claim limitations 1.d and claim limitation 9.d.</i>
16.e	determining, using the audience detector, an orientation of the head with respect to the camera	<i>See claim limitations 1.e and claim limitation 9.e.</i>
16.f	determining, using the audience detector, audience identification information based on an indication that the head matches a known person associated with the to a data collection facility. audience detector; and	<i>See claim limitations 1.f and claim limitation 9.f.</i>
16.g	providing the content identifying data and the audience identification information to a data collection facility.	<i>See claim limitations 1.g, 9.g, and 16.pre.</i>
18.pre	The method of claim 16, further comprising	
18.a	reducing a resolution of the first image of the media exposure environment to obtain a reduced-resolution image, and	<i>See claim limitation 11.a and 16.pre. .</i>
18.b	wherein the determining of the orientation of the head includes determining the orientation of the	<i>See claim limitation 11.b and 16.pre.</i>

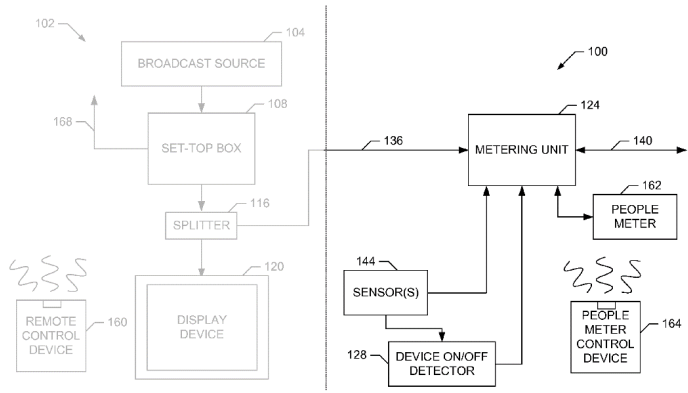
Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	head with respect to the camera using the reduced-resolution image.	
19.pre	The method of claim 18, further comprising	
19.a	identifying a region corresponding to the head within the first image from which the reduced-resolution image was obtained;	<i>See claim limitation 12.a and 16.pre. .</i>
19.b	analyzing a portion of the second image corresponding to the identified region; and	<i>See claim limitation 12.b and 16.pre.</i>
19.c	based on the analyzing of the region of the second image, determining whether the head matches the known person	<i>See claim limitation 12.b and 16.pre.</i>
20.	The method of claim 19, wherein the audience identification information includes an identifier associated with the known person, and further including recording the identifier associated with the known person in a memory.	<i>See claim 13.</i>

Exhibit A2

Exhibit A2 – Invalidity Claim Chart for U.S. Patent No. 11,470,243 ('243 Patent)

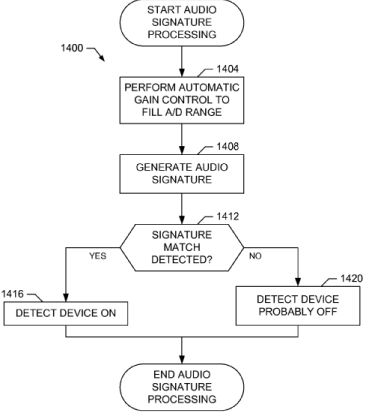
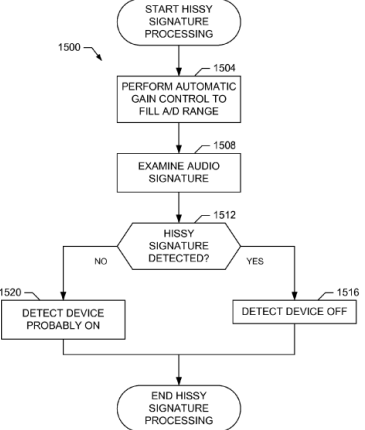
US Patent No. 2010/0274372 (“Nielsen-372”)

Nielsen-372 was July 7, 2010 and published October 28, 2010. Therefore, **Nielsen-372** is prior art under pre-AIA §102(b) because it was published over one year before December 15, 2011. The below exemplary disclosure shows how **Nielsen-372** anticipates and/or renders obvious claims 4–6, 8, 11–14, 18–20 of the '243 Patent.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
1.pre	1. An audience measurement system to obtain exposure data for a media exposure environment, the audience measurement system comprising:	Nielsen-372 discloses an audience measurement system that obtains exposure data for a media exposure environment. Nielsen-372 at FIG. 1.  FIG. 1 [0036]: “[C]apable of providing viewing and metering information”). [0044]: “[T]o receive audio signals corresponding to the program being displayed.”

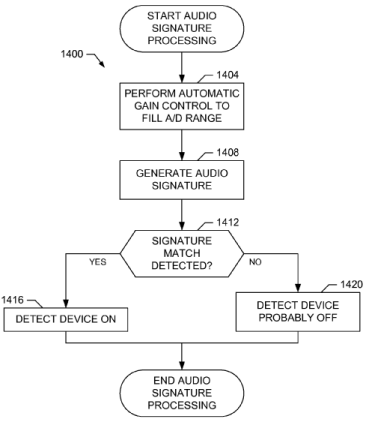
Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0049]: “[T]he metering unit 124 and the display device ON/OFF detector 128 may be implemented as separate devices or integrated into a single unit.” [0057]: “[C]haracteristics of the audio portion of presented program content may be used to generate a substantially unique proxy or signature (e.g., a series of digital values, a waveform, etc.) for that content.” [0048]: “The example local metering system 100 of FIG. 1 also includes a people meter 162 to capture information about the audience.” [0036]: “[I]n a statistically selected household having one or more home entertainment systems 102, the metering unit 124 may be implemented as a single home unit and one or more site units.” Nielsen-372 at [0036], [0044], [0048]-[0049], and [0057].
1.a.	memory; machine readable instructions; and processor circuitry to execute the machine readable instructions to;	Nielsen-372 discloses memory; machine readable instructions; and processor circuitry to execute the machine readable instructions. Nielsen-372 at FIGS. 29, 6-7, and 14-15.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		FIG. 29 FIG. 6 FIG. 7

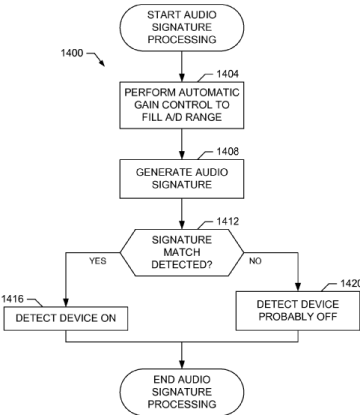
Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		 FIG. 14  FIG. 15 [0092]: “[I]mplementing [its] apparatus and methods” [0135]: “The system 2900 of the instant example includes a processor 2912 such as a general purpose programmable processor. The processor 2912 includes a

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		local memory 2914, and executes coded instructions 2916 present in the local memory 2914 and/or in another memory device. The processor 2912 may execute, among other things, the machine readable instructions[.]” [0035]: “FIG. 29 is a block diagram of an example computer that may execute the example machine readable instructions of FIGS. 13-26 and/or 27 to implement the example display device ON/OFF detector of FIG. 2.” [0036]: “A block diagram of an example local metering system 100 capable of providing viewing and metering information for program content presented via an example home entertainment system 102 is illustrated in FIG. 1.” [0051]: “The display device ON/OFF detector 200 includes one or more audio processors 228 to process the audio signal 230 output by the audio sensor 224. The audio processors 228 are configured to determine characteristics of the input audio signal 230 and/or information included in the input audio signal 230 that may be used to ascertain whether the monitored information presenting is turned ON and operating in an active state.” [0056]: “The example set of audio engines 228 of FIG. 3 includes an audio code detector 312, an audio signature processor 316, an audio gain level processor 320, a horizontal sync audio processor 324, a quiet time detector 328, a fan noise processor 332 and an audio source detector 336. The example audio code detector 312 is configured to detect audio codes that may be embedded in the audio signal corresponding to the input audio signal 230.” [0075]: “A first example audio processor system 600 that may be used to implement any or all of the audio code detector 312, the audio signature processor 316, the audio gain level processor 320, the horizontal sync audio processor 324, the quiet time detector 328 and/or the fan noise processor 332 of FIG. 3 is shown in FIG. 6. The example audio processor system 600 is configured to process audio signals emanating from the monitored display device 120 (or, more generally, a

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		corresponding information presenting device) and detected by the audio sensor 204.” [0078]: “A second example audio processor system 700 that may be used to implement any or all of the audio code detector 312, the audio signature processor 316, the audio gain level processor 320, the horizontal sync audio processor 324, the quiet time detector 328, the fan noise processor 332 and/or the audio Source detector 336 of FIG. 3 is shown in FIG. 7.” [0095]: “First example machine readable instructions 1400 that may be executed to implement the audio signature processor 316 of FIG. 3 are shown in FIG. 14. The machine readable instructions 1400 process audio signals emitted by an information presenting device (e.g., the display device 120 of FIG. 1), detected by an audio sensor (e.g., the audio sensor 204 of FIGS. 2 and 6) and input to the audio signature processor 316.” [0097]: “Second example machine readable instructions 1500 that may be executed to implement the audio signature processor 316 of FIG.3 are shown in FIG. 15. The machine readable instructions 1500 process audio signals emitted by an information presenting device (e.g., the display device 120 of FIG. 1), detected by an audio sensor (e.g., the audio sensor 204 of FIGS. 2 and 6) and input to the audio signature processor 316.” [0041]: “[I]s a data logging and processing unit that may be used to generate viewing records[.]” Nielsen-372 at [0035]-[0036], [0041], [0051], [0056], [0078], [0092], [0095], [0097], and [0135].

