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(54) **SYSTEMS AND METHODS FOR SIMULATING A PARTICULAR USER IN AN INTERACTIVE COMPUTER SYSTEM**

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Related U.S. Application Data

(63) Continuation-in-part of application No. 11/252,695, filed on Oct. 17, 2005, now abandoned, which is a continuation-in-part of application No. 11/105,734, filed on Apr. 13, 2005.

(51) **Int. Cl.**
A63F 9/24 (2006.01)

(52) **U.S. Cl.** **463/6**

(58) **Field of Classification Search** 463/1, 4, 463/7, 13, 23, 32, 41–43, 6
See application file for complete search history.

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Assistant Examiner — Eric M Thomas
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(57) **ABSTRACT**

The field of the invention relates to interactive computer systems and more particularly to systems and methods for simulating a particular user's behavior in an interactive computer system. In one embodiment, a computer program product includes a simulator configured to simulate a user interacting with a computer program. The simulator includes a learning mode of operation and a simulation mode of operation. During the learning mode, the simulator is configured to monitor the user's interaction with the computer program for one or more events and analyze one or more current circumstances during the occurrence of the one or more events. The simulator is further configured to record one or more user inputs in response to the occurrence of the one or more events, store the one or more user inputs in one or more data fields, and associate the one or more data fields with the one or more events and the one or more current circumstances. During the simulation mode of operation, the simulator is configured to monitor the computer program for the one or more particular events, retrieve the one or more data fields associated with the one or more particular events, analyze one or more current circumstances upon the occurrence of the one or more particular events, and invoke one or more simulated inputs based on the value of the one or more data fields in response to the occurrence of the one or more events and the one or more current circumstances.

24 Claims, 16 Drawing Sheets

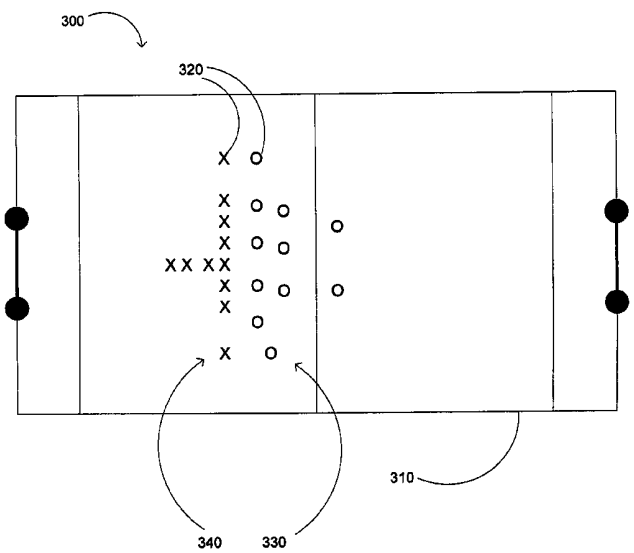

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Fig. 1

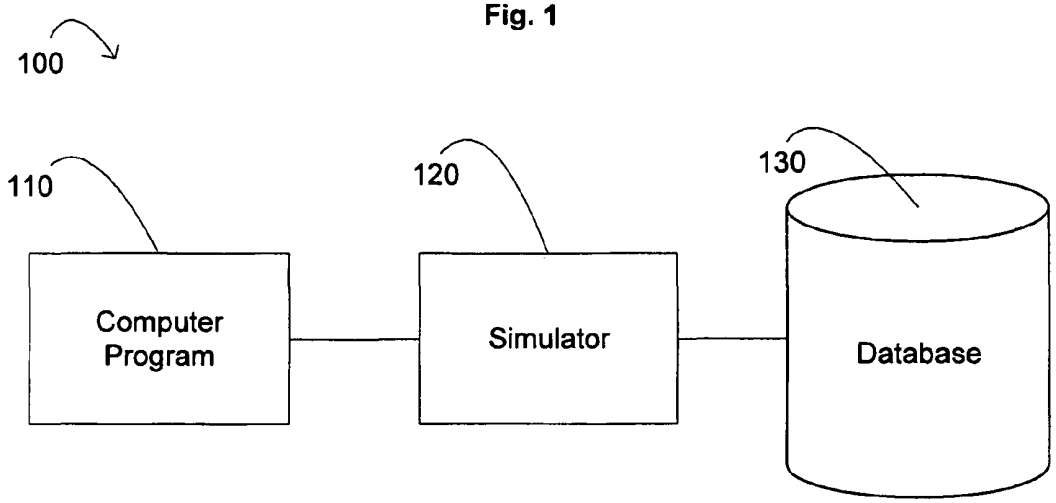


Fig. 2a

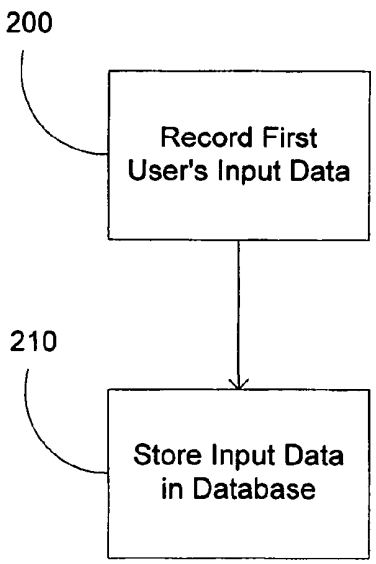


Fig. 2b

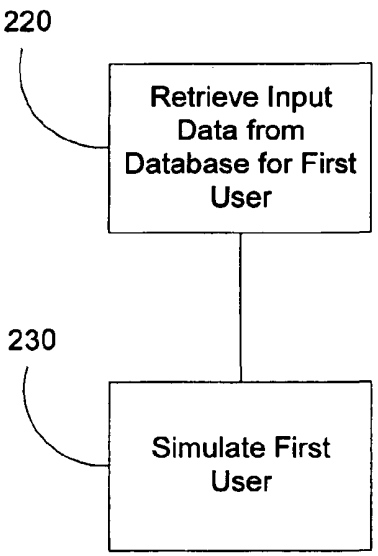


Fig. 3a

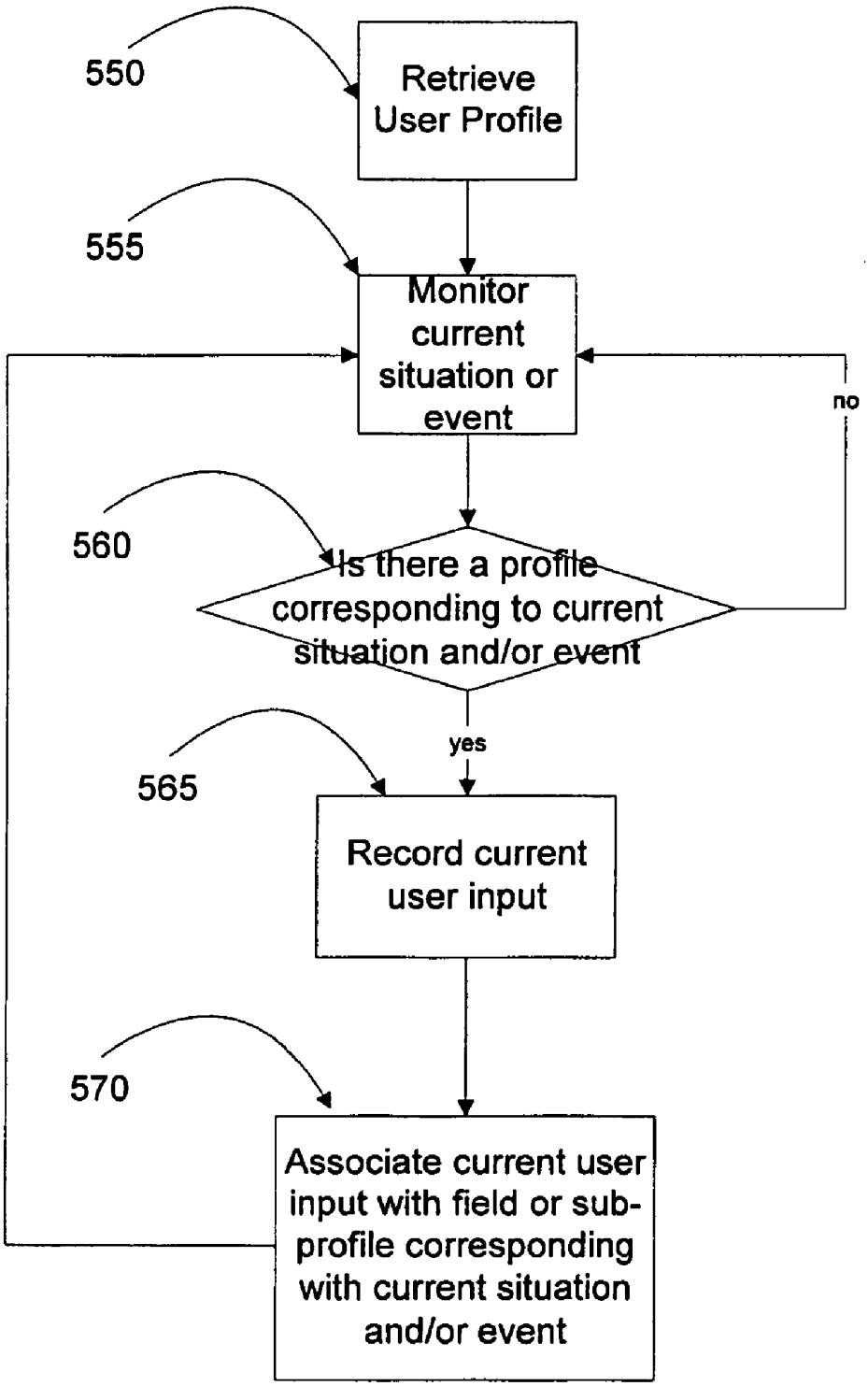

550
Retrieve User Profile
555
Monitor current situation or event
no
560
Is there a profile corresponding to current situation and/or event
yes
565
Record current user input
570
Associate current user input with field or sub-profile corresponding with current situation and/or event

Fig. 3b

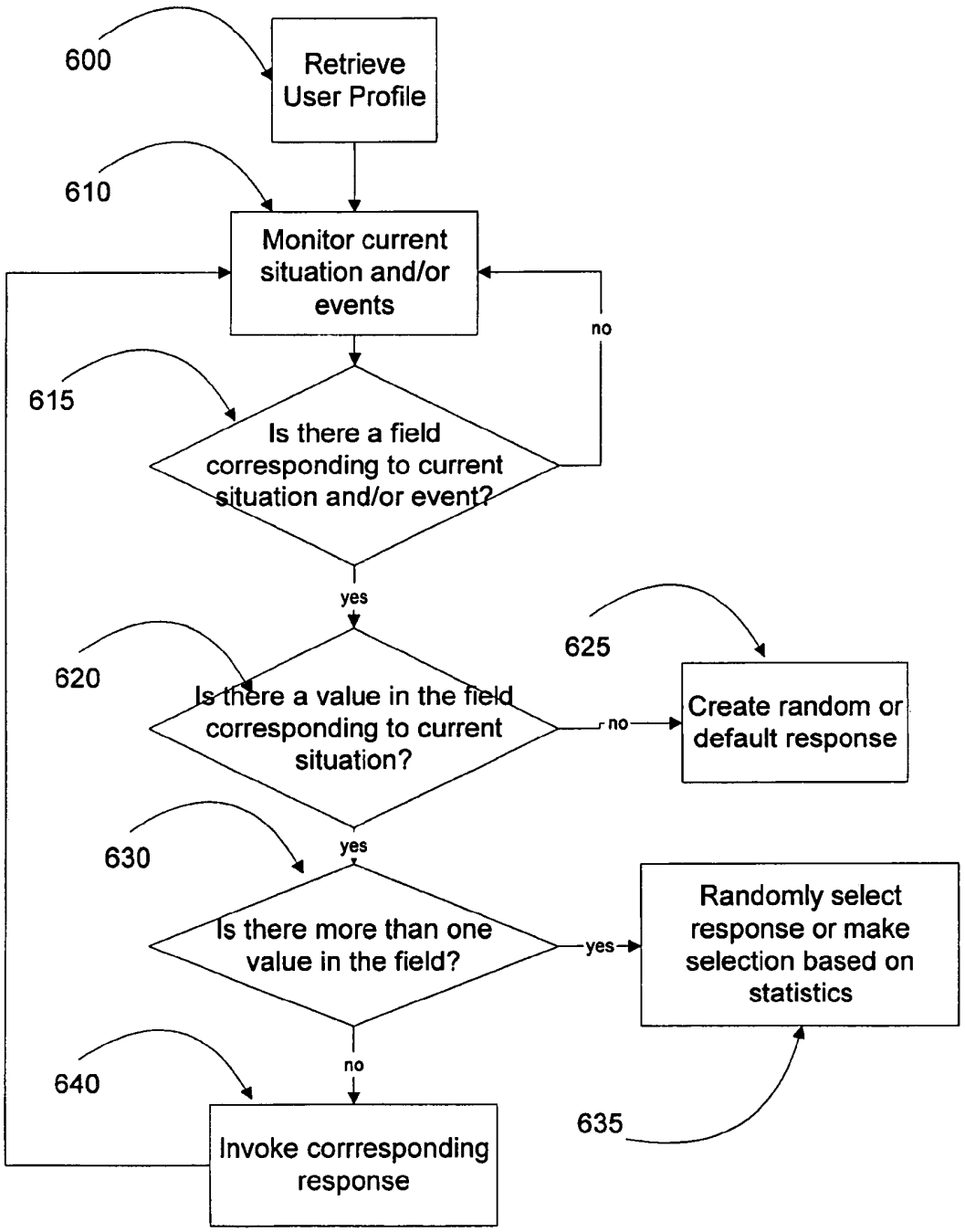

600
Retrieve User Profile
610
Monitor current situation and/or events
no
615
Is there a field corresponding to current situation and/or event?
yes
620
Is there a value in the field corresponding to current situation?
no
625
Create random or default response
630
yes
Is there more than one value in the field?
yes
Randomly select response or make selection based on statistics
no
640
Invoke corrresponding response
635

Fig. 4

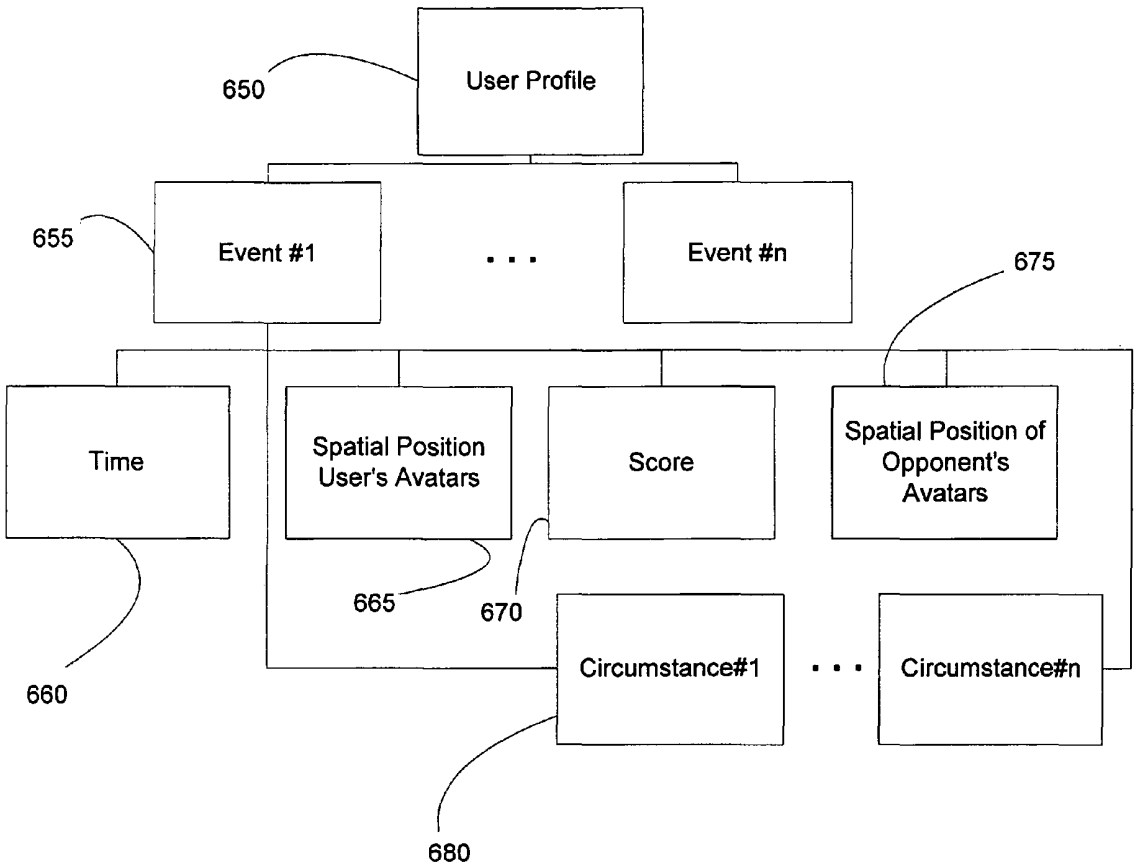

User Profile
650
Event #1
. . .
Event #n
655
675
Time
Spatial Position User's Avatars
Score
Spatial Position of Opponent's Avatars
665
670
660
Circumstance#1
. . .
Circumstance#n
680

Fig. 5

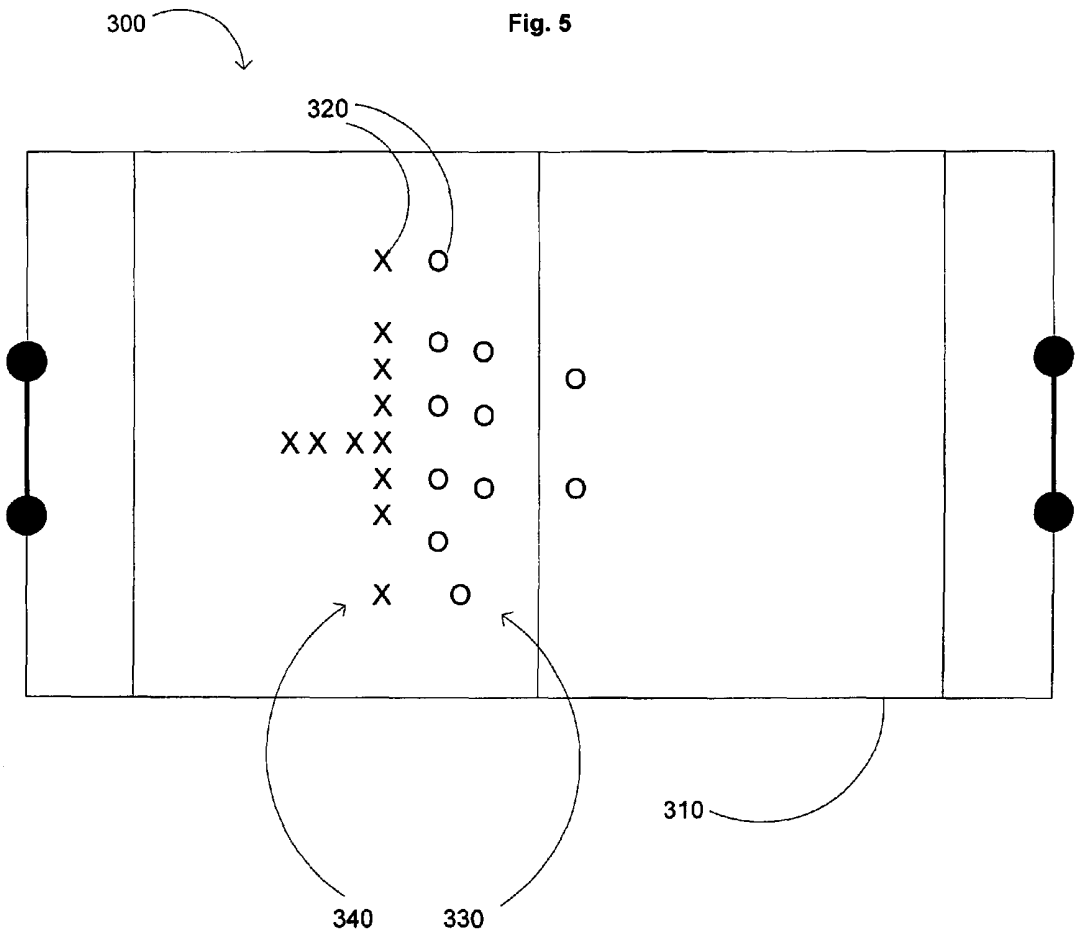
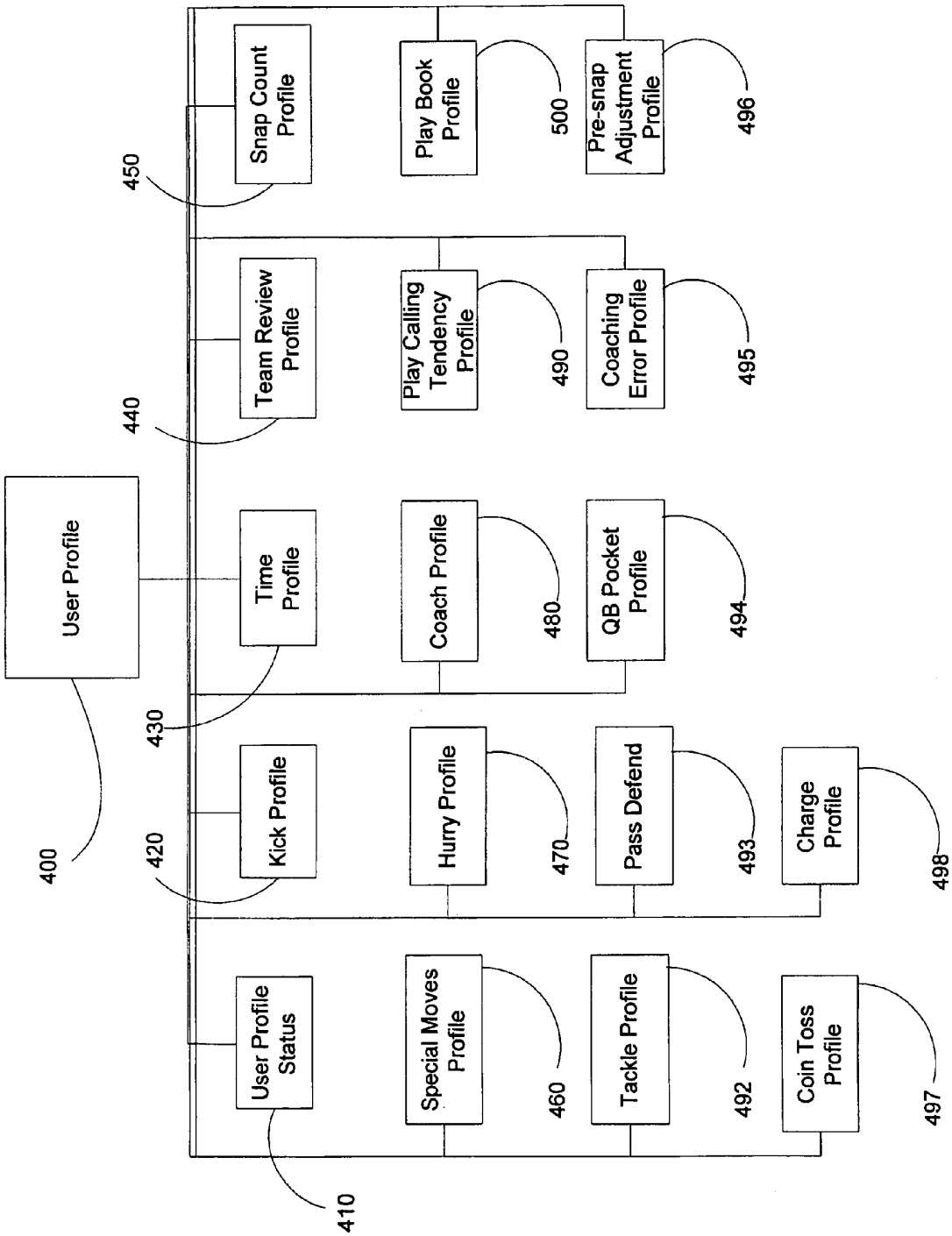


Fig. 6


User Profile
400
User Profile Status
410
Kick Profile
420
Time Profile
430
Team Review Profile
440
Snap Count Profile
450
Special Moves Profile
460
Hurry Profile
470
Coach Profile
480
Play Calling Tendency Profile
490
Play Book Profile
500
Tackle Profile
492
Pass Defend
493
QB Pocket Profile
494
Coaching Error Profile
495
Pre-snap Adjustment Profile
496
Coin Toss Profile
497
Charge Profile
498

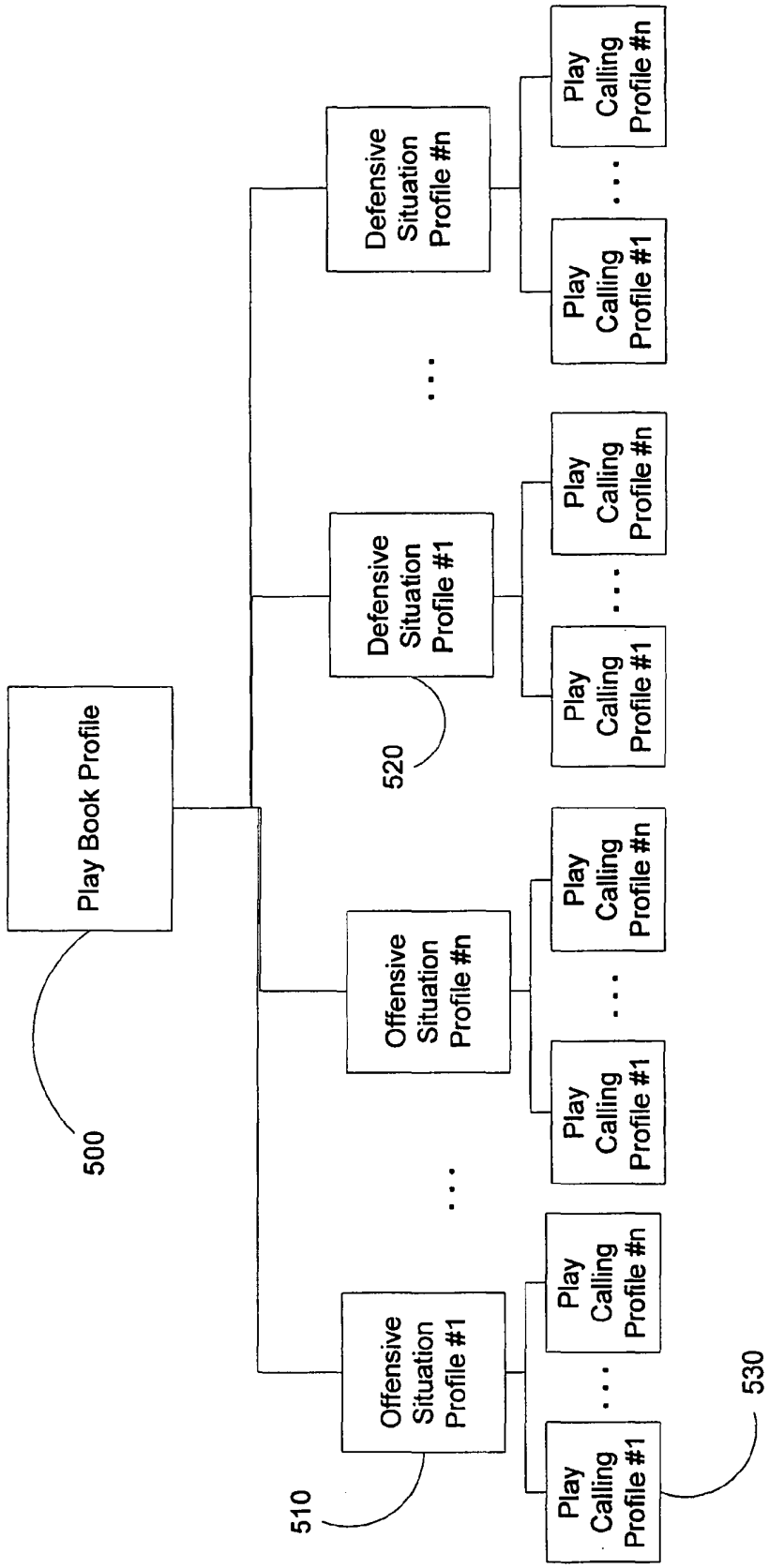

Play Book Profile
500
Offensive Situation Profile #1
510
Offensive Situation Profile #n
Defensive Situation Profile #1
520
Defensive Situation Profile #n
Play Calling Profile #1
Play Calling Profile #n
530