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
1.b	generate an audio signature of media content presented by a television within the media exposure environment;:	Nielsen-372 discloses that the audience measurement system generates an audio signature of media content presented by a television within the media exposure environment. Nielsen-372 at FIG. 14  <pre> graph TD 1400([START AUDIO SIGNATURE PROCESSING]) --> 1404[PERFORM AUTOMATIC GAIN CONTROL TO FILL A/D RANGE] 1404 --> 1408[GENERATE AUDIO SIGNATURE] 1408 --> 1412{SIGNATURE MATCH DETECTED?} 1412 -- YES --> 1416[DETECT DEVICE ON] 1412 -- NO --> 1420[DETECT DEVICE PROBABLY OFF] 1416 --> 1418([END AUDIO SIGNATURE PROCESSING]) 1420 --> 1418 </pre> FIG. 14 [Abstract]: “An example method disclosed herein to determine whether a presentation device is ON or OFF comprises determining an audio signature based on an audio signal corresponding to an output of the presentation device, comparing the audio signature to a set of reference signatures corresponding to a set of known media content, and determining a result indicating whether the presentation device is ON or OFF based on whether the audio signature matches any of the set of reference signatures.” [0044]: “The metering unit 124 and/or display device ON/OFF detector 128 ... process the audio signals [to] generate one or more audio signatures corresponding to [the] program”

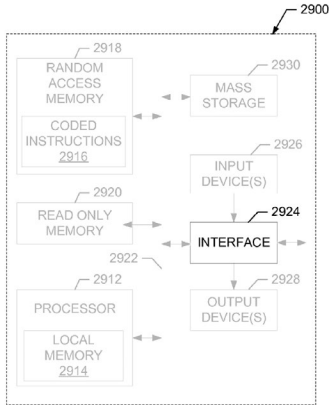
Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0050]: “The audio sensor 204 may be one or more microphones positioned to detect audio signals emitted by the display device 120 or corresponding information presenting device.” [0051]: “The display device ON/OFF detector 200 includes one or more audio processors 228 to process the audio signal 230 output by the audio sensor 224.” [0055]: “An example set of audio processors 228 is shown in FIG. 3. The audio processors 228 process the input audio signal(s) 230 provided, for example, by the audio sensor(s) 204 of FIG. 2. The input audio signal(s) 230 are intended to correspond to an audio signal being output by a monitored information presenting device. Such as the display device 120 of FIG. 1.” [0056]: “The example audio code detector 312 is configured to detect audio codes that may be embedded in the audio signal corresponding to the input audio signal 230.” [0057]: “The example audio signature processor 316 of FIG. 3 is configured to generate and process audio signatures corresponding to the input audio signal 230. AS is known, characteristics of the audio portion of presented program content may be used to generate a substantially unique proxy or signature (e.g., a series of digital values, a waveform, etc.) for that content.” [0095]: “First example machine readable instructions 1400 that may be executed to implement the audio signature processor 316 of FIG. 3 are shown in FIG. 14.” [0037]: “The broadcast source 104 may be any broadcast media Source. Such as a cable television service provider, a satellite television service provider, a radio frequency (RF) television service provider, an internet streaming video/audio provider, etc.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0036]: “The broadcast source 104 may be ... a cable television service provider” Nielsen-372 at [Abstract], [0044], [0050]-[0051], [0055]-[0057], [0095], and [0036]-[0037].
1.c	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature of the media content presented by the television within the media exposure environment;;	Nielsen-372 discloses that the audience measurement system obtains content identifying data corresponding to the presented media content and generates an audio signature of media content presented by a television within the media exposure environment. Nielsen-372 at FIG. 14  <pre> graph TD 1400([START AUDIO SIGNATURE PROCESSING]) --> 1404[PERFORM AUTOMATIC GAIN CONTROL TO FILL A/D RANGE] 1404 --> 1408[GENERATE AUDIO SIGNATURE] 1408 --> 1412{SIGNATURE MATCH DETECTED?} 1412 -- YES --> 1416[DETECT DEVICE ON] 1412 -- NO --> 1420[DETECT DEVICE PROBABLY OFF] 1416 --> 1425([END AUDIO SIGNATURE PROCESSING]) 1420 --> 1425 </pre> FIG. 14 [0044]: “[P]rogram identifying information.” [0036]: “A block diagram of an example local metering system 100 capable of providing viewing and metering information for program content presented via an example home entertainment system 102 is illustrated in FIG. 1.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0041]: “[I]s a data logging and processing unit that may be used to generate viewing records[.]” [0043]: “[T]he display device ON/OFF detector 128 may be used to augment the viewing information and/or viewing records determined by the metering unit 124 to more accurately determine whether program content output by the STB 108 is actually presented by the display device 120.” [0044]: “The metering unit 124 and/or display device ON/OFF detector 128 may then process the audio signals received from the microphone 144 to decode any embedded ancillary code(s) and/or generate one or more audio signatures corresponding to a program being displayed.” [0057]: “[A] set of reference signatures” [0096]: Finding “a match” [0051]: “The display device ON/OFF detector 200 includes one or more audio processors 228 to process the audio signal 230 output by the audio sensor 224. The audio processors 228 are configured to determine characteristics of the input audio signal 230 and/or information included in the input audio signal 230 that may be used to ascertain whether the monitored information presenting is turned ON and operating in an active state.” [0056]: “The example set of audio engines 228 of FIG. 3 includes an audio code detector 312, an audio signature processor 316, an audio gain level processor 320, a horizontal sync audio processor 324, a quiet time detector 328, a fan noise processor 332 and an audio source detector 336. The example audio code detector 312 is configured to detect audio codes that may be embedded in the audio signal corresponding to the input audio signal 230.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0057]: “[C]haracteristics of the audio portion of presented program content may be used to generate a substantially unique proxy or signature (e.g., a series of digital values, a waveform, etc.) for that content.” [0095]: “First example machine readable instructions 1400 that may be executed to implement the audio signature processor 316 of FIG. 3 are shown in FIG. 14. The machine readable instructions 1400 process audio signals emitted by an information presenting device (e.g., the display device 120 of FIG. 1), detected by an audio sensor (e.g., the audio sensor 204 of FIGS. 2 and 6) and input to the audio signature processor 316.” [0096]: “After convergence of the AGC algorithm at block 1404, control proceeds to block 1408 at which the audio signature processor 316 generates an audio signature from the received audio signal.” Nielsen-372 at [0036], [0041], [0043]-[0044], [0051], [0056]-[0057], and [0095]-[0096].
1.d	analyze a sequence of images of the media exposure environment to detect a head appearing in one or more of the images, the sequence of images obtained by a camera while the media content corresponding to the content identifying data is presented by the television:	Nielsen-372 discloses that the people meter detects the identities and/or number of the persons currently viewing programs displayed on the television. [0003]: “[D]etect[s] the identities and/or number of the persons currently viewing programs displayed on the television.” [0048]: “The example local metering system 100 of FIG. 1 also includes a people meter 162 to capture information about the audience.” Nielsen-372 at [0003] and [0048].
1.e	determine an orientation of the head with respect to the camera; and,	

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
1.f	determine audience identification information based on a match of the head to a known person associated with the media exposure environment; and	Nielsen-372 discloses that its people meter is located in a media exposure environment for identifying members of the audience. [0003]:“ [D]etect[s] the identities and/or number of the persons currently viewing programs displayed on the television.” [0048]: “The example local metering system 100 of FIG. 1 also includes a people meter 162 to capture information about the audience.” Nielsen-372 at [0003] and [0048].
1.g	network interface circuitry to output a signal indicative of the content identifying data and the audience identification information to a data collection facility	Nielsen-372 discloses implementing the apparatus and methods using a computer that includes an interface circuit. Nielsen-372 at FIGS. 1 and 29. FIG. 1

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		 FIG. 29 [0134]: “[I]mplementing the apparatus and methods” [0137]: “[I]ncludes a conventional interface circuit...such as an Ethernet interface[.]” [0041]: “[I]s a data logging and processing unit that may be used to generate viewing records[.]” [0036]: “The metering unit 124 ... transmits the collected viewing records over a connection 140 to a central office or data processing facility[.]” Nielsen-372 at [0036], [0041], [0134], and [0137].
4.pre	4. The audience measurement system of claim 1, wherein the processor circuitry is to:.	