Fig. 7

Fig. 8a

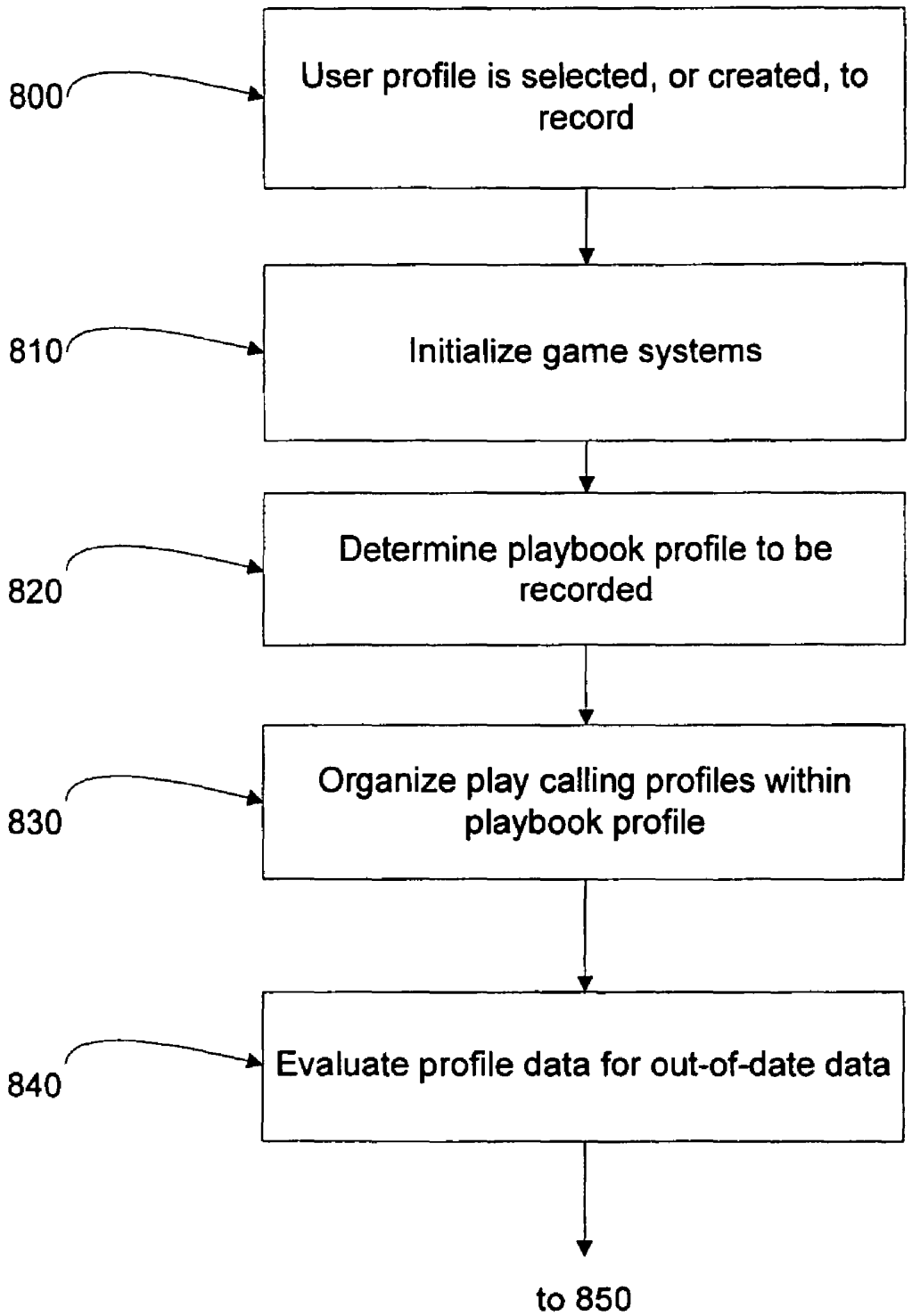

800
User profile is selected, or created, to record
810
Initialize game systems
820
Determine playbook profile to be recorded
830
Organize play calling profiles within playbook profile
840
Evaluate profile data for out-of-date data
to 850

Fig. 8b

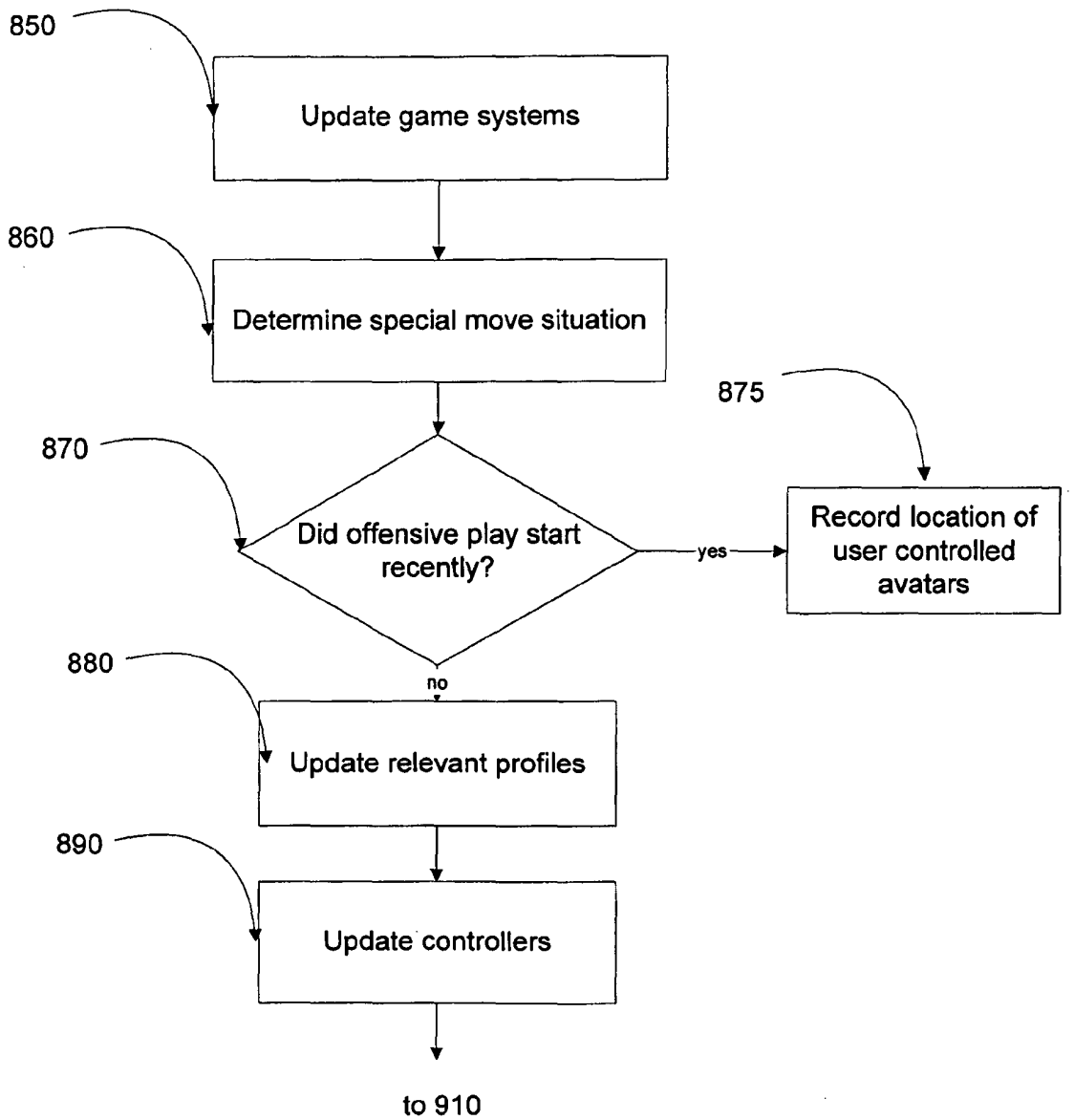

850
Update game systems
860
Determine special move situation
875
870
Did offensive play start recently?
yes
Record location of user controlled avatars
880
no
Update relevant profiles
890
Update controllers
to 910

Fig. 8c

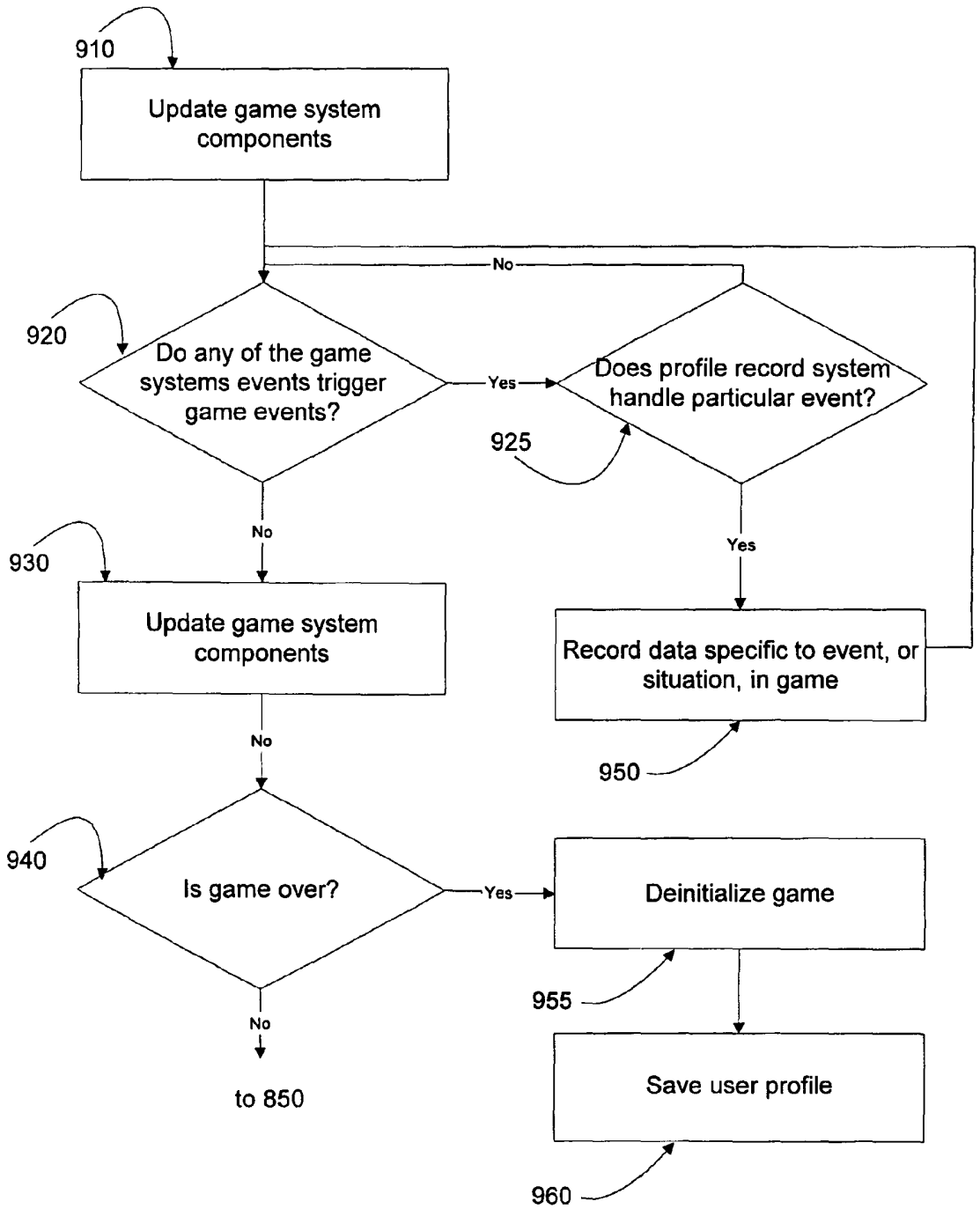

910
Update game system components
No
920
Do any of the game systems events trigger game events?
Yes
Does profile record system handle particular event?
925
No
Yes
930
Update game system components
Record data specific to event, or situation, in game
950
No
940
Is game over?
Yes
Deinitialize game
955
No
to 850
Save user profile
960

Fig. 9a

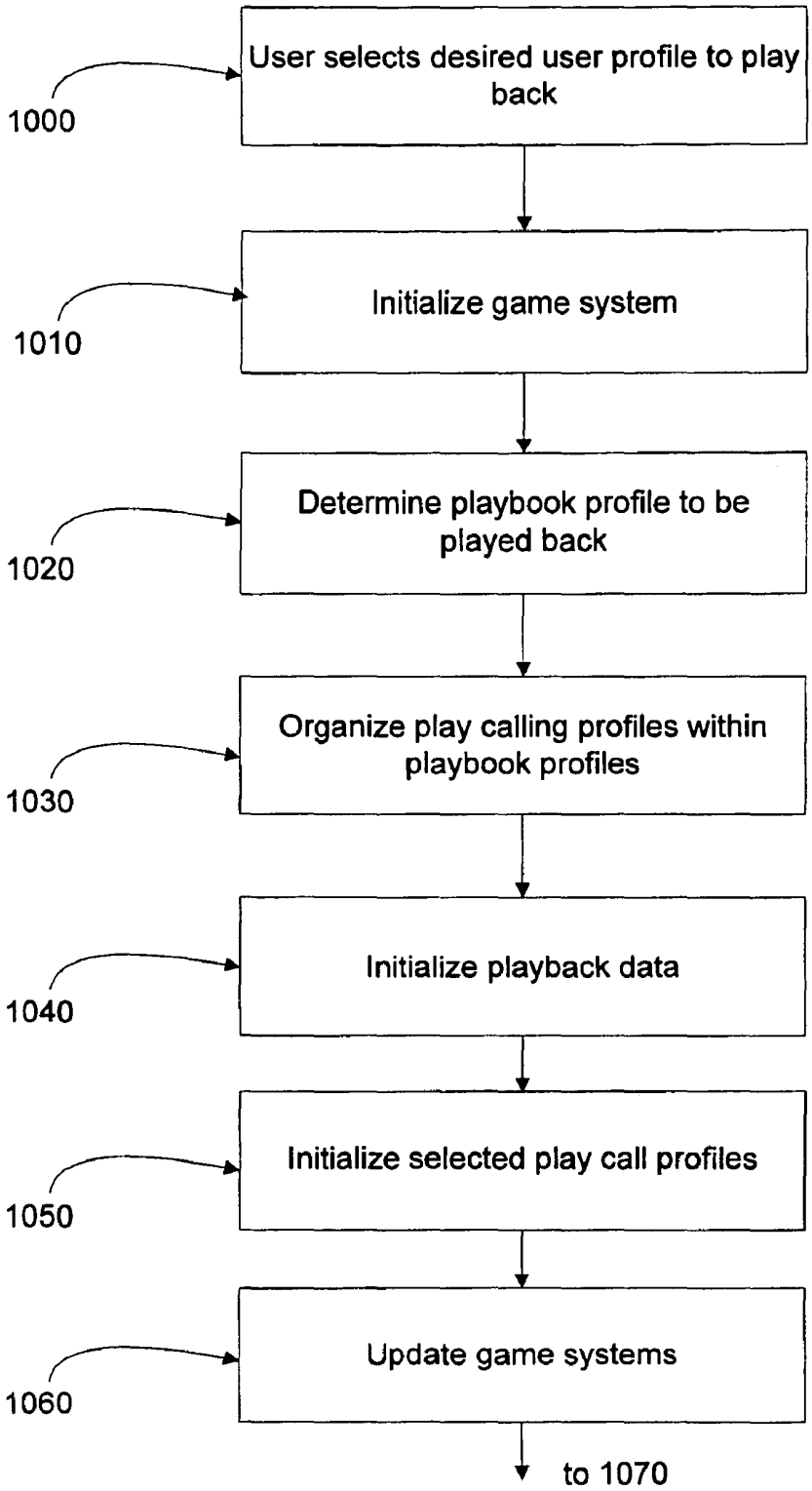

User selects desired user profile to play back
1000
Initialize game system
1010
Determine playbook profile to be played back
1020
Organize play calling profiles within playbook profiles
1030
Initialize playback data
1040
Initialize selected play call profiles
1050
Update game systems
1060
to 1070

Fig. 9b

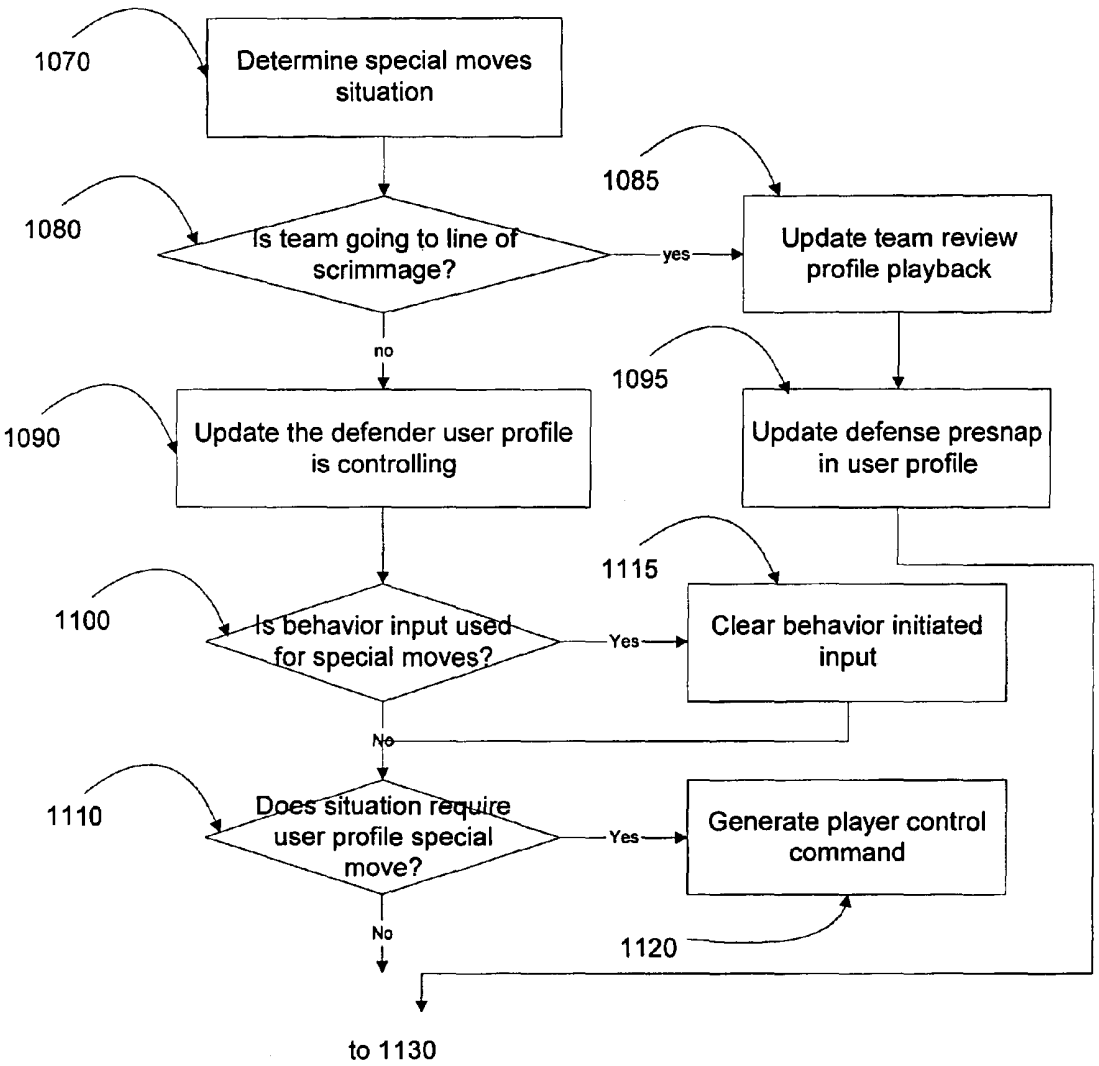

1070
Determine special moves situation
1080
Is team going to line of scrimmage?
yes
1085
Update team review profile playback
no
1095
1090
Update the defender user profile is controlling
Update defense presnap in user profile
1115
1100
Is behavior input used for special moves?
Yes
Clear behavior initiated input
No
1110
Does situation require user profile special move?
Yes
Generate player control command
No
1120
to 1130

Fig. 9c

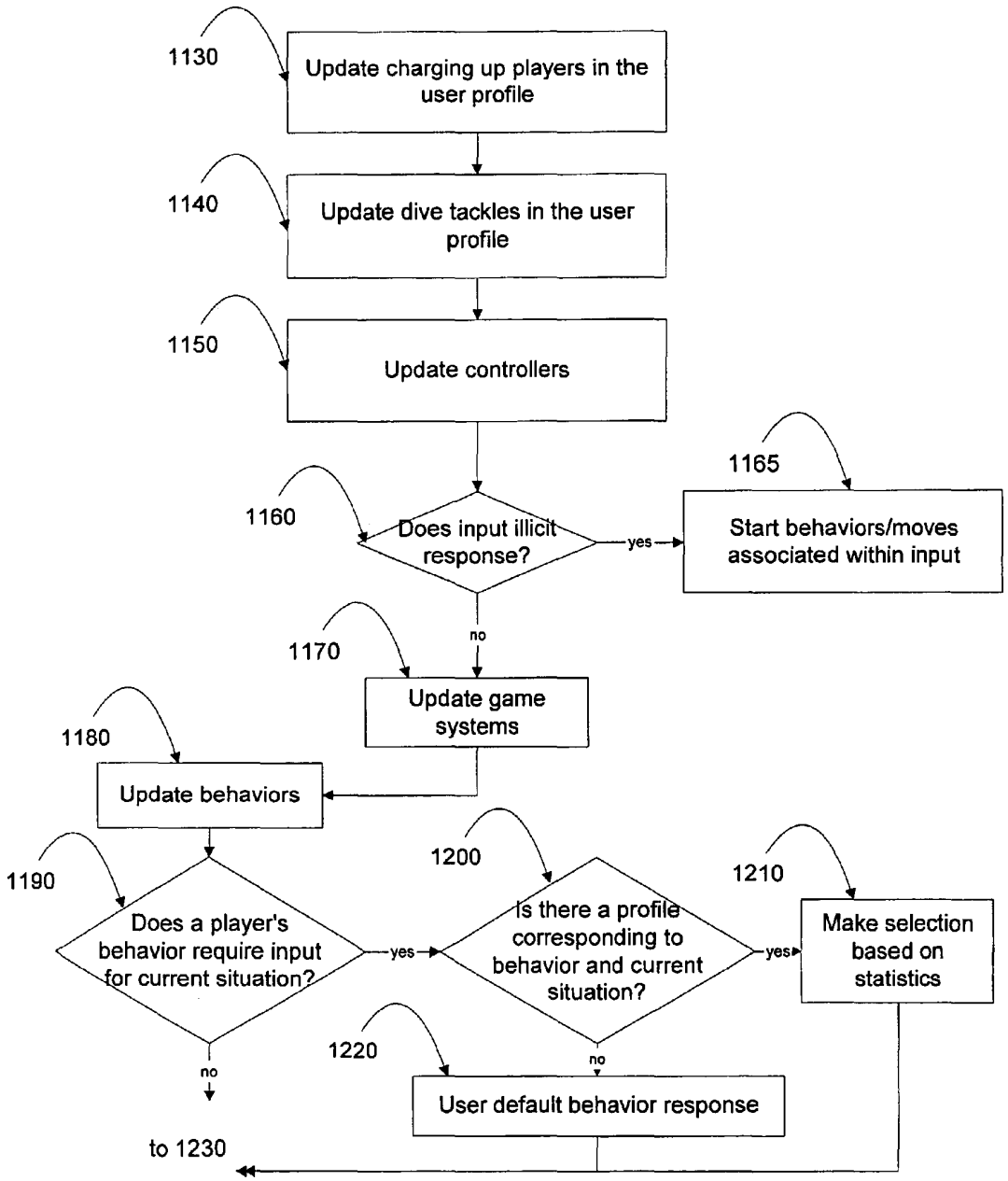

1130
Update charging up players in the user profile
1140
Update dive tackles in the user profile
1150
Update controllers
1160
Does input illicit response?
yes
1165
Start behaviors/moves associated within input
no
1170
Update game systems
1180
Update behaviors
1190
Does a player's behavior require input for current situation?
yes
1200
Is there a profile corresponding to behavior and current situation?
yes
1210
Make selection based on statistics
no
1220
User default behavior response
no
to 1230

Fig. 9d

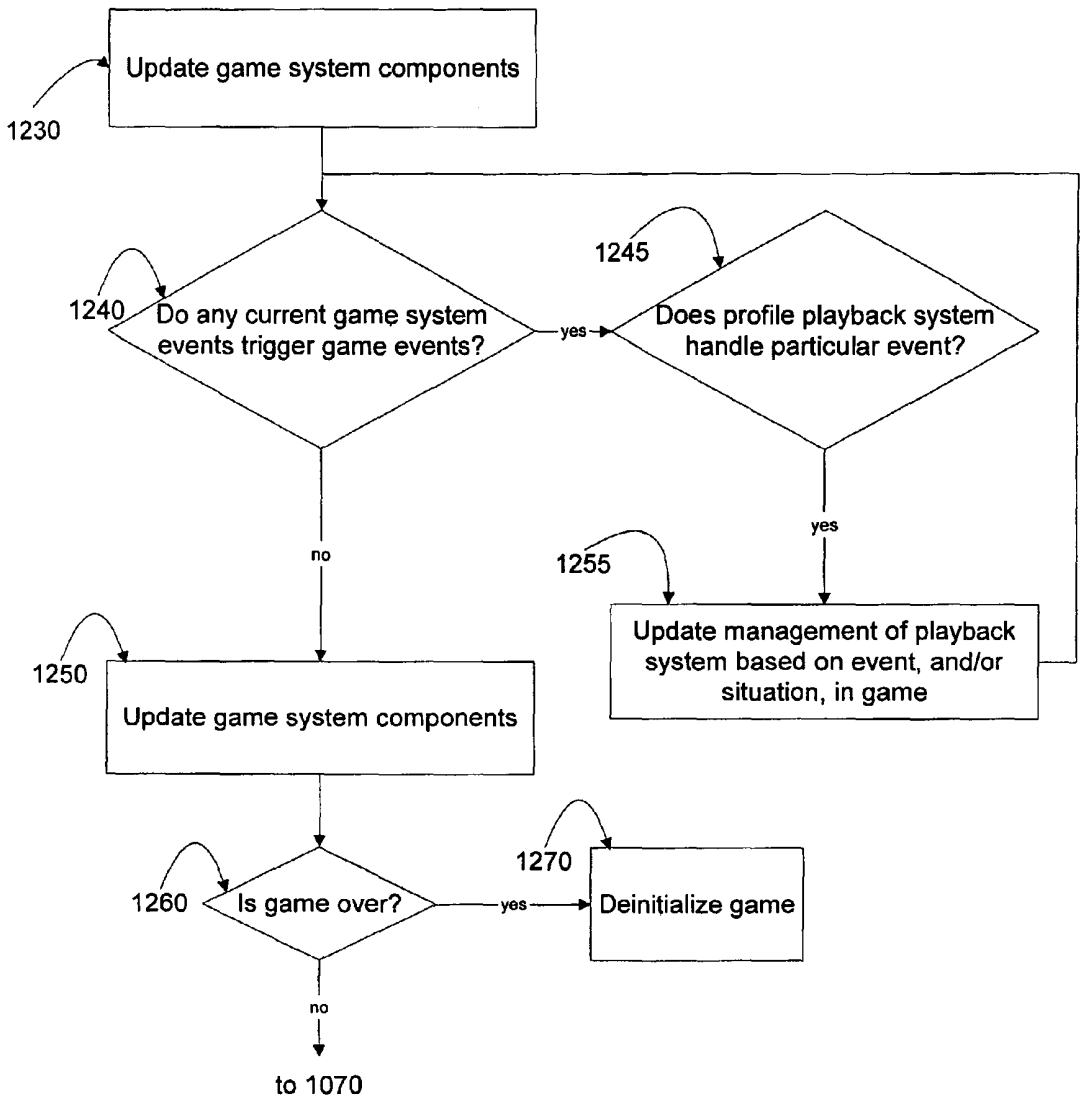

Update game system components
1230
1240
Do any current game system events trigger game events?
yes
1245
Does profile playback system handle particular event?
yes
no
1255
Update management of playback system based on event, and/or situation, in game
1250
Update game system components
1260
Is game over?
yes
1270
Deinitialize game
no
to 1070