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
4.a	reduce a resolution of a first image of the one or more of the images of the media exposure environment to obtain a reduced-resolution image, and.	
4.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	
5.pre	The audience measurement system of claim 4, wherein the processor circuitry is to determine the audience identification information by	
5.a	generating a facial signature from a region of a second image of the one or more of the images corresponding to a location of the head in the reduced-resolution image, and	
5.b	comparing the generated facial signature to a database of facial signatures	
6.pre	The audience measurement system of claim 4, wherein the processor circuitry is to	
6.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained	

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
6.b	analyze a portion corresponding to the identified region of a second image; and	
6.c	based on the analysis of the region of the second image, determine that the head matches the known person	
8.	The audience measurement system of claim 6, wherein the audience identification information includes an identifier associated with the known person and the processor circuitry is to, responsive to a determination that the head matches the known person, cause the identifier associated with the person to be stored in the memory.	Nielsen-372 discloses the local metering unit storing viewing records, which includes information regarding the audience, before sending the records to a central facility. [0036]: “[P]erforms the functions of collecting viewing/metering data, processing such data (possibly in real-time) and sending the processed data to the single home unit for that home.” [0041]: “[I]s a data logging and processing unit that may be used to generate viewing records[.]” [0048]: “The example local metering system 100 of FIG. 1 also includes a people meter 162 to capture information about the audience.” Nielsen-372 at [0036], [0041], and [0048].
9.pre	An audience measurement system, comprising:	<i>See claim 1.pre.</i>
9.a	an audience measurement device at a media exposure environment, the audience measurement device to	Nielsen-372 discloses an audience measurement device [Abstract]: “An example method disclosed herein to determine whether a presentation device is ON or OFF comprises deter mining an audio signature based on an audio signal corresponding to an output of the presentation device, comparing the audio signature to a set of reference signatures corresponding to a

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		set of known media content, and determining a result indicating whether the presentation device is ON or OFF based on whether the audio signature matches any of the set of reference signatures.” Nielsen-372 at [Abstract].
9.b	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature;	<i>See claim limitations 1.b, 1.c, and 9.a.</i>
9.c	while the media content corresponding to the content identifying data is presented by the television, collect a first image of the media exposure environment with a camera;	<i>See claim limitations 1.c and 9.a.</i>
9.d	attempt to detect a head in the first image;	<i>See claim limitations 1.d and 9.a.</i>
9.e	determine an orientation of the head with respect to the camera	<i>See claim limitations 1.e and 9.a.</i>
9.f	determine audience identification information based on an indication that the head matches a known person associated with the audience measurement system; and	<i>See claim limitations 1.f and 9.a.</i>
9.g	a data collection facility to obtain the content identifying data and the audience identification information	Nielsen-372 discloses that the data collection facility further processes the obtained data and information.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	from the audience measurement device.	<i>See claim limitation 1.g.</i> [0036]: “[P]erforms the functions of collecting viewing/metering data, processing such data (possibly in real-time) and sending the processed data to the single home unit for that home.” [0041]: “[I]s a data logging and processing unit that may be used to generate viewing records[.]” Nielsen-372 at [0036] and [0041].
11.pre	The audience measurement system of claim 9, wherein the audience measurement device is to	<i>See claim 9.</i>
11.a	reduce a resolution of the first image of the media exposure environment to obtain a reduced-resolution image, and	<i>See claim limitations 4.a and 9.a.</i>
11.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	<i>See claim limitations 4.b and 9.a.</i>
12.pre	The audience measurement system of claim 11, wherein the audience measurement device is to	<i>See claim 11.</i>
12.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained; and	<i>See claim limitations 6.a and 9.a.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
12.b	analyze a portion of a second image corresponding to the identified region to determine whether the head matches the known person.	<i>See claim limitations 6.b and 9.a.</i>
13.	The audience measurement system of claim 12, wherein the audience identification information includes an identifier associated with the known person and the audience measurement device is to, responsive to the indication that the head matches the known person, cause recordation of the identifier associated with the known person in a memory.	<i>See claim 8 and limitation 9.a.</i>
14.pre	The audience measurement system of claim 11, wherein the audience measurement device is to determine the audience identification information by:	<i>See claim 11.</i>
14.a	generating a facial signature from a region of a second image corresponding to a location of the head in the reduced-resolution image, and	<i>See claim 11, claim limitations 5.a.</i>
14.b	comparing the generated facial signature to a database of facial signatures	<i>See claim 11, claim limitations 5.b.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
16.pre	A method for obtaining exposure data for a media exposure environment, the method comprising:	Nielsen-372 discloses methods that include operations it teaches. <i>See claim 1.</i> [Abstract]: “Display device ON/OFF detection methods and apparatus are disclosed.” [0134]: “[I]mplementing the apparatus and methods” Nielsen-372 at [Abstract] and [0134].
16.a	generating, using a program detector, an audio signature of media content presented by a television within the media exposure environment	Nielsen-372 discloses a program detector. <i>See claim limitation 1.b.</i> [Abstract]: “An example method disclosed herein to determine whether a presentation device is ON or OFF comprises determining an audio signature based on an audio signal corresponding to an output of the presentation device, comparing the audio signature to a set of reference signatures corresponding to a set of known media content, and determining a result indicating whether the presentation device is ON or OFF based on whether the audio signature matches any of the set of reference signatures.” Nielsen-372 at [Abstract].
16.b	obtaining, based on the audio signature, content identifying data corresponding to the presented media content	<i>See claim limitations 1.c, 9.b, and 16.pre.</i>
16.c	while the media content corresponding to the content identifying data is presented by the	<i>See claim limitations 1.d and 9.c.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	television, capturing first and second images of the media exposure environment with a camera	
16.d	analyzing, using an audience detector, the first image to attempt to detect a head in the first image	<i>See claim limitations 1.d and claim limitation 9.d.</i>
16.e	determining, using the audience detector, an orientation of the head with respect to the camera	<i>See claim limitations 1.e and claim limitation 9.e.</i>
16.f	determining, using the audience detector, audience identification information based on an indication that the head matches a known person associated with the to a data collection facility. audience detector; and	<i>See claim limitations 1.f and claim limitation 9.f.</i>
16.g	providing the content identifying data and the audience identification information to a data collection facility.	<i>See claim limitations 1.g, 9.g, and 16.pre.</i>
18.pre	The method of claim 16, further comprising	
18.a	reducing a resolution of the first image of the media exposure environment to obtain a reduced-resolution image, and	<i>See claim limitation 11.a and 16.pre. .</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
18.b	wherein the determining of the orientation of the head includes determining the orientation of the head with respect to the camera using the reduced-resolution image.	<i>See claim limitation 11.b and 16.pre.</i>
19.pre	The method of claim 18, further comprising	
19.a	identifying a region corresponding to the head within the first image from which the reduced-resolution image was obtained;	<i>See claim limitation 12.a and 16.pre. .</i>
19.b	analyzing a portion of the second image corresponding to the identified region; and	<i>See claim limitation 12.b and 16.pre.</i>
19.c	based on the analyzing of the region of the second image, determining whether the head matches the known person	<i>See claim limitation 12.b and 16.pre.</i>
20.	The method of claim 19, wherein the audience identification information includes an identifier associated with the known person, and further including recording the identifier associated with the known person in a memory.	<i>See claim 13.</i>

Exhibit A3

Exhibit A3 – Invalidity Claim Chart for U.S. Patent No. 11,470,243 ('243 Patent)

Ying-li Tian, *Evaluation of Face Resolution for Expression Analysis*, 2004 Conference on Computer Vision and Pattern Recognition Workshop, Washington, DC, USA, 2004, pp. 82-82, doi: 10.1109/CVPR.2004.334 (“Tian”)

Tian was published no later than July 2, 2004. Therefore, **Tian** is prior art under pre-AIA §102(b) because it was published over one year before December 15, 2011. The below exemplary disclosure shows how **Tian** anticipates and/or renders obvious claims 4–6, 8, 11–14, 18–20 of the '243 Patent.