Fig. 10

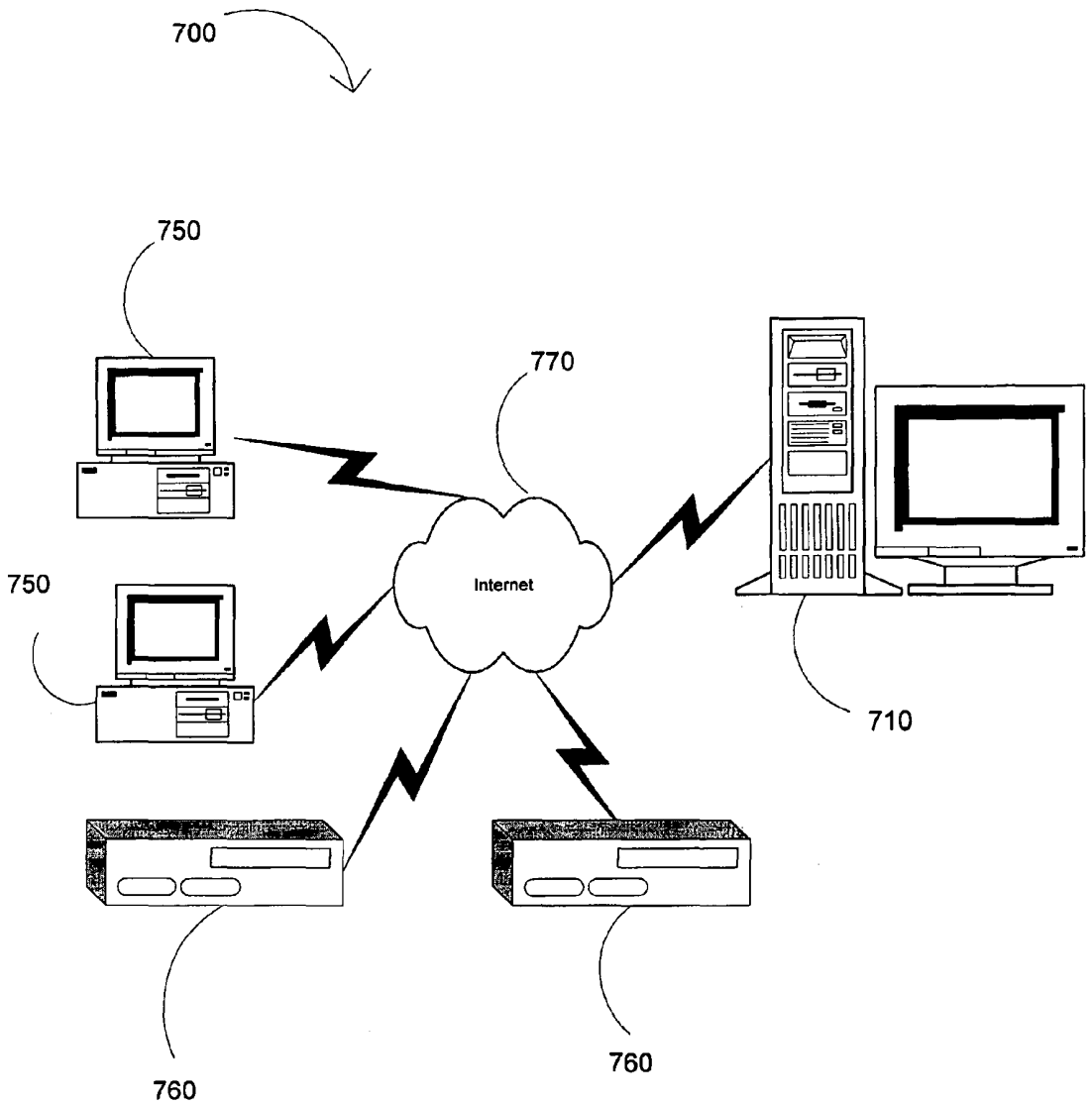


Fig. 11a

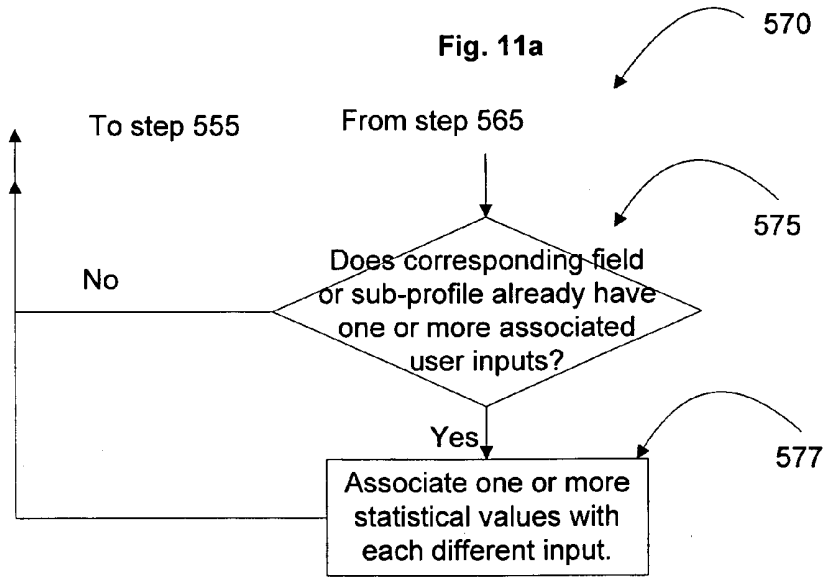


Fig. 11b

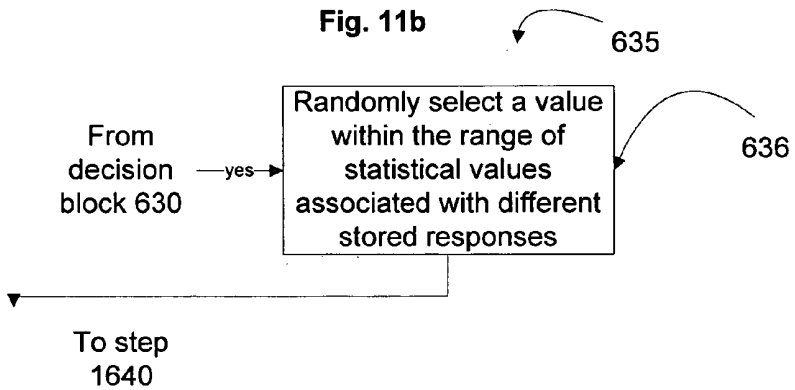
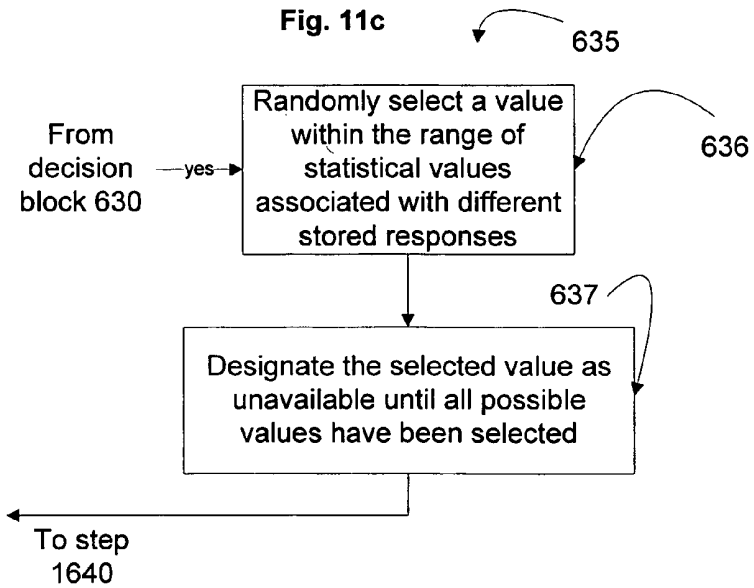


Fig. 11c



SYSTEMS AND METHODS FOR SIMULATING A PARTICULAR USER IN AN INTERACTIVE COMPUTER SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 11/252,695, filed on Oct. 17, 2005, now abandoned which is a continuation-in-part of co-pending U.S. patent application Ser. No. 11/105,734, filed on Apr. 13, 2005. The priority of this prior application is expressly claimed and its disclosure is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

The field of the invention relates to interactive computer systems, and more particularly to systems and methods for simulating a particular user's behavior in an interactive computer system.

BACKGROUND OF THE INVENTION

As in real life, a key component in the entertainment value of most videogames is that of competition between opponents, whereby each opponent vies against the competition to win and to become the best. The configuration of competition in videogames can take many forms, including that of the single-player configuration, whereby a single human user competes against one or more computer-controlled opponents ("AI") ("single-player"); the multi-player configuration, whereby one or more human users compete against one or more other human users ("multi-player"); or a combination of the two configurations, whereby one or more human users compete against any combination of one or more human users or computer-controlled AI opponents. The underlying means by which human users in a multi-player videogame configuration are connected to each other can take a variety of forms, including that of a multi-player local configuration, where two or more human users compete via a single local machine; a multi-player online configuration, where two or more human users compete on separate machines connected via a local area network ("LAN") or wide area network ("WAN") such as the Internet; or a combination of the two. In any configuration, the operability of the multi-player videogame depends upon the timely availability of at least one other human user against or with whom to compete. It therefore follows that, in the situations where a sufficient number of human opponents are unavailable at a given time, multi-player interaction is not possible.

Moreover, as in real life, research has demonstrated that for videogames, when players are not actively competing against other players, they spend time training and practicing in order to improve their skills and thereby become better, more capable competitors. In real life, when a human opponent is unavailable, a player must train in other ways, whether through individual training, through practice against a machine, or through practice against a human proxy. In multi-player videogames, prior to the invention described herein, human players who seek to practice their skills during the time they are not actively competing against other human players, would primarily do so by playing against the computer AI in the single-player videogame configuration.

However, the single-player videogame experience is significantly different from the multi-player videogame experience in a variety of ways. A player's knowledge that he or she is competing against live human opponents is a radically different psychological experience than that of competition against a computer. Further, the behavior, the strategy, and the tendencies of a given computer AI is not exactly the same as that of a human opponent. The computer AI and the human opponent are entirely different entities, and therefore, possess entirely different levels of skill, are affected by different weaknesses, exhibit different tendencies, employ different strategies, and behave and respond in completely different ways when compared to each other. Playing or practicing against a computer is simply not the same experience as playing or practicing against a human. Accordingly, an improved interactive computer system that overcomes such limitations of current videogames and current videogame technology would be desirable.

SUMMARY OF THE INVENTION

The field of the invention relates to interactive computer systems and more particularly to systems and methods for simulating a particular user's behavior in an interactive computer system. In one embodiment, a computer program product includes a simulator configured to simulate a user interacting with a computer program. The simulator includes a learning mode of operation and a simulation mode of operation. During the learning mode, the simulator is configured to monitor the user's interaction with the computer program for one or more events and analyze one or more current circumstances during the occurrence of the one or more events. The simulator is further configured to record one or more user inputs in response to the occurrence of the one or more events, store the one or more user inputs in one or more data fields, and associate the one or more data fields with the one or more events and the one or more current circumstances.

During the simulation mode of operation, the simulator is configured to monitor the computer program for the one or more particular events, retrieve the one or more data fields associated with the one or more particular events, and invoke one or more simulated inputs based on the value of the one or more data fields in response to the occurrence of the one or more events.

Other systems, methods, features and advantages of the invention will be or will become apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description, be within the scope of the invention, and be protected by the accompanying claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to better appreciate how the above-recited and other advantages and objects of the inventions are obtained, a more particular description of the embodiments briefly described above will be rendered by reference to specific embodiments thereof, which are illustrated in the accompanying drawings. It should be noted that the components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like reference numerals designate corresponding parts throughout the different views. However, like parts do not always have like reference numerals. Moreover, all illustrations are intended to convey concepts, where relative sizes, shapes and other detailed attributes may be illustrated schematically rather than literally or precisely.

FIG. **1** is a systems diagram of a preferred embodiment of the present invention;

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FIGS. **2***a-b* are processes in accordance with a preferred embodiment of the present invention;

FIGS. **3***a-b* are processes in accordance with a preferred embodiment of the present invention;

FIG. **4** is a diagram of a user profile in accordance with a preferred embodiment of the present invention;

FIG. **5** is a diagram of a computer video game interface;

FIG. **6** is a data structure in accordance with a preferred embodiment of the present invention;

FIG. **7** is a data structure in accordance with a preferred embodiment of the present invention;

FIGS. **8***a-c* is a process in accordance with a preferred embodiment of the present invention;

FIGS. **9***a-d* is a process in accordance with a preferred embodiment of the present invention; and

FIG. **10** is a system diagram in accordance with a preferred embodiment of the present invention.

FIG. **11***a* is a process in accordance with a preferred embodiment of the present invention.

FIG. **11***b* is a process in accordance with a preferred embodiment of the present invention.

FIG. **11***c* is a process in accordance with a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As described above, a user of an interactive computer system configured to have a plurality of users interact with each other, such as a video game system, may desire to compete against another user. However, the ability to compete against another user, especially a particular user, depends upon the availability of that particular user. Further, if the particular user is a superior player, it may be desirable to learn how to defeat such a user without having to play against that particular user in real-time. One approach is to compete against a computer system that simulates the particular user, e.g., a computer system that simulates the particular user's decisions and tendencies.

An exemplary embodiment of such a system is shown in FIG. **1**. FIG. **1** shows a diagram of an interactive computer system **100** that includes an interactive computer program **110** configured to have a plurality of users interact with each other, such as a video game, a simulator **120** operatively coupled with the program **110** that is configured to simulate a particular user's decisions and behavior, and a database **130** coupled with the simulator **120**, which stores data used by the simulator **120** to calculate and generate the decisions and behavior. The simulator **120** generally operates in two modes: (1) learn, or record, mode and (2) simulation, or playback, mode.

Turning to FIG. **2***a*, a flowchart of the learn mode is shown. During the learn mode, if a first user is using the computer program **110**, the simulator **120** collects and evaluates data about the first user's input when interacting with the computer program **110** (action block **200**). The collected data is then stored in the database **130** (action block **210**). The data is stored in a data structure, generally referred to as a user's profile, corresponding to the first user. Generally, the data is logically linked to an event, or situation, that initiated the user's input.

Turning to FIG. **2***b*, a flowchart of the simulation mode is shown. During simulation mode, if a second user is using the computer program **110** and the second user desires to interact with the first user, but the first user is not available, the simulator **120** will then retrieve input data from the first user, i.e., the first user's profile, from the database **130** (action block **220**) and simulate the first user's behavior based on the retrieved data (action block **230**).

Turning to FIGS. **3***a* and **3***b*, flowcharts of the general operation of a simulator **120** when in learn mode **550** and when in simulation mode **600** are respectively shown. During learning mode **550**, as shown in FIG. **3***a*, the simulator **120** records a user's input as the user is interacting with the game. Preferably, the inputs for a user are stored in data structures herein referred to as user profiles, which may be individual data structures in a database **130**. Each user profile has fields or sub-profiles logically associated, or linked, to one or more events and/or situations.

An example structure of a user profile **650** is shown in FIG. **4**. A user profile can contain a sub-profile related to one or more events **685** and/or situations **655** that occur within the computer program **110** during operation. An event **685** is a particular action occurring, whereas a situation **655** is the surrounding circumstances during which an event **685** may take place. For example, in a football game, a situation **655** may be how much time is left in a game or the position of players on the football field, whereas an event may be the quarterback throwing a long bomb or the running back breaking a tackle. Each event **685** and situation **655** are defined by a set of one or more parameters. In the instance where the computer program **110** is a multi-user interactive computer game, wherein each user controls one or more avatars, such as a sports game or a first person shooter game, events **685** and situations **655** may be defined by a number of parameters. One common parameter that defines a situation may be time **660**, e.g., time left in a particular session or game, and/or time played in a particular session or game. Another may include spatial position of avatars controlled by the user **665** on the interface screen. For example, in football, the spatial position may be position on a football field, as will be explained in more detail below. In the case of a first person shooter game, spatial position may be location of controlled avatar within the virtual reality of the game. Another parameter may be the spatial position(s) of the avatars controlled by one or more user opponents **675** of the game. Another parameter may be the score if applicable to the computer program **110**. For example, the score of a game, e.g., a board game such as chess or a sports game, may trigger a particular type of response by the user. Scores may be based on points or other objective analysis such as opponent players captured, attacking moves made, etc. Another type of parameter, in the case of a computer game involving one or more avatars, is the archetype of the avatar. For example, an archetype can be defined by relative size, strength, and speed. In the case of a basketball game, wherein avatars represent players of the game, archetypes can include true point guard, slasher, shooter, pure shooter, low post scorer, midrange scorer, and role player. One of ordinary skill in the art would also appreciate that other circumstances **680** may be included as parameters, such as virtual weather in games such as golf, or road conditions of racing games. An event **685**, as mentioned above, can be defined by a particular action taken place either by a user or by the computer program **110** itself. An action can be movement by an avatar **687**, special moves invoked **689**, stoppage of time **691**, such as a timeout, etc.

During operation, the simulator **120** retrieves, creates, or establishes, a user profile for a particular user interacting with the computer program **110** (action block **552**). Next, the simulator **120** monitors and analyzes the user's interaction with the program **110** (action block **555**). If the simulator **120** identifies a particular situation and/or event occurring, defined by parameters such as those above (decision block **560**), then the simulator **120** will record the user's decision/

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input, such as a pressed button, combination of buttons, or joystick move of a controller, in response to the particular situation and/or event (action block **565**) and store the user's input in the field or sub-profile associated with the particular situation and/or event (action block **570**). A user's response to the occurrence of an event can differ depending upon the surrounding circumstances or situation. Thus, the data recorded can be associated with both an event and a situation. In other words, when a user responds to an event, the user's response, when recorded, is not only associated with the occurrence of that event, but also with the situation during the occurrence of that event, which is defined by one or more current circumstances. For example, in the game of basketball, if a user is controlling a basketball player near the three-point line and sees two defenders, one on each side, the user may choose to shoot a jump shot or split the defenders-responses that may be recorded in the profile **650** and linked with opponent's avatar's position. However, the learn mode recognizes that the responses can depend on the situation during which the two defenders are approaching. If the user is losing by a lot of points, then the user may choose to shoot the three pointer instead of split the defenders.

During operation, the simulator **120** will continue this process. The stored data enables the analysis of a user's behavior, tendencies, and inclinations for a given event. Thus, as will be described in more detail below, when the simulator **120** is in simulation mode, and a particular event and/or situation occurs, the simulator **120** can invoke a corresponding reaction based on the stored data, thereby simulating the user.

During simulation, or playback, mode, as shown in FIG. **3***b*, when a first user desires to interact with a particular second user via the computer program **110**, the simulator **120** retrieves the second user's profile (action block **600**), if it has been created. Then, the simulator **120** monitors and analyzes the operation of the computer program in search of particular events and/or situations (action block **610**). If the simulator **120** identifies the occurrence of a particular event that is linked to a field or sub-profile of the user's profile (decision block **615**), then the simulator **120** will check the value of the field or sub-profile (decision block **620**). The value represents the stored user input recorded during the learn mode **550** for the simulated user. If the response can differ given different situations during the occurrence of the event (decision block **617**), then the simulator **120** also analyzes the current situation to determine the proper response (action block **619**). For example, in the case of a football game, if the simulated user is on its own twenty yard line and just failed to reach the first down mark after a third down play, e.g., it is fourth down and one, the simulator **120** can analyze the time left on the play clock and the score. If the time left on the play clock is less than two minutes, and simulated user is losing by 5 points, then the simulator **120** will analyze such a situation to determine whether the user would kick a field goal or try to reach the end zone for a touchdown. If there is no value, i.e., stored user input, recorded for the given the event and/or situation, then the simulator **120** will generate a random or default response representing the second user's simulated input, or response. If there is a stored user input value, (decision block **630**) then the simulator **120** will generate a response corresponding to that value, which would represent the second user's response to the occurring situation or event (action block **640**), and then continue monitoring (action block **610**). If there is more than one value (decision block **630**), then the actual second user may have invoked more than one type of response to the particular situation or event while being recorded. In such a case, the simulator **120** can randomly select from one of the values, or the simulator **120** can select its response based on statistics or mathematical formula, e.g., based on the number of times the actual user invoked one response over another (action block **635**). Such statistics may indicate tendencies demonstrated by the simulated user.

Approaches to account for such tendencies are illustrated in FIGS. **11**(*a-c*). During learning mode, at step **570**, if the user has invoked more than one type of response, the simulator **120** can record each type of response and apply a statistical, or weighted, value to a response based on its statistical occurrence compared to other types of responses. Turning to FIG. **11***a*, at step **570**, the simulator **120** will check if one or more user inputs have already been recorded for the current situation and/or event (decision block **575**). If so, then the simulator **120** will associate one or more values with each different type of user input based on the statistical occurrence of each input compared to other inputs (action block **577**). For example, in the case of a football game, a player's avatar is running down the sideline and encounters an opposing player's avatar (an event). In one hundred (100) occurrences of the event, if the user spun left twenty (20) times, right thirty (30) times, and juked fifty (50) times, the simulator **120** will assign values of twenty (20), thirty (30), and fifty (50) to the respective responses. Alternatively, each response can be assigned a range of values, such as 1-20, 21-50, and 51-100, respectively, or 1-2, 3-5, and 6-10. It should be noted that the weighted values can be calculated based on any number of responses and any number of types of responses.

During simulation mode, the simulator **120** can randomly invoke a response to a situation and/or event based on weighted statistical values of the stored inputs. One approach is shown in FIG. **11***b*, at step **635**, the simulator **120** will randomly select a value within the range of available statistical values associated with the different stored responses (action block **636**). The stored input associated with the selected value will then be invoked. In the example above, when the simulated opponent's avatar is running down the sideline and encounters an opposing player's avatar and each of the above responses are given the respective range of values, the simulator **120** will randomly select a number from 1 to 100. If the number 53 is selected, then the avatar will juke (51-100 are associated with juke). Similarly, the simulator **120** could randomly select a number from 1-10. If the number is 1, then the avatar will spin left (1-2 are associated with spin left).

An alternative approach is shown in FIG. **11***c*, in addition to having the simulator **120** randomly select a value within the range of available statistical values associated with the different stored responses (action block **636**), the selected value will then be made unavailable until all the other possible values have been selected (action block **637**). Like the approach above, the stored input associated with the selected value will then be invoked. In the example above, when the simulated opponent's avatar is running down the sideline and encounters an opposing player's avatar and each of the above responses are given the respective range of values, the simulator **120** will randomly select a number from 1 to 100. The selected number will then be made unavailable to the simulator **120** until all other possible numbers have been selected. Thus, if the number 53 is selected, then the avatar will juke (51-100 are associated with juke). Subsequently, the value 53 will be made unavailable to the simulator **120** until all other possible values have been selected. Likewise, if the range of numbers is from 1-10 and if two (2) is selected, then the number two (2) will subsequently be unavailable for selection until 1 and 3-10 have been selected.

One of ordinary skill in the art will appreciate that such a system can be applied to any computer system involving

multiple users interacting with one another, such as a computer video game. For example, the computer program **110** can be a team sports video game, such as football, basketball, hockey, baseball, etc. In the case of a baseball game, a user profile can contain a field that indicates whether a user will bunt, wherein the field is linked to a situation where there is a player on second base with one out, for example. Other computer programs **110** can include individual sports video games, such as golf, boxing, racing, etc. In the case of a golf game, a user profile can contain a field that indicates the type of golf club used, wherein the field is linked to a situation such as a sand trap. Yet other computer programs **110** can include non sports video games, such as first person shooters, fighting games, board games, etc. In the case of a chess match, a user profile can include a field that indicates when to move the queen, wherein the field is linked to a particular situation. In each of these cases, a user profile can be established with data that enables the analysis and simulation of a particular user. A simulator **120** can be configured to populate a user profile with data, analyze the data, and simulate the user based on the data in accordance with the processes described above.

For example, in the case of a basketball game, an event may be an inbound event, an offensive rebound event, a pass out of shot event, a catch and shoot event, a pump fake event, defensive steal event, and/or a shot event. During learning mode **550**, for an inbound event, wherein a team is taking a ball inbound to begin play, the simulator **120** records a user's response to the event. If the user is controlling the team taking the ball inbound, then the simulator **120** records who the inbound was passed; whether the user hurried the inbound, which can be in the form of a quick tap of a control button; whether the user ran an avatar around and then passed, which would indicate a normal inbound; and where the user ended up on the court to start play. During each of these decisions made by the user, the simulator **120** will record the current circumstances, for example, whether the defense is playing a full court press or how much time is left in the game, which may indicate whether a user will hurry the inbound pass. During playback mode **600**, when an inbound event occurs, the simulator **120** will retrieve the recorded data associated with the inbound event and also analyze the current situation, such as time, score, and spatial positions of defensive avatars, to determine which action to invoke that represents the simulated user.

For an offensive rebound event, the simulator **120**, during learning mode **550**, will record which avatar grabbed the rebound and whether the user immediately passed the ball, which indicates a "reset" type rebound, or whether the user shoots the ball, which indicates a "shoot" type rebound. Again, current circumstances are recorded for the event. During playback **600**, the simulator **120** will analyze the current circumstances during the occurrence of an offensive rebound event and invoke the proper response accordingly, e.g., whether to invoke a "shoot" rebound or a "reset" rebound.

For a pass out of shot event, the simulator **120**, during learn mode **550**, records a shot type, which avatar passed, and which avatar was passed to. For current circumstances, the simulator **120** records how open the receiving avatar was and how covered the passing avatar was. During playback **600**, for a pass out of shot event, the simulator **120** will analyze how well the passing avatar and the receiving avatar are covered. The simulator **120** will invoke a pass if the current circumstances meet the criteria, e.g., how much the passing and receiving avatars are covered.

For a catch and shoot event, during the learning mode **550**, the simulator **120** records how often a user catches and shoots right after the catch and records, as a current circumstance, the location of the user's avatar that catches and shoots. During playback mode **600**, the simulator **120** will monitor when the simulated user catches the ball and analyze the simulated user's location on the basketball court. If the simulated user is located in the typical spot for catch and shoot, then the simulator **120** will have the simulated user immediately shoot the ball after the catch.

For a pump fake event, during the learning mode **550**, the simulator **120** records how often a user pump fakes. For current circumstances, the simulator **120** records how covered the user was and user's location. During playback mode **600**, the simulator **120** will monitor for a shoot event and analyze the location of the simulated user and the defensive coverage. If criteria is met, then simulator **120** will invoke a pump fake.

For a defensive steal event, the simulator **120**, during learning mode **550**, records how often a user attempts to steal and the average time between attempts. As current circumstances, the simulator **120** records the user's distance to the ball, number of fouls to give in a quarter, and the skill level of the avatar with the ball. During playback mode **600**, whenever an opponent has the ball and is at or below a typical skill level that the simulated user is willing to attempt a steal on, the simulated user's avatar is close enough to the ball handler, the last time a steal attempt was made is greater than the average recorded time between attempts, and there are enough fouls for the simulated user to give, then a steal is attempted.

For shot timing, during the learning mode **550**, the simulator **120** records how well the shot was timed for each shot type, e.g., jump shot, bank shot, etc. During playback mode **600**, the simulated user's release shot is timed based on recorded data.

In addition to the current circumstances above, another circumstance that can define a situation and effect the simulated user's response is the archetype of the avatar(s), e.g., whether the avatar is a true point guard, a slasher, a shooter, a pure shooter, a low post shooter, a midrange shooter, and role player. For each event, during learning mode **550**, the simulator **120** records the archetype of the avatar that initiated a monitored event. Other circumstances include the spatial location of the event, time on the shot clock, duration of the event, and how many teammates were available to participate.

The simulator **120** provides a means for players to engage in any possible configuration of multi-player game play at any time, regardless of the availability of another human opponent. It further enables a user to be able to practice against and develop skills against one or more specific human opponents at any time, regardless of whether the actual human opponent is physically present or connected, or not. It also enables a user to be able to simulate the unique, individual behaviors, weaknesses, strategies and tendencies of actual human opponents within a videogame, thereby blurring the line that differentiates human opponents and computer AI, and the resulting interactive experience of the two.

Another example embodiment of a computer system **100** is a video game system that simulates an American football game and enables a first user to play the game against a computer opponent or a second user, and which is embodied in Visual Concepts' ESPN NFL 2K5™ ("NFL 2K5") video game, a product currently available in the market. NFL 2K5 includes a computer program **110** in the form of an video game to be executed on a video game console, such as Microsoft's Xbox® or Sony's Playstation 2®, which includes a user input device, typically referred to as a game controller (not shown).

Turning to FIG. **5**, a diagram representing a video game interface **300** is shown. The interface **300** generally includes

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a graphical representation of a football field **310**, and two sets of avatars **320**, each representing a football team set to oppose each other. One of the sets of avatars **320** represent a defensive team, or team on defense **330**, wherein each avatar **320** represents a defensive player, i.e., defensive linemen, linebackers, and defensive backs. The other set of avatars **320** represents an offensive team, or team on offense **340**, wherein each avatar **320** represents an offensive player, i.e., offensive linemen, backs, receivers, and a quarterback.

At a state before any action begins, which is commonly referred to as the "pre-snap" state, the user's input generally includes the choice of a formation from among a set of pre-defined choices, i.e., the position of the respective avatars **320** on the representative football field **310**, and the user's input further includes the choice of a play from among a set of pre-defined choices, which defines a route for each avatar **320**, i.e., how each avatar **320** will move when action begins and when the user is not controlling that avatar **320**, in accordance with the general rules of American football. These choices are commonly referred to as play calling.

When action begins, which is commonly referred to as the "post-snap" state, the avatars **320** move in accordance to the choices made by the user during the "pre-snap" state, and the user's input generally includes controlling the movements and actions of one or more of the avatars **320**. Thus, skill in this game generally depends upon the user's ability to make the appropriate choices during the pre-snap state and the ability to control one or more avatars **320** during the post-snap state.