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
1.pre	1. An audience measurement system to obtain exposure data for a media exposure environment, the audience measurement system comprising:	
1.a.	memory; machine readable instructions; and processor circuitry to execute the machine readable instructions to;	
1.b	generate an audio signature of media content presented by a television within the media exposure environment;;	
1.c	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature of the media content presented by the television within the media exposure environment;;	

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art																		
1.d	analyze a sequence of images of the media exposure environment to detect a head appearing in one or more of the images, the sequence of images obtained by a camera while the media content corresponding to the content identifying data is presented by the television:	Tian discloses obtaining a sequence of images of human subjects using a camera analyzing a sequence of images to detect a head appearing in one or more of the images. [3.1]: “The database contains 704 image sequences from 97 subjects.” [3.2]: “All images in 704 sequences from 97 subjects are used for face detection and head pose estimation.” Tian at [3.1] and [3.2].																		
1.e	determine an orientation of the head with respect to the camera; and,	Tian discloses determining an orientation of the head with respect to the camera. Tian at [2.1]. <table><tr><td>Poses</td><td>Frontal or near frontal</td><td>Side view or profile</td><td colspan="2">Others</td></tr><tr><td>Definitions</td><td>Both eyes and lip corners are visible</td><td>One eye or one lip corner is occluded</td><td colspan="2">Not enough facial features</td></tr><tr><td>Examples</td><td></td><td></td><td colspan="2"></td></tr></table> [1]: “[P]ose estimation can be applied[.]” Tian at [1].				Poses	Frontal or near frontal	Side view or profile	Others		Definitions	Both eyes and lip corners are visible	One eye or one lip corner is occluded	Not enough facial features		Examples				
Poses	Frontal or near frontal	Side view or profile	Others																	
Definitions	Both eyes and lip corners are visible	One eye or one lip corner is occluded	Not enough facial features																	
Examples																				

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
1.f	determine audience identification information based on a match of the head to a known person associated with the media exposure environment; and	
1.g	network interface circuitry to output a signal indicative of the content identifying data and the audience identification information to a data collection facility	
4.pre	4. The audience measurement system of claim 1, wherein the processor circuitry is to:.	
4.a	reduce a resolution of a first image of the one or more of the images of the media exposure environment to obtain a reduced-resolution image, and.	Tian discloses the effects of different image resolutions for facial analysis. [3.1]: “Subjects sat directly in front of the camera and performed a series of facial behaviors which were recorded in an observation room.” [Abstract]: “[T]he effects of different image resolutions... The lower resolution images are down-sampled from the originals.” Tian at [3.1] and [Abstract].
4.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	Tian discloses determining an orientation of the head with respect to the camera and performing pose estimation based on a reduced-resolution image. [3.2]: “[H]ead pose estimation can detect 98% faces for all the resolutions.” Tian at [3.2].

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
5.pre	The audience measurement system of claim 4, wherein the processor circuitry is to determine the audience identification information by	
5.a	generating a facial signature from a region of a second image of the one or more of the images corresponding to a location of the head in the reduced-resolution image, and	Tian discloses generating a reduced-resolution image and determining a face/head location in a first image and using this location for subsequent images unless a change is detected. [Abstract]: “[T]he effects of different image resolutions... The lower resolution images are down-sampled from the originals.” [2.2]: “To detect and track changes of facial components in near frontal face images, multi-state models are developed to extract the geometric facial features... Then, all face feature changes are automatically tracked in the image sequence.” Tian at [2.2] and [Abstract].
5.b	comparing the generated facial signature to a database of facial signatures	
6.pre	The audience measurement system of claim 4, wherein the processor circuitry is to	
6.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained	Tian discloses determining a face/head location in a first image and using this location for subsequent images unless a change is detected and obtaining a reduced-resolution image from the first image. [2.2]: “To detect and track changes of facial components in near frontal face images, multi-state models are developed to extract the geometric facial

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		features...Then, all face feature changes are automatically tracked in the image sequence.” [Abstract]: “[T]he effects of different image resolutions... The lower resolution images are down-sampled from the originals.” Tian at [2.2] and [Abstract].
6.b	analyze a portion corresponding to the identified region of a second image; and	
6.c	based on the analysis of the region of the second image, determine that the head matches the known person	
8.	The audience measurement system of claim 6, wherein the audience identification information includes an identifier associated with the known person and the processor circuitry is to, responsive to a determination that the head matches the known person, cause the identifier associated with the person to be stored in the memory.	
9.pre	An audience measurement system, comprising:	
9.a	an audience measurement device at a media exposure environment, the audience measurement device to	

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
9.b	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature;	
9.c	while the media content corresponding to the content identifying data is presented by the television, collect a first image of the media exposure environment with a camera;	<i>See claim limitations 1.c and 9.a.</i>
9.d	attempt to detect a head in the first image;	<i>See claim limitations 1.d and 9.a.</i> Tian discloses attempting to detect a head appearing in an image. [2]: “Head Pose Estimation: In order to handle the full range of head motion for expression analysis in real environments, we also evaluate head pose detection for different image resolutions.” Tian at [2].
9.e	determine an orientation of the head with respect to the camera	<i>See claim limitations 1.e and 9.a.</i> Tian discloses determining an orientation of the head with respect to the camera. Tian discloses the effects of different image resolutions for facial analysis. [3.1]: “Subjects sat directly in front of the camera and performed a series of facial behaviors which were recorded in an observation room.” Tian at [3.1].

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
9.f	determine audience identification information based on an indication that the head matches a known person associated with the audience measurement system; and	<i>See claim limitations 1.f and 9.a.</i>
9.g	a data collection facility to obtain the content identifying data and the audience identification information from the audience measurement device.	<i>See claim limitation 1.g.</i>
11.pre	The audience measurement system of claim 9, wherein the audience measurement device is to	<i>See claim 9.</i>
11.a	reduce a resolution of the first image of the media exposure environment to obtain a reduced-resolution image, and	<i>See claim limitations 4.a and 9.a.</i>
11.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	<i>See claim limitations 4.b and 9.a.</i>
12.pre	The audience measurement system of claim 11, wherein the audience measurement device is to	
12.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained; and	<i>See claim limitations 6.a and 9.a.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
12.b	analyze a portion of a second image corresponding to the identified region to determine whether the head matches the known person.	<i>See claim limitations 6.b and 9.a.</i>
13.	The audience measurement system of claim 12, wherein the audience identification information includes an identifier associated with the known person and the audience measurement device is to, responsive to the indication that the head matches the known person, cause recordation of the identifier associated with the known person in a memory.	<i>See claim 8 and limitation 9.a.</i>
14.pre	The audience measurement system of claim 11, wherein the audience measurement device is to determine the audience identification information by:	<i>See claim 11.</i>
14.a	generating a facial signature from a region of a second image corresponding to a location of the head in the reduced-resolution image, and	<i>See claim 11, claim limitations 5.a.</i>
14.b	comparing the generated facial signature to a database of facial signatures	<i>See claim 11, claim limitations 5.b.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
16.pre	A method for obtaining exposure data for a media exposure environment, the method comprising:	Tian discloses methods that include operations it teaches. <i>See claim 1.</i> [1]: “[T]he implementation details for the methods used in our evaluation in each step of facial expression analysis.” Tian at [1].
16.a	generating, using a program detector, an audio signature of media content presented by a television within the media exposure environment	<i>See claim limitation 1.b.</i>
16.b	obtaining, based on the audio signature, content identifying data corresponding to the presented media content	<i>See claim limitations 1.c, 9.b, and 16.pre.</i>
16.c	while the media content corresponding to the content identifying data is presented by the television, capturing first and second images of the media exposure environment with a camera	Tian discloses obtaining a sequence of images of human subjects using a camera. <i>See claim limitations 1.d and 9.c.</i> [3.1]: “Subjects sat directly in front of the camera and performed a series of facial behaviors which were recorded in an observation room.” Tian at [3.1].
16.d	analyzing, using an audience detector, the first image to attempt to detect a head in the first image	Tian discloses analyzing an image to attempt to detect a head appearing in an image using face detection techniques. <i>See claim limitations 1.d and claim limitation 9.d.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art												
		[3.1]: “The database contains 704 image sequences from 97 subjects.” [3.2]: “All images in 704 sequences from 97 subjects are used for face detection and head pose estimation.” Tian at [3.1] and [3.2].												
16.e	determining, using the audience detector, an orientation of the head with respect to the camera	<i>See claim limitations 1.e and claim limitation 9.e.</i> Tian discloses determining an orientation of the head with respect to the camera. Tian at [2.1]. <table><tr><td>Poses</td><td>Frontal or near frontal</td><td>Side view or profile</td><td>Others</td></tr><tr><td>Definitions</td><td>Both eyes and lip corners are visible</td><td>One eye or one lip corner is occluded</td><td>Not enough facial features</td></tr><tr><td>Examples</td><td></td><td></td><td></td></tr></table> [1]: “[P]ose estimation can be applied[.]” Tian at [1].	Poses	Frontal or near frontal	Side view or profile	Others	Definitions	Both eyes and lip corners are visible	One eye or one lip corner is occluded	Not enough facial features	Examples			
Poses	Frontal or near frontal	Side view or profile	Others											
Definitions	Both eyes and lip corners are visible	One eye or one lip corner is occluded	Not enough facial features											
Examples														
16.f	determining, using the audience detector, audience identification	<i>See claim limitations 1.f and claim limitation 9.f.</i>												

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	information based on an indication that the head matches a known person associated with the to a data collection facility. audience detector; and	
16.g	providing the content identifying data and the audience identification information to a data collection facility.	<i>See claim limitations 1.g, 9.g, and 16.pre.</i>
18.pre	The method of claim 16, further comprising	
18.a	reducing a resolution of the first image of the media exposure environment to obtain a reduced-resolution image, and	<i>See claim limitation 11.a and 16.pre. .</i>
18.b	wherein the determining of the orientation of the head includes determining the orientation of the head with respect to the camera using the reduced-resolution image.	<i>See claim limitation 11.b and 16.pre.</i>
19.pre	The method of claim 18, further comprising	
19.a	identifying a region corresponding to the head within the first image from which the reduced-resolution image was obtained;	<i>See claim limitation 12.a and 16.pre. .</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
19.b	analyzing a portion of the second image corresponding to the identified region; and	<i>See claim limitation 12.b and 16.pre.</i>
19.c	based on the analyzing of the region of the second image, determining whether the head matches the known person	<i>See claim limitation 12.b and 16.pre.</i>
20.	The method of claim 19, wherein the audience identification information includes an identifier associated with the known person, and further including recording the identifier associated with the known person in a memory.	<i>See claim 13.</i>