A first user controls one of the teams **330**/**340**. The other of the teams **330**/**340** may be controlled by the computer program **110** or by a second user. In addition, the other of the teams **330**/**340** may be controlled by a simulator **120**, which includes a learning mode and a simulation mode.

During learning mode, the simulator **120** records a user's input as the user is interacting with the game. Turning to FIG. **6**, the inputs for a user are stored in user profiles **400**, which, as described above, may be individual data structures in a database **130**. The general structure of a user profile **400** for this particular video game is shown in FIG. **6**. A user profile includes sub-profiles, e.g., **410**, each containing fields or additional sub profiles that store the user's inputs in an organized and logical manner. Generally, as mentioned above, the user's input is logically linked to an event and/or situation that initiated the user's input. For example, in the case of NFL 2K5, a pre-snap state can define a situation established by current circumstances, such as the score and spatial location on the football field, e.g., the user's team being down 21 points against an opponent, and the user's offense is on the football field on its own 25 yard line in the middle of the fourth quarter. Current circumstances can also include the spatial location of individual avatars, such as the linebacker or defensive back. A post-snap event can be a user controlling the quarterback, and the opponent is blitzing. As mentioned above, the response to a post-snap event may depend upon the situation, e.g., the pre-snap state. Therefore, not only is the occurrence of the event identified, but one or more current circumstances during the occurrence of the event are analyzed and stored also. Generally, a user profile **400** for each user is created and stored in the database **130** and managed and controlled by the simulator **120**.

The stored data enables the analysis of a user's behavior, tendencies, and inclinations for a given event and situation. Thus, as will be described in more detail below and as mentioned above, when the simulator **120** is in simulation mode, and a particular event occurs, the simulator **120** may invoke a corresponding reaction based on the stored data.

A number of the sub-profiles, e.g., **410**, will now be described. Turning to FIG. **7**, the data structure for a play book profile **500** is shown. As shown in FIG. **6**, a play book profile **500** is a sub-profile of a user profile **400** that generally includes a history of a user's play calling choices in response to particular events and situations. A user's profile can include one or more play book profiles **500**. A play book profile **500** includes a plurality of offensive and defensive situation profiles **510** that include a plurality of play calling profiles **530**. Preferably, a situation is generally defined by the down, distance, position on the field, the score, the time in the game, and the plays called by the opposing team. A play calling profile **530** stores information about the user's choice of play and the choices made within the play. Preferably, the key pieces of information stored in a play calling profile is the formation and play.

The operation of the learning mode of the simulator **120** for the American football computer system **100** is shown in FIGS. **8***a-c*. During learning mode, the simulator **120** retrieves the user profile **400** of the user to be simulated (action block **800**). The computer system initializes the game system features, e.g., controllers, animations, collisions, behaviors, etc. (action block **810**). Next, the simulator **120** determines the play book profile **500** to be recorded corresponding to the user (action block **820**). The simulator **120** next organizes the play calling profiles **530** within the playbook profile **500** (action block **830**). If there is existing data in the playbook profile **500**, then the simulator **120** will evaluate whether the data is up to date (action block **840**). Preferably, data should evolve as the user's interaction evolves. In other words, data recorded thirty games ago may have a lesser impact on the total data available.

After the game starts, and the game system components are updated, e.g., clocks, teams, cameras, etc. (action block **850**), the simulator **120** monitors to determine whether a situation for special moves has occurred (action block **860**). If the user is playing offense and an offensive play has started (decision block **870**), then the simulator **120** will record the location of the user controlled avatars, such as the quarterback or running back (action block **875**). Otherwise, the simulator **120** will record data into relevant profiles (action block **880**). Next, the simulator **120** will control the user's input via the game controller (action block **890**).

After the game system components are updated, e.g., behaviors, moves, animation, etc. (action block **910**), the simulator **120** next determines if any of the game system events, such as animations, trigger actual game events (decision block **920**). If so, if a profile handles such a game system event (decision block **925**), then the simulator **120** will record the game system event (action block **950**). If not, then the game system continues, and the components are updated, e.g., roster data, sound effects, crowd, statistics (action block **930**). Upon completion of the game (decision block **940**), the game is deinitialized (action block **955**), and the user profile will be saved (action block **960**).

The operation of the play back mode is illustrated in FIGS. **9***a-d*. A user first selects the opponent to be simulated, and thus, selects the corresponding user profile to play back (action block **1000**). After the system initializes, e.g., controllers, animations, behaviors, etc. (action block **1010**), the simulator **120** then determines the appropriate playbook profile **500** to use (action block **1020**) and then organizes the play calling profiles **520** within the playbook profile (action block **1030**). The simulator **120** then initializes the playback data (action block **1040**) and initializes selected play call profiles **520** (action block **1050**). The game system is then updated, e.g., clocks, teams, coaching decisions, cameras, etc. (action block

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1060). While the computer program **110** is running, the simulator **120** monitors the program to identify events or situations that may warrant a special move (action block **1070**). The simulator **120** then monitors to determine if a team is approaching the line of scrimmage (decision block **1080**). If so, then the simulator **120** updates the team review profile **440** (action block **1085**) and updates defense pre-snap **496** in user profile (action block **1095**). If not, then the simulator updates the defender that the user profile **400** is controlling (action block **1090**).

The simulator **120** then evaluates whether behavior input is used for special moves (decision block **1100**). If so, then the simulator **120** clears the behavior initiated input (action block **1115**). The simulator **120** then determines whether current situation requires a user profile **400** special move (decision block **1110**). If so, then the simulator **120** generates a player control command for the computer program **110** (action block **1120**). The simulator **120** then charges up appropriate avatars based on information in the user profile **400** (action block **1130**) and updates dive tackles in the user profile **400** (action block **1140**). The simulator **120** will then generate controller data representing the user (action block **1150**).

The simulator **120** then determines whether the input data will illicit some behavior or response (decision block **1160**). If so, then the program will start the behaviors/moves associated with the input (action block **1165**). If not, game system components, such as reference data, is updated (action block **1170**) and then the behaviors are updated (action block **1180**). Next, whether input is required for a player's behavior in the current situation (decision block **1190**). If so, then the simulator **120** determines whether there is data that corresponds to the behavior or current situation (decision block **1200**). If so, then the behavior is invoke. If there is more than one behavior recorded, the selection is based on statistical data (action block **1210**). The selection returns input command to be used by the behaviors. If not, then default behavior or response is chosen (action block **1220**).

After the game system components are updated, e.g., moves, animations, physics/collisions (action block **1230**), the simulator **120** then determines whether any current game system events, such as animations or collisions, trigger game events (decision block **1240**). If so, then the simulator **120** searches for a profile playback system that handles this event (decision block **1245**). If so, then the simulator **120** updates the management of the playback system based on the event in the game (action block **1255**). If not, then game system components are updated, e.g., roster data, sound effects, crowd, and statistics (action block **1250**). When the game ends (decision block **1260**), the game is deinitialized (action block **1270**).

To illustrate the operation, if the user is playing offense and is on its own goal line, 2nd and goal, up by 21 points in the middle of the fourth quarter, then the simulator **120** will retrieve the corresponding offensive situation profile **510**. If the user in that situation selects the "I" formation and then selects a run play with the half-back assigned to run between the right guard and tackle, those choices are stored in a play calling profile **530** for the corresponding offensive situation profile **510**. Likewise, if the user is playing defense in that same situation, the simulator **120** will retrieve the corresponding defensive situation profile **520**. If the user selects a goal line formation with all the avatars **320** blitzing, such information is stored in a play calling profile **530** for the corresponding defensive situation profile **520**. Further, the simulator **120** may compare the defensive situation with the actual formation the offense uses, which may not be an expected formation. The defensive situation profile **520** may include information as to whether a user may react to an unexpected formation. For example, an offensive situation may be 3rd down and 10 yards to go. In such a situation, the defense would expect to see an offensive formation with more than two wide receivers. However, the actual offensive formation may be one wide receiver, a full back, and a tight end (large formation). In such a case, the defensive situation profile **520** may include recorded responses by the user, such as calling a run defense, calling the base personal in a 4-3, or maintaining a pass defense, such as a nickel or dime.

Other information to be stored may include how the formation and play are used by the user. For example, for an offensive play calling profile **530**, information may include whether the user motions avatars **320** for a play and which avatar is motioned. For a pass play, which receiver is passed to, what hot routes are called, and whether the QB pump fakes. Other information includes where the QB or the running back initially moves to after the ball is snapped, how hard the QB throws the ball, when the QB does throw the ball, and what circumstances cause the user to flip a play.

For a defensive play calling profile **530**, the simulator **120** may store whether and how a user adjusts defensive players for a particular play, which avatar **320** the user typically controls, and where the user typically lines up the avatars **320**. Other information may include when the user blitzes, what defensive adjustments are made (linemen shift, linebacker shift, and defensive back adjustments), and whether the user makes adjustments to double team the best receiver on the opposing team.

A user may call more than one formation and/or play for a given situation. Thus, a situation profile **510**/**520** may include more than one play calling profile, each with different selections made by the user. If a user varies in selection but does make a particular selection more frequently than others, such statistical data may be stored in the play calling profiles **530** as well. As will be described in more detail below, when the simulator **120** is in simulation mode, when the simulator **120** retrieves the corresponding situation profile **510**/**520**, if a situation profile **510**/**520** includes more than one play calling profile **530**, a play calling profile **530** may be selected randomly or based on available statistical data.

Turning to FIG. **6**, a kick profile **420** stores information as to how well a user kicks the ball during play. This includes how many times a user has kicked the ball, the minimum and maximum distances that a user has kicked the ball, and the total power used. There is a kick profile for when a user kicks off, punts, and kicks field goals. When recording data for a kick profile **420**, the simulator **120** may check to see if the user's power has exceeded the minimum or maximum, increment the kick count, and add the power to the total power accumulated. When the simulator **120** is in simulation mode, based on the user's profile **400**, and the simulated user is in a kick situation, the simulator **120** may determine the power for kick based on the corresponding kick profile **420**, e.g., whether the power should be above the average or below the average and/or whether the power should be a random value between the maximum and minimum powers recorded. If this value is above the average, then the simulator **120** may randomly select a value between the minimum power and the average. If this value is below the average, then the simulator **120** can randomly select a value between the average and the maximum power.

Another sub-profile that can be included is the special moves profile **460**. A user can invoke special moves if the user's avatars **320** are in possession of the ball. In such a situation, the simulator **120** may examine where the closest two defending avatars **320** are in relation to the ball carrying

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avatar **320** ("the ball carrier") on the football field **310**. In one approach, the simulator **120** defines a logical grid of two rows and three columns on the football field **310** in front of the ball carrier. If one of the two closest defending avatars **320** is within one of the defined locations, then the simulator **120** records such information by setting a bit in an index within the special moves profile **460** to indicate this. The simulator **120** further defines a logical half circle behind the ball carrier on the football field **310**. If one of the two closest defending avatars **320** is in this area, the simulator **120** sets a bit in an index in the special moves profile **460** to indicate this as well. A table can be created within the special moves profile **460** of how much time a user has spent in this situation, how often a user selected an available turbo button in this situation, and how many times the user has invoked any of the available number of different special moves in this situation. As with the play book profile **500**, this information may be categorized based on different situations.

When a ball carrier is in a known situation, the simulator **120** can increment the time spent in this situation. When the appropriate situation profile is retrieved, the simulator **120** may store whether a special move was invoked, what special move was invoked, and whether the user selected an available turbo button. During simulation mode, the simulator **120** retrieves the special moves profile **460**, determines when the last time the user invoked a special move or hit a turbo button, evaluates special moves recorded in the profile **460**, and determines whether a special move should be invoked, what the special move should be, and whether to initiate the turbo button option. The type of special move can be selected randomly and/or based on the frequency of the recorded selections of certain types of special moves.

Other sub-profiles include tackle profile **492**, which stores the types of tackles the user prefers; pass defend profile **493**, which stores the user's preference in defending passes thrown to the receiver the user is covering; QB pocket profile **494**, which stores the tendencies the user has when controlling the quarterback in the pocket, e.g., whether the user likes to scramble, pump fake, evade, etc.; coaching error profile **495**, which stores the types of mistakes the user makes for "head coach" decisions, such as inappropriately going for two points; pre-snap adjustment profile **496**, which stores the types of adjustments the user prefers to make at the line of scrimmage; coin toss profile **497**, which stores the decisions the user prefers to make during the coin toss; charge profile **498**, which stores when and how often a users prefers to "charge up" the controlled avatar; and play calling tendency profile **490**, which stores a group of information indicating how often a user uses coaches pick and audibles and whether the user calls a defensive play without knowing what offensive package will be used on the field.

If a first user desires to play the video game against a simulation of a particular second user, the simulator **120** may operate in simulation mode and retrieve the second user's profile **400** from the database **130** of profiles in accordance with process shown in FIG. **3** and described above.

The following is a detailed list of profiles stored in a user profile **400** and the type of information that may be stored within the respective profiles:

USER_PROFILE **400**

doDiveTackle	Whether to dive tackle at next tackle opportunity
checkDefenseSwap	Determine which defender the user is controlling

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chargeUp	Whether turbo meter is charging up
chargeUpThisPlay	Whether to test for charging up turbo meter on current play
usePlaybook	Whether to record and play back play call data
trainerIntroDone	Whether VIP trainer has been explained to user
userName	Name of the user who created this profile
playbookProfiles	
currentPlaybookProfile	The current PLAYBOOK_PROFILE in use by the user
currentOffensiveSituation	What is the current situation being profiled?
currentDefensiveSituation	What is the current situation being profiled?
currentOffensivePlaycallProfile	Which play call profiles are being used on the current offense play? (See OFFENSIVE_PLAYCALL_PROFILE)
currentDefensivePlaycallProfile	Which play call profiles are being used on the current defense play? (See DEFENSIVE_PLAYCALL_PROFILE)
passPlaysStarted	How many times did the user hike the ball with a pass play called?
numberOffensePlaysStarted	How many times was user on offense?
numberDefensePlaysStarted	How many times was user on defense?
numberOffensivePlaysCalled	Number of opportunities to call coaches pick on offense
numberOffensiveCoachesPick	Number of times coaches pick actually used
numberDefensivePlaysCalled	Number of opportunities to call coaches pick or audibles on defense
numberDefensiveCoachesPick	Number of times coaches pick actually used
numberDefensiveNonWaitCalls	Number of times play on defense was called before package offense was noticed
numberDefensiveAudibles	How many times was a defensive audible being called?
numberOffensiveAudibles	How many times was an offensive audible called?
pumpFake	How often does user use pump fake to get players open?
passThrownAway	Of the number of pass plays, number of balls thrown away?
scrambleCount	Of the number of pass plays, number of scrambles?
escapeMoves	How often does user use various defensive escape moves?
wrapTackle	How many times did user do non dive tackle?
diveTackle	How many times did user do dive tackle?
numberDefenseSwapPlays	How many plays did user change which defender they were are play started?
numberDefenseChargePlays	Number of plays charged up on defense
numberOffenseChargePlays	Number of plays charged up on defense
passDefendOpportunities	How many chances has user had to pass defend?
blockPass	How many times has user tried to block a pass?
interceptPass	How many times has user tried to intercept a pass?
controlledPlayer	Current player to put player indicator under
lastTurboTime	Last time the turbo button was hit during playback
chargeTime	How long to turbo charge up for during playback?
hotRouteOpportunities	How many plays could a hot route have been called on?
hotRouteCalled	How often did was any of the various hot routes used?
motionCalled	How often was an avatar sent in motion?
playFlipOpportunities	How many plays could the play have been flipped on?
playFlips	How many times was a play flipped?
defenseShiftOpportunities	How many opportunities was there to make defensive adjustment?
shiftLinemen	How often were any of the various line shifts used?
shiftLinebackers	How often were any of the various linebacker shifts used?
shiftSecondary	How often was any of the various secondary adjustments used?