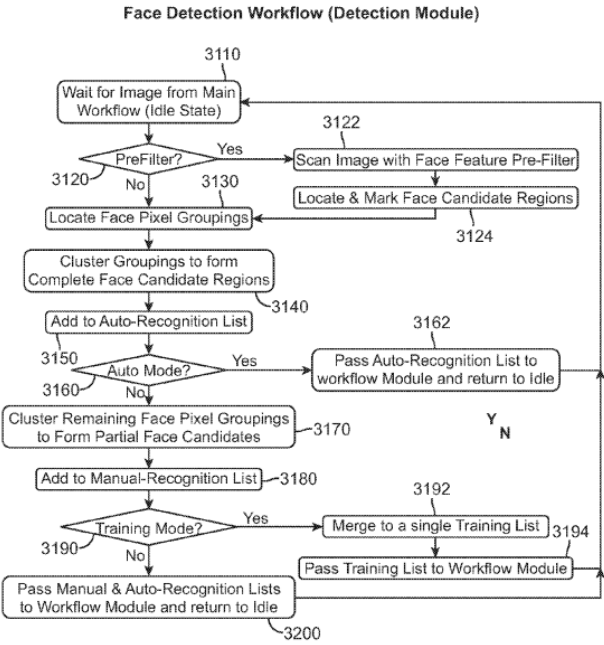
Exhibit A4

Exhibit A4 – Invalidity Claim Chart for U.S. Patent No. 11,470,243 ('243 Patent)

US Patent No. 2010/0066822 (“Steinberg”)

Steinberg was filed September 4, 2009 and published March 18, 2010. Therefore, **Steinberg** is prior art under pre-AIA §102(b) because it was published over one year before December 15, 2011. The below exemplary disclosure shows how **Steinberg** anticipates and/or renders obvious claims 4–6, 8, 11–14, 18–20 of the '243 Patent.

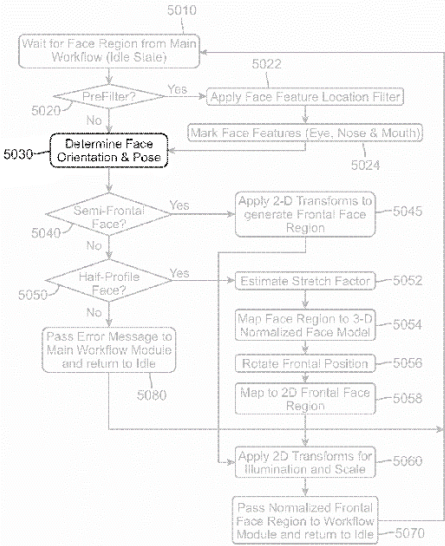
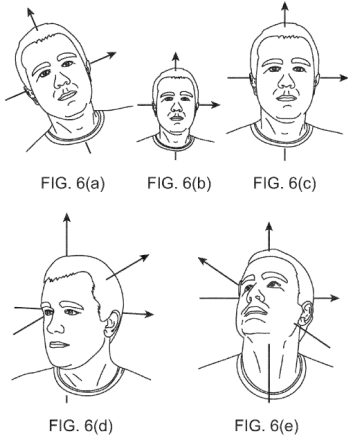
Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
1.pre	1. An audience measurement system to obtain exposure data for a media exposure environment, the audience measurement system comprising:	
1.a.	memory; machine readable instructions; and processor circuitry to execute the machine readable instructions to;	
1.b	generate an audio signature of media content presented by a television within the media exposure environment;;	
1.c	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature of the media content presented by the television within the media exposure environment;;	
1.d	analyze a sequence of images of the media exposure environment to detect a head appearing in one or	Steinberg teaches obtaining a sequence of images by a camera, adding sets of new images, when new image(s) are acquired, a Face Detection module is alerted

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	more of the images, the sequence of images obtained by a camera while the media content corresponding to the content identifying data is presented by the television:	to further process the image(s), analyzing a sequence of images by disclosing analyzing multiple images, and face detection. Steinberg at FIG. 3.  <pre> graph TD 3110[Wait for Image from Main Workflow Idle State] --> 3120{PreFilter?} 3120 -- Yes --> 3122[Scan Image with Face Feature Pre-Filter] 3120 -- No --> 3130[Locate Face Pixel Groupings] 3122 --> 3124[Locate & Mark Face Candidate Regions] 3124 --> 3130 3130 --> 3140[Cluster Groupings to form Complete Face Candidate Regions] 3140 --> 3150{Auto Mode?} 3150 -- Yes --> 3162[Pass Auto-Recognition List to workflow Module and return to Idle] 3150 -- No --> 3160[Cluster Remaining Face Pixel Groupings to Form Partial Face Candidates] 3160 --> 3170[Add to Manual-Recognition List] 3170 --> 3180{Training Mode?} 3180 -- Yes --> 3192[Merge to a single Training List] 3180 -- No --> 3190[Pass Manual & Auto-Recognition Lists to Workflow Module and return to Idle] 3192 --> 3194[Pass Training List to Workflow Module] 3194 --> 3190 3162 --> 3110 3190 --> 3110 </pre> FIG. 3 [0010]: “Such an image collection is in a constant state of growth as new sets of images are added every time the user off-loads pictures from the camera onto his computer.” [0128]: “In the embodiment described here a compressed Micro Classification Database 1360 provides an initial dataset for the Face Recognition module 1390). If the Image Capture Device 1300 is set to operate in “recognition mode then the

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Image Acquisition Process 1325 will alert the Face Detection module 1380 when a new image is successfully acquired. If face candidate regions are present in this image the Face Detection module [1380] will alert the Embedded Workflow module 1370 which may use the information derived from the face candidate regions to interact with the user of the Image Capture Device 1300 or may pass the extracted face candidate regions on to the Face Recognition module 1390 to obtain the relevant Faceprint. In this embodiment the Workflow module 1370 does not implement a detailed recognition process, but does store the locations of any candidate face regions and any derived Faceprint(s) in the Metadata of the image. The main recognition process is initiated when images are uploaded from the Image Capture Device 1300 to a user's Personal Image Collection 1470 and essentially follows the same steps described above except that in this embodiment (i) the Face Detection process has already been implemented in the camera and the location of face candidate regions is already available in the image Metadata and (ii) a preliminary Faceprint or even a Recognition Match for each face candidate region may also be available, depending on the quality of the detected candidate region(s).” [0129]: “FIG. 1 (c) schematically illustrates the in-camera user interface (UI) modules 1500, the workflow module 1610 and the image acquisition engine 1600 each implemented entirely within a digital camera or other image capture device.” [0092]: “An image detection module determines when new images are added to the image collection and alerts the main workflow module which then activates a face detection module which scans the image to determine if faces are present. If faces are found, then they are preferably normalized and face prints are generated. Then, the images and face prints, together with the locations of the detected facial-regions and other face classifier parameter data, are made available for the face recognition module to extract, enhance and scan the facial regions and compares their faceprints with a database of “known faceprints’.”

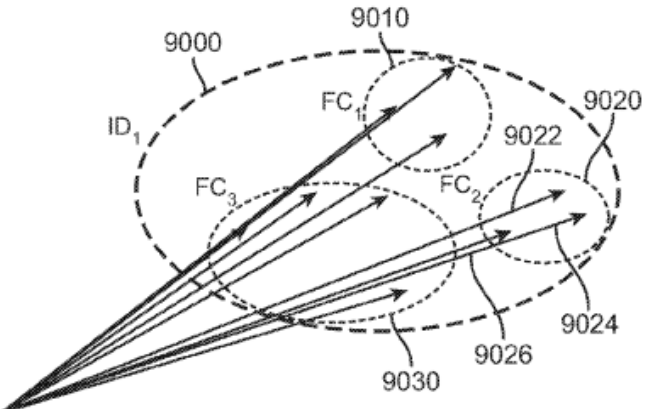
Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0117]: “The first of these modules is an Image Detection module [1120] alerts the system that at least one new image has been obtained from Some external image source.” [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.” [0151]: “FIG. 3 illustrates the Face Detection Workflow as implemented by the relevant modules in FIGS. 1(a)-1(b). The system sits in a wait state [3110] until the Image Detection Module [1120] informs the Face Detection module that an image is available for processing. If a Prefilter setting is active [3120] the module will initially apply the Prefilter Scan [3122] and recording location information on any potential face candidate regions [3124].” [Abstract]: “[P]erforms a method including identifying a group of pixels corresponding to a face region within digital image data acquired by an image acquisition device. A set of face analysis parameter values is extracted from said face region, including a faceprint associated with the face region. First and second reference face prints are determined for a person using reference images captured respectively in predetermined face-portrait conditions and using ambient conditions. The faceprints are analyzed to determine a baseline faceprint and a range of variability from the baseline associated with the person.” [0005]: “The techniques of face detection and face recognition are each being explored by those skilled and a great many advancement have been made in those respective fields in recent years. Face detection has to do with the problem of locating regions within a digital image or video sequence which have a high probability of representing a human face. Face recognition involves the analysis

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		of such a “face region’ and its comparison with a database of known faces to determine if the unknown “face region’ is sufficiently similar to any of the known faces to represent a high probability match.” [0057]: “Face Detection’ involves the art of isolating and detecting faces in an image; Face Detection includes a process of determining whether a human face is present in an input image, and may include or is preferably used in combination with determining a position and/or other features, properties, parameters or values of parameters of the face within the input image[.]” [0233]: “A method of generating one or more new digital images using an original digitally-acquired image including a face is further provided. One or more groups of pixels may be identified that correspond to two or more faces within the original digitally-acquired image. A portion of the original image may be selected to include the group of pixels. Values of pixels may be automatically generated of one or more new images based on the selected portion in a manner which always includes at least one of the two or more faces within the one or more new images or a panning intermediate image between two of the faces of said two or more identified faces or a combination thereof.” Steinberg at [0010], [0128], [0092], [0117], [0130], [0151], [Abstract], [0005], [0057], and [0233].
1.e	determine an orientation of the head with respect to the camera; and,	Steinberg discloses normalizing detected faces. Steinberg at FIG. 5(a) and 6(a)-6(e).

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Face Normalization Module (Mode A)  <pre> graph TD 5010[Wait for Face Region from Main Workflow (Idle State)] --> 5020{PreFilter?} 5020 -- Yes --> 5022[Apply Face Feature Location Filter] 5020 -- No --> 5030[Determine Face Orientation & Pose] 5022 --> 5024[Mark Face Features (Eye, Nose & Mouth)] 5024 --> 5030 5030 --> 5040{Semi-Frontal Face?} 5040 -- Yes --> 5045[Apply 2-D Transforms to generate Frontal Face Region] 5040 -- No --> 5050{Half-Profile Face?} 5050 -- Yes --> 5052[Estimate Stretch Factor] 5052 --> 5054[Map Face Region to 3-D Normalized Face Model] 5054 --> 5056[Rotate Frontal Position] 5056 --> 5058[Map to 2D Frontal Face Region] 5058 --> 5060[Apply 2D Transforms for Illumination and Scale] 5060 --> 5070[Pass Normalized Frontal Face Region to Workflow Module and return to Idle] 5050 -- No --> 5080[Pass Error Message to Main Workflow Module and return to Idle] </pre> FIG. 5(a)  FIG. 6(a) FIG. 6(b) FIG. 6(c) FIG. 6(d) FIG. 6(e)

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0092]: “If faces are found, then they are preferably normalized and face prints are generated.” [0120]: “These are then passed to the Face Normalization module [1190] which analyzes the lighting, pose, facial features and/or orientation of each face candidate region. Following this analysis, which may involve referencing the entire original image in certain cases, the Face Normalization module [1190] performs certain transformations, shape & texture analysis and filtering on each candidate region and then passes the normalized region back to the Workflow Core module [1110]. This normalized face candidate region will now become the input to the Face Recognition module [1140]. [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.” [0136]: “In a further embodiment, such normalizations may be advantageously achieved using a handheld imaging device.” [0166]: “[T]he Face Normalization module ... analyzes the ... pose, ... orientation of each face candidate region.” [0168]: “[U]tilize a technique which is based on determining the 2-D projection of the 3-D eye-mouth triangle onto the face candidate region. The anthropometric data indicates that the region delineated by these face features forms an equilateral triangle in the plane of the face for the majority of persons. Thus, from the shape of the 2-D projection of this region, it is possible to determine the plane of the face, and thereby extrapolate the pose distortion [5030].”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0176]: “[D]etermine the facial pose which, in our preferred embodiment, is calculated based on the relative positions of the principle face features (eyes, nose, mouth and, occasionally, ears, hairline and chin). Now information on the locations of the features may already be determined by the face detection module and passed to the normalization module with the image, or may be contained within the image metadata.” [0121]: “[T]he face candidate region can be mapped onto a 3D face model which preserves the shape and texture of the original 2D image and allows non-linear lighting and pose compensation to be performed more accurately. Following Such compensation, the corrected 3D facial model is projected onto a new, frontal and lighting normalized 2D facial image. [0167]: “[O]ther physical characteristics which can influence the recognition process are illustrated in FIGS. 6(a)-6(e). The most common of these, but also the more straight-forward of these to handle, as they relate to frontal, or semi-frontal face candidate regions, are in-plane rotation of the face, illustrated by FIG. 6(a) and scaling variations in the size of the face candidate region, illustrated in FIG. 6(b). The ideal face candidate region which is fully frontal and is free of rotational or scaling distortions, is illustrated in FIG. 6(c). The more difficult distortions of a face candidate region occur when the face is rotated to face to the left (or right) so that it appears in a semi-profile as illustrated in FIG. 6(d) Note: If it is rotated to 45 degrees we shall refer to this as half-profile; to 90 degrees as full-profile. Equally difficult to correct is the case when the face candidate region is rotated so that the face looks up (or down) as illustrated in FIG. 6(e).” [0173]: “[F]ace recognition datasets associated with left/right pitch rotations of 0, 15, 30, 45, 60, 70 and 90 degrees and for up/down yaw rotations of 0, 15, 30 and 45 degrees.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Steinberg at [0092], [0120], [0130], [0136], [0166], [0168], [0176], [0121], [0167], and [0173].
1.f	determine audience identification information based on a match of the head to a known person associated with the media exposure environment; and	Steinberg teaches determining identification information, based on a match of the head to a known person and face recognition based a match between a face region in an image and a known face. Steinberg at FIG. 9(a) and FIG. 4(b).  FIG. 9(a)

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Core System Workflow (Workflow Module II) FIG. 4(b) [0005]: “The techniques of face detection and face recognition are each being explored by those skilled and a great many advancement have been made in those respective fields in recent years. Face detection has to do with the problem of locating regions within a digital image or video sequence which have a high probability of representing a human face. Face recognition involves the analysis of such a “face region' and its comparison with a database of known faces to determine if the unknown “face region' is sufficiently similar to any of the known faces to represent a high probability match.” [0057]: “Face Detection' involves the art of isolating and detecting faces in an image; Face Detection includes a process of determining whether a human face is

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		present in an input image, and may include or is preferably used in combination with determining a position and/or other features, properties, parameters or values of parameters of the face within the input image[.]” [0092]: “An image detection module determines when new images are added to the image collection and alerts the main workflow module which then activates a face detection module which scans the image to determine if faces are present. If faces are found, then they are preferably normalized and face prints are generated. Then, the images and face prints, together with the locations of the detected facial-regions and other face classifier parameter data, are made available for the face recognition module to extract, enhance and scan the facial regions and compares their faceprints with a database of “known faceprints’.” [0092]: “[T]he face recognition module ... compares their faceprints with a database of ‘known faceprints’.” [0126]: “The role of the Face Recognition module 1140) is to generate a feature vector, or Faceprint, for a face candidate region identified in an image.” [0127]: “[T]he Face Detection, Face Recognition and Core Workflow process are implemented in the camera and the information about the image that is determined from these processes may be incorporated in individual images as Image Metadata[.]” [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0135]: “[A]ccount may be taken of local acquisition conditions. Each person may have multiple identities associated with him or her. Each identity may include one or more face classes.” [0099]: “Each person may have multiple identities... Each identity may include one or more face classes.” [0178]: “FIG. 9(a) shows a graphical representation of how multiple, distinct, face classes formed from collections of closely collocated faceprints can be used to define a unique region in Face Space which is associated with a particular Identity Region for a “known person’[.]” [0156]: “Firstly, a search of all the known Faceprints, or of a selected sub-set when working in semi-automatic mode, which have been recorded by the Image Classification Engine is made and the distance between the current Faceprint and each of these is calculated [4220].” [0157]: “After this distance calculation, the search algorithm first determines if the N closest matches lie within the same Face Class.” Steinberg at [0005], [0057], [0092], [0126]-[0127], [0130], [0135], [0099], [0178], and [0156]-[0157].
1.g	network interface circuitry to output a signal indicative of the content identifying data and the audience identification information to a data collection facility	Steinberg discloses a local device (e.g., a camera) outputting data to an image classification database. [0131]: “The camera shown is configured for preferably wirelessly networking over a network 1720, e.g., over the internet, to off-camera data storage 1750.” Steinberg at [0131].

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
4.pre	4. The audience measurement system of claim 1, wherein the processor circuitry is to:.	
4.a	reduce a resolution of a first image of the one or more of the images of the media exposure environment to obtain a reduced-resolution image, and.	Steinberg discloses processing images of different resolutions. [0141]: “[A]n image of the person for whom we wish to determine a local face class is captured with the camera in flash mode, enabling it to compensate for any deficiency in the ambient illumination conditions. Then a second image is captured in non-flash mode, or at a lower resolution or with faster exposure settings. This second image provides a measure of the variability introduced by the ambient conditions.” [0142]: “[A]s it may be captured at a lower resolution than the main image acquisition and at a fixed exposure and acquisition rate (typically 30-60 fps), no compensation for illumination conditions is typically performed on this preview stream.” [0196]: “Selective compression, or alternatively selective resolution, or both, of images may be suggested or automatically provided where one or more faces receive higher grade compression and/or alternatively higher local resolution than other portions of the image.” Steinberg at [0141]-[0142] and [0196].
4.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	
5.pre	The audience measurement system of claim 4, wherein the processor	

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	circuitry is to determine the audience identification information by	
5.a	generating a facial signature from a region of a second image of the one or more of the images corresponding to a location of the head in the reduced-resolution image, and	Steinberg discloses generating a facial signature from a region of an image corresponding to a location of the head. [0092]: “An image detection module determines when new images are added to the image collection and alerts the main workflow module which then activates a face detection module which scans the image to determine if faces are present. If faces are found, then they are preferably normalized and face prints are generated. Then, the images and face prints, together with the locations of the detected facial-regions and other face classifier parameter data, are made available for the face recognition module to extract, enhance and scan the facial regions and compares their faceprints with a database of “known faceprints’.” [0096]: “When a faceprint is returned to the main workflow module from the face recognition module the “N’ most probable matches are determined by searching the face recognition data tables in the image classification database and if the majority of these matches have the same “identity”, and the workflow module is running in “automatic mode’, then a successful “automatic match’ is considered to have taken place. If, however, there are several equally probable identity matches, or the workflow module is running in “manual’ or “learning mode, then the face recognition module passes these images onto the workflow module which then presents these possible matches to the user and requests that they select a matching “person’ for this facial image.” [0126]: “The role of the Face Recognition module 1140) is to generate a feature vector, or Faceprint, for a face candidate region identified in an image. This is returned to the Workflow Core module 1110 where the generated Faceprint is compared with existing identity regions and face classes.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0127]: “[T]he Face Detection, Face Recognition and Core Workflow process are implemented in the camera and the information about the image that is determined from these processes may be incorporated in individual images as Image Metadata[.]” [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.” [0077]: “An “archived faceprint” is a set of face classifier parameters associated with a particular fate region ultimately extracted from a parent image and preferably normalized, and stored in the main recognition database, preferably along with links to the parent image and the face region.” [0124]: “The faceprint may be stored for each face region.” [0178]: “FIG. 9(a) shows a graphical representation of how multiple, distinct, face classes formed from collections of closely collocated faceprints can be used to define a unique region in Face Space which is associated with a particular Identity Region for a “known person’[.]” [0118]: “Once at least one new image is detected it is preferably then analyzed by the Face Detection module [1130]. This module employs a means to determine if facial candidate regions are present in the new image.” [0120]: “These are then passed to the Face Normalization module [1190] which analyzes the lighting, pose, facial features and/or orientation of each face candidate region. Following this analysis, which may involve referencing the entire original image in certain cases, the Face Normalization module [1190]

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		performs certain transformations, shape & texture analysis and filtering on each candidate region and then passes the normalized region back to the Workflow Core module [1110]. This normalized face candidate region will now become the input to the Face Recognition module [1140]. Steinberg at [0077], [0092], [0096], [0118], [0120], [0124], [0126]-[0127], [0130], and [0178].
5.b	comparing the generated facial signature to a database of facial signatures	Steinberg discloses comparing the generated facial signature to a database of facial signatures and determining the audience identification information. [0092]: “An image detection module determines when new images are added to the image collection and alerts the main workflow module which then activates a face detection module which scans the image to determine if faces are present. If faces are found, then they are preferably normalized and face prints are generated. Then, the images and face prints, together with the locations of the detected facial-regions and other face classifier parameter data, are made available for the face recognition module to extract, enhance and scan the facial regions and compares their faceprints with a database of “known faceprints’.” [0096]: “When a faceprint is returned to the main workflow module from the face recognition module the “N’ most probable matches are determined by searching the face recognition data tables in the image classification database and if the majority of these matches have the same “identity”, and the workflow module is running in “automatic mode’, then a successful “automatic match’ is considered to have taken place. If, however, there are several equally probable identity matches, or the workflow module is running in “manual’ or “learning mode, then the face recognition module passes these images onto the workflow mod ule which then presents these possible matches to the user and requests that they select a matching “person’ for this facial image.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0126]: “The role of the Face Recognition module 1140) is to generate a feature vector, or Faceprint, for a face candidate region identified in an image. This is returned to the Workflow Core module 1110 where the generated Faceprint is compared with existing identity regions and face classes.” [0127]: “[T]he Face Detection, Face Recognition and Core Workflow process are implemented in the camera and the information about the image that is determined from these processes may be incorporated in individual images as Image Metadata[.]” [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.” [0099]: “Each person may have multiple identities... Each identity may include one or more face classes.” [0135]: “[A]ccount may be taken of local acquisition conditions. Each person may have multiple identities associated with him or her. Each identity may include one or more face classes.” [0156]: “Firstly, a search of all the known Faceprints, or of a selected sub-set when working in semi-automatic mode, which have been recorded by the Image Classification Engine is made and the distance between the current Faceprint and each of these is calculated [4220].” [0157]: “After this distance calculation, the search algorithm first determines if the N closest matches lie within the same Face Class.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		Steinberg at [0092], [0096], [0124], [0126]-[0127], [0130], [0135], [0099], [0178], and [0156]-[0157].
6.pre	The audience measurement system of claim 4, wherein the processor circuitry is to	.
6.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained	Steinberg discloses analyzing images to detect a “face region,” which is a region corresponding to the face and head. [Abstract]: “[P]erforms a method including identifying a group of pixels corresponding to a face region within digital image data acquired by an image acquisition device.” [0005]: “The techniques of face detection and face recognition are each being explored by those skilled and a great many advancement have been made in those respective fields in recent years. Face detection has to do with the problem of locating regions within a digital image or video sequence which have a high probability of representing a human face. Face recognition involves the analysis of such a “face region’ and its comparison with a database of known faces to determine if the unknown “face region’ is sufficiently similar to any of the known faces to represent a high probability match.” [0057]: “Face Detection’ involves the art of isolating and detecting faces in an image; Face Detection includes a process of determining whether a human face is present in an input image, and may include or is preferably used in combination with determining a position and/or other features, properties, parameters or values of parameters of the face within the input image[.]” [0118]: “Once at least one new image is detected it is preferably then analyzed by the Face Detection module [1130]. This module employs a means to determine if facial candidate regions are present in the new image.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0128]: “In the embodiment described here a compressed Micro Classification Database 1360 provides an initial dataset for the Face Recognition module 1390). If the Image Capture Device 1300 is set to operate in “recognition mode then the Image Acquisition Process 1325 will alert the Face Detection module 1380 when a new image is successfully acquired. If face candidate regions are present in this image the Face Detection module [1380] will alert the Embedded Workflow module 1370 which may use the information derived from the face candidate regions to interact with the user of the Image Capture Device 1300 or may pass the extracted face candidate regions on to the Face Recognition module 1390 to obtain the relevant Faceprint. In this embodiment the Workflow module 1370 does not implement a detailed recognition process, but does store the locations of any candidate face regions and any derived Faceprint(s) in the Metadata of the image. The main recognition process is initiated when images are uploaded from the Image Capture Device 1300 to a user's Personal Image Collection 1470 and essentially follows the same steps described above except that in this embodiment (i) the Face Detection process has already been implemented in the camera and the location of face candidate regions is already available in the image Metadata and (ii) a preliminary Faceprint or even a Recognition Match for each face candidate region may also be available, depending on the quality of the detected candidate region(s).” [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.” [0151]: “FIG. 3 illustrates the Face Detection Workflow as implemented by the relevant modules in FIGS. 1(a)-1(b). The system sits in a wait state [3110] until the Image Detection Module [1120] informs the Face Detection module that an image is available for processing. If a Prefilter setting is active [3120] the module

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		will initially apply the Prefilter Scan [3122] and recording location information on any potential face candidate regions [3124].” Steinberg at [Abstract], [0005], [0057], [0118], [0128], [0130], [0099] and [0151].
6.b	analyze a portion corresponding to the identified region of a second image; and	Steinberg discloses analyzing a portion corresponding to the identified region of the head or face. [0092]: “An image detection module determines when new images are added to the image collection and alerts the main workflow module which then activates a face detection module which scans the image to determine if faces are present. If faces are found, then they are preferably normalized and face prints are generated. Then, the images and face prints, together with the locations of the detected facial-regions and other face classifier parameter data, are made available for the face recognition module to extract, enhance and scan the facial regions and compares their faceprints with a database of “known faceprints'.” [0096]: “When a faceprint is returned to the main workflow module from the face recognition module the “N' most probable matches are determined by searching the face recognition data tables in the image classification database and if the majority of these matches have the same “identity”, and the workflow module is running in “automatic mode', then a successful “automatic match' is considered to have taken place. If, however, there are several equally probable identity matches, or the workflow module is running in “manual' or “learning mode, then the face recognition module passes these images onto the workflow mod ule which then presents these possible matches to the user and requests that they select a matching “person’ for this facial image.” [0126]: “The role of the Face Recognition module 1140) is to generate a feature vector, or Faceprint, for a face candidate region identified in an image.”

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		[0127]: “[T]he Face Detection, Face Recognition and Core Workflow process are implemented in the camera and the information about the image that is determined from these processes may be incorporated in individual images as Image Metadata[.]” Steinberg at [0092], [0096], and [00126]-[0127].
6.c	based on the analysis of the region of the second image, determine that the head matches the known person	Steinberg discloses to determine that the head matches the known person based on the analysis. [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.” [0135]: “[A]ccount may be taken of local acquisition conditions. Each person may have multiple identities associated with him or her. Each identity may include one or more face classes.” [0156]: “Firstly, a search of all the known Faceprints, or of a selected sub-set when working in semi-automatic mode, which have been recorded by the Image Classification Engine is made and the distance between the current Faceprint and each of these is calculated [4220].” [0157]: “After this distance calculation, the search algorithm first determines if the N closest matches lie within the same Face Class.” [0178]: “FIG. 9(a) shows a graphical representation of how multiple, distinct, face classes formed from collections of closely collocated faceprints can be used to

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		define a unique region in Face Space which is associated with a particular Identity Region for a “known person”[.]” Steinberg at [0130], [00135], [00165]-[0157], and [0178].
8.	The audience measurement system of claim 6, wherein the audience identification information includes an identifier associated with the known person and the processor circuitry is to, responsive to a determination that the head matches the known person, cause the identifier associated with the person to be stored in the memory.	Steinberg discloses storing identification information in association with faceprints. [0099]: “Each person may have multiple identities... Each identity may include one or more face classes.” [0150]: “The data stored in this set of database tables is directly associated with known Identity Regions, Face Class Regions[.]” Steinberg at [0099] and [0150].
9.pre	An audience measurement system, comprising:	<i>See claim 1.pre.</i>
9.a	an audience measurement device at a media exposure environment, the audience measurement device to	<i>See Claim 1.</i>
9.b	obtain content identifying data corresponding to the presented media content, the content identifying data based on the audio signature;	<i>See claim limitations 1.b, 1.c, and 9.a.</i>
9.c	while the media content corresponding to the content identifying data is presented by the television, collect a first image of the	<i>See claim limitations 1.c and 9.a.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
	media exposure environment with a camera;	
9.d	attempt to detect a head in the first image;	<i>See claim limitations 1.d and 9.a.</i>
9.e	determine an orientation of the head with respect to the camera	<i>See claim limitations 1.e and 9.a.</i>
9.f	determine audience identification information based on an indication that the head matches a known person associated with the audience measurement system; and	Steinberg discloses associating a detected face with identity information of a matched faceprint of a known person. <i>See claim limitations 1.f and 9.a.</i> [0092]: “An image detection module determines when new images are added to the image collection and alerts the main workflow module which then activates a face detection module which scans the image to determine if faces are present. If faces are found, then they are preferably normalized and face prints are generated. Then, the images and face prints, together with the locations of the detected facial-regions and other face classifier parameter data, are made available for the face recognition module to extract, enhance and scan the facial regions and compares their faceprints with a database of “known faceprints'.” [0096]: “When a faceprint is returned to the main workflow module from the face recognition module the “N' most probable matches are determined by searching the face recognition data tables in the image classification database and if the majority of these matches have the same “identity”, and the workflow module is running in “automatic mode', then a successful “automatic match' is considered to have taken place. If, however, there are several equally probable identity matches, or the workflow module is running in “manual' or “learning mode, then the face recognition module passes these images onto the workflow mod ule which then

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
		presents these possible matches to the user and requests that they select a matching “person” for this facial image.” [0126]: “The role of the Face Recognition module 1140) is to generate a feature vector, or Faceprint, for a face candidate region identified in an image.” [0127]: “[T]he Face Detection, Face Recognition and Core Workflow process are implemented in the camera and the information about the image that is determined from these processes may be incorporated in individual images as Image Metadata[.]” [0130]: “These stored images are then preferably processed by the face detection module [1630], face normalization module [1690], when one or more faces are detected within the acquired images, and face recognition module [1640] which compares face classifier parameter values of the normalized face regions, or face prints, with archived face prints to discern whether there are matches with known identities.” [0157]: “After this distance calculation, the search algorithm first determines if the N closest matches lie within the same Face Class.” Steinberg at [0092], [0096], [0092], [0126]-[0127], [0130], and [0157].
9.g	a data collection facility to obtain the content identifying data and the audience identification information from the audience measurement device.	<i>See claim limitation 1.g.</i>
11.pre	The audience measurement system of claim 9, wherein the audience measurement device is to	<i>See claim 9.</i>

Claims	U.S. Patent No. 11,470,243	Exemplary Evidence in Prior Art
11.a	reduce a resolution of the first image of the media exposure environment to obtain a reduced-resolution image, and	<i>See claim limitations 4.a and 9.a.</i>
11.b	determine the orientation of the head with respect to the camera based on the reduced-resolution image	<i>See claim limitations 4.b and 9.a.</i>
12.pre	The audience measurement system of claim 11, wherein the audience measurement device is to	<i>See claim 11.</i>
12.a	identify a region corresponding to the head within the first image from which the reduced-resolution image was obtained; and	<i>See claim limitations 6.a and 9.a.</i>
12.b	analyze a portion of a second image corresponding to the identified region to determine whether the head matches the known person.	Steinberg discloses determining whether the head matches the known person. <i>See claim limitations 6.b and 9.a.</i> [0126]: “The role of the Face Recognition module 1140) is to generate a feature vector, or Faceprint, for a face candidate region identified in an image.” Steinberg at [0126].
13.	The audience measurement system of claim 12, wherein the audience identification information includes an identifier associated with the known person and the audience measurement device is to, responsive	<i>See claim 8 and limitation 9.a.</i>

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	to the indication that the head matches the known person, cause recordation of the identifier associated with the known person in a memory.	
14.pre	The audience measurement system of claim 11, wherein the audience measurement device is to determine the audience identification information by:	<i>See claim 11.</i>
14.a	generating a facial signature from a region of a second image corresponding to a location of the head in the reduced-resolution image, and	<i>See claim 11, claim limitations 5.a.</i>
14.b	comparing the generated facial signature to a database of facial signatures	<i>See claim 11, claim limitations 5.b.</i>
16.pre	A method for obtaining exposure data for a media exposure environment, the method comprising:	Steinberg discloses methods that includes operations it teaches. <i>See Claim 1.</i> [Abstract]: “[P]erforms a method including identifying a group of pixels corresponding to a face region within digital image data acquired by an image acquisition device.” [0090]: “A system, method and techniques are now described for applying digital image processing using face detection and face recognition techniques to identify

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		the persons contained within a digital image, which may be part of a personal or other image collection.” Steinberg at [Abstract] and [0090].
16.a	generating, using a program detector, an audio signature of media content presented by a television within the media exposure environment	<i>See claim limitation 1.b.</i>
16.b	obtaining, based on the audio signature, content identifying data corresponding to the presented media content	<i>See claim limitations 1.c, 9.b, and 16.pre.</i>
16.c	while the media content corresponding to the content identifying data is presented by the television, capturing first and second images of the media exposure environment with a camera	<i>See claim limitations 1.d and 9.c.</i>
16.d	analyzing, using an audience detector, the first image to attempt to detect a head in the first image	<i>See claim limitations 1.d and claim limitation 9.d.</i>
16.e	determining, using the audience detector, an orientation of the head with respect to the camera	<i>See claim limitations 1.e and claim limitation 9.e.</i>
16.f	determining, using the audience detector, audience identification information based on an indication that the head matches a known	<i>See claim limitations 1.f and claim limitation 9.f.</i>

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	person associated with the to a data collection facility. audience detector; and	
16.g	providing the content identifying data and the audience identification information to a data collection facility.	<i>See claim limitations 1.g, 9.g, and 16.pre.</i>
18.pre	The method of claim 16, further comprising	
18.a	reducing a resolution of the first image of the media exposure environment to obtain a reduced-resolution image, and	<i>See claim limitation 11.a and 16.pre. .</i>
18.b	wherein the determining of the orientation of the head includes determining the orientation of the head with respect to the camera using the reduced-resolution image.	<i>See claim limitation 11.b and 16.pre.</i>
19.pre	The method of claim 18, further comprising	
19.a	identifying a region corresponding to the head within the first image from which the reduced-resolution image was obtained;	<i>See claim limitation 12.a and 16.pre. .</i>
19.b	analyzing a portion of the second image corresponding to the identified region; and	<i>See claim limitation 12.b and 16.pre.</i>

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19.c	based on the analyzing of the region of the second image, determining whether the head matches the known person	<i>See claim limitation 12.b and 16.pre.</i>
20.	The method of claim 19, wherein the audience identification information includes an identifier associated with the known person, and further including recording the identifier associated with the known person in a memory.	<i>See claim 13.</i>