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onePointOpportunities	How many times did user have opportunity where they should go for one?
twoPointAttempts	How many times did user go for two instead?
fourthDownOpportunities	How many times did user have opportunity where they should punt?
fourthDownAttempts	How many times did the user attempt a fourth down conversion instead?
onsideOpportunities	How many times did user have opportunity where they should do normal kickoff?
onsideAttempts	How many times did user have opportunity where they should do normal kickoff but instead did onside kick?
choseToReceiveKick	How many times did user choose to receive during coin toss?
choseToKickKick	How many times did user choose to kick during coin toss?
qbEvades	How many times did user use a qb evade command?
qbEvadeOpportunities	How many times could user use a qb evade command?
kickoffProfile	How much power the user usually achieves during kickoffs
fieldGoalProfile	How much power the user usually achieves during field goals
puntProfile	How much power the user usually achieves during punts
timeProfiles	How much time is spent in huddle and going to the line in any one of 4 possible situations?
currentTimeProfile	How much time is spent in huddle and going to the line in any one of 4 possible situations?
reviewTeam	How much time is spent reviewing the field and the play in any one of 3 possible situations?
checkPlayReview	During playback, what is the current state?
currentTeamReviewProfile	Current team reviews for this play This is the current set of field/play review profiles that should be used to record or playback to. There is a review set for offense passing, offense running, and defense. Each set is just a list of field/play review samples from when the user last played. Each sample says how often they like to pull the camera back and review the field prior to the ball being snapped. Each sample also says whether the user will review the play in front of their opponents.
currentTeamPlayReview	Current team reviews for this play
snapCount	How to use the hard count?
hurryToLine	When to hit the hurry to line button in any of 2 possible situations?
currentHurryProfile	When to hit the hurry to line button in any of 2 possible situations? This is the current set of hurry to line profiles to use to record or playback to. There is a set for when simulator 120 is in a critical situation and a set for when simulator 120 is not in a critical situation. Each set contains a set of samples/times when the user presses the hurry to line button.
specialMovesProfile	The SPECIAL_MOVES_PROFILE for special moves executed by the user
coachProfile	The coaching profile of this user

SPECIAL_MOVES_RESPONSE_PROFILE

turboTime	Time spent in threat grid where to consider turboing
moveTime	Time spent in threat grid where to consider using a special move
turboCount	How many times did user hit turbo button?
moveCount[n]	How often did user use each one of the special moves?

SPECIAL_MOVES_PROFILE
(460)

threatGrid[n]	A SPECIAL_MOVES_RESPONSE_PROFILE for each combination of situations within the threat grid. This is the array of situations a runner can get in to. There are seven locations around a runner. If a defender is in any of those locations we set a bit on our grid index. When simulator 120 is done looking to see where all the close defenders are, simulator 120 has a 7-bit value, hence threatGird[128]. So for each possibility, simulator keeps track of how the user reacts to being in that situation - how often they use the turbo button and how often they use any of the various special moves.

OFFENSIVE_PLAYCALL_PROFILE
(530)

formationFlip	Did user flip formation?
playFlip	Did user audible to play flip?
onStrongSide	Was simulator 120 on the strong side of field?
isPassThrown	Did simulator 120 attempt to throw a pass this play?
motionCalled	How many players did simulator 120 send in motion (0, 1, 2)?
hotRouteCalled	Did simulator 120 assign a hot route this play?
motionState1	Where did simulator 120 motion the first motion player to?
motionState2	Where did simulator 120 motion the second motion player to?
beenCalled	Has simulator 120 called this play during playback?
pumpFake	Did QB do a pump fake on this play?
move1	Did user move ball handler during phase1?
move2	Did user move ball handler during phase2?
runCharge	Did user charge up immediately on running play?
thrownTo	The receiver the ball is passed to
passMagnitude	The magnitude the ball is thrown at
passTime	When does QB start passing motion?
motionPlayer1	The formation index of first player simulator 120 sends in motion
motionPlayer2	The formation index of second player simulator 120 sends in motion
motionTime1	Did simulator 120 hike ball during motion - if so, when?
motionTime2	Did simulator 120 hike ball during second motion - if so, when?
hotRoutePlayer	Who simulator 120 assigned a hot route to
hotRoute	What hot route did simulator 120 assign to them?
formation	What formation (index) did simulator 120 call?
Play	What play (index) did simulator 120 call?
move1X	Where user moved ball handler relative to ball spot, phase 1
move1Z	Where user moved ball handler relative to ball spot, phase 1
move2X	Where user moved ball handler relative to ball spot, phase 2
move2Z	Where user moved ball handler relative to ball spot, phase 2

DEFENSIVE_PLAYCALL_PROFILE
(530)

userPlacement	Does the user move user-controlled defender before snap of ball?
userBlitz	Did user bring defensive controlled player across line of scrimmage during play?

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beenCalled	Has simulator 120 called this play during playback?
formationFlip	Did user flip formation?
shiftLinemen	What type of linemen shift did simulator 120 do?
shiftLinebackers	What type of linebacker shift did simulator 120 do?
shiftSecondary	What type of secondary shift did simulator 120 do?
scramblingQB	Was qb on this play a good scrambler (e.g. Vick)?
userPlayer	Which player does user control prior to the snap?
adjustPlayer	Which player did simulator 120 make individual adjustments for?
individualAdjustment	What adjustment does simulator 120 make for individual player?
coverBestReceiver	Did simulator 120 make adjustment to cover best receiver?
formation	What formation (index) did simulator 120 call?
Play	What front (index) did simulator 120 call?
coverage	What coverage (index) did simulator 120 call?
placementX	Where user places user-controlled defender relative to ball spot in feet?
placementZ	Where user places user-controlled defender relative to ball spot in feet?

OFFENSIVE_SITUATION_PROFILE (**510**)

recordsFilled	Has simulator 120 filled up all play call records?
beenCalled	Has any play been called from this situation?
nextRecord	Next record to record to?
maxRecords	How many records are in this profile?
Records	The OFFENSIVE_PLAYCALL_PROFILE records stored for this situation

DEFENSIVE_SITUATION_PROFILE (**520**)

recordsFilled	Has simulator 120 filled up all play call records?
beenCalled	Has any play been called from this situation?
nextRecord	Next record to record to?
maxRecords	How many records are in this profile?
Records	The DEFENSIVE_PLAYCALL_PROFILE records stored for this situation

KICK_PROFILE (**420**)

numberKicks	Number of kicks simulator 120 has recorded
minPower	Worst kick
maxPower	Best kick
totalPower	Total power on all kicks

PLAYBOOK_PROFILE (**400**)

numberPlays	Number of plays recorded using given "playbook" index
playbook	Playbook index used to record for playcalling data
offensivePlaycallProfiles	The playcall profiles for various situations on offense
offensiveSituation	The offensive situation structure points to the various offensivePlaycallProfiles in simulator 120 playbook profile. Both can be considered simulator 120 play call profiles for various situations on offense. The situation profile groups play call profiles in to groups for various situations.
defensiveSituation	The playcall profiles for various situations on defense
firstDownSituation	The playcall profiles for generic first down situation on offense
offensiveBackToGoallineSituation	The playcall profiles for goalline situations on offense
offensiveOnGoallineSituation	The playcall profiles for goalline situations on offense

TIME_PROFILE (**430**)

numberTimes	Number of times simulator 120 has recorded going to the line and being in the huddle
totalHuddleTime	Total time spent in the huddle
totalAtLineTime	Total time spent at the line

TEAM_PLAY_REVIEW_PROFILE

numberReviews	How many times did simulator 120 review field for given play?
Start	Times at which simulator 120 started field reviews
Stop	Times at which simulator 120 stopped field reviews
startPlayReview	Start time of when simulator 120 reviewed play
stopPlayReview	Stop time of when simulator 120 reviewed play

TEAM_REVIEW_PROFILE (**440**)

nextRecord	The next team play review profile record
recordsFilled	Are all records filled?
Records	The TEAM_PLAY_REVIEW_PROFILE records

PLAY_SNAP_COUNT_PROFILE

numberSnapCounts	How many times does simulator 120 do a hard count?
snapCount	Times for each of the hard counts

HURRY_PROFILE (**470**)

nextRecord	The next hurry record
recordsFilled	Are all records filled?
startTimes	The start time each time to hit the hurry to line button

COACH_PROFILE (**480**)

numberPassPlays	Number of pass plays recorded
numberRunPlays	Number of run plays recorded
scoreRunRatio	Based on the score in the game, how often the simulated user runs to how often the simulated user passes
redzoneRunRatio	When in the red zone, how often the simulated user runs to how often the simulated user passes
downDistanceRunRatio	Based on the down and distance, how often the simulated user runs to how

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	often the simulated user passes
numberPassesThrown	Number of passes thrown
passDirection	How many times have user has passed in any of fives directions (e.g. how many times was the ball thrown to the right)?
passDistance	How many times did the simulated user pass to a particular distance down field?
passPosition	How many times did a simulator user pass to a particular player position (e.g. tight end)?
runDirection	How many times ran in any of five directions?
runFormation	How many times did the simulated user run the ball from any of five generic formation types?
passFormation	How many times did the simulated user pass the ball from any of five generic formation types?
runPackage	How many times have was the ball ran using a particular personal package?
passPackage	How many times have was the ball passed using a particular personal package?
numberPassMotion	How many times was a player motioned on a passing play?
numberRunMotion	How many times was a player motioned on a running play?
numberNoHuddleOpportunites	How many times has there been a situation where no huddle offense was inappropriate?
numberNoHuddles	How many times has there been a situation where the simulated user inappropriate ran a no huddle offense?
numberDefensivePlays	How many times has a defensive play been called?
numberZoneDefenses	Of the times that called a defensive play, how many times was a zone coverage called?
numberBlitzes	Of the times that a defensive play was called, how many times was a blitz called?

Turning to FIG. **10**, the computer program **110**, simulator **120**, and database **130**, as shown in FIG. **1**, can reside on a single client console, such as the workstation **750** or a video game console **760**, such as an Xbox or Playstation. Alternatively, or in addition, the computer program **110**, the simulator **120**, and database **130** can reside on a server **710** accessible by one or more client consoles **750**/**740** via a network, local area or wide area, such as the Internet **770**. In yet another alternative, a copy of the computer program **110** may reside on each client console **740**/**750**, and the simulator **120** and database **130** can reside on the server **710**. Further, the computer program **110** and the simulator **120** can reside on each client console and the database **130** can reside on the server. Multiple users can compete against each other either on a single console **750**/**740** or from multiple consoles **750**/**740**. For example, a first user can compete on a first video game console **760** against a second user competing on a second video game console **760**. Whether the simulator **120** is on one of the client consoles **740**/**750** or a server **710**, the simulator **120** can operate in learning and/or simulation mode as long as the simulator **120** is communicatively coupled with a copy of the interactive computer program **110**. In the case where the simulator **120** and database **130** resides on a server **710**, any participating user can upload its own user profile for access by any other participating user, and further any participating users can download or access any user profile available in the database **130**.

The interactive computer system **100** may further include a security system that requires an authentication by each user. For example, the simulator **120** resides on a server **710** accessible by participating video game consoles **760**. For Xbox video game consoles **760**, an Xbox Live authentication server is used. For Playstation 2 game consoles **760**, a corresponding authentication server is used as well. Both servers verify whether a participating user has a valid user profile and whether the user is entitled to participate in the interactive computer system **100**.

In the foregoing specification, the invention has been described with reference to specific embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the invention. For example, this invention is particularly suited for applications involving video games, but can be applicable for other interactive computer programs. As a further example, each feature of one embodiment can be mixed and matched with other features shown in other embodiments. Additionally and obviously, features may be added or subtracted as desired. Accordingly, the invention is not to be restricted except in light of the attached claims and their equivalents.

What is claimed is:

1. A computer program product comprising a computer-usable medium having a sequence of instructions stored thereon, which, when executed by a processor, causes said processor to execute a first process for learning the behavior of a first user interacting with a multi-user computer game and a second process for simulating the first user interacting with the multi-user computer game, wherein the first process for learning includes

monitoring the first user's interaction with the computer game for the occurrence of one or more events;

recording one or more first user inputs in response to the occurrence of the one or more events;

analyzing one or more current circumstances during the one or more first user inputs upon the occurrence of the one or more events;

storing the one or more first user inputs in one or more data fields;

associating one or more statistical values with each of the one or more first user inputs, wherein the one or more statistical values are derived from a number of occurrences of each of the one or more first user inputs, and wherein one or more statistical values of the first user input having the largest number of occurrences compared to other first user inputs has the greatest weight; and

associating the one or more data fields with the one or more events and the one or more current circumstances,

wherein the one or more first user inputs includes inputs by a substantial simulation of the first user.

2. The computer program product of claim **1**, wherein the second process for simulating enables a second user to interact with the substantial simulation of the first user via the computer program and includes:

monitoring the computer game for the one or more events;

analyzing the one or more current circumstances upon the occurrence of the one or more events;

retrieving the one or more data fields associated with the one or more events and the one or more current circumstances;

randomly selecting one of the one or more statistical values of the one or more first user inputs in the one or more data fields, wherein the first user input having the largest number of occurrences compared to the other first user inputs will have the highest probability of having one of its one or more statistical values chosen; and

invoking a response based on the selected statistical value subsequent to the occurrence of the one or more events and the one or more current circumstances.

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3. The computer program product of claim 2, further comprising designating the selected statistical value as unavailable until all of the one or more statistical values have been selected.

4. The computer program product of claim 1, wherein the multi-user computer game is a football game, the one or more events include at least one of a called pass play and a called run play and the one or more current circumstances include score and time.

5. The computer program product of claim 4, wherein the one or more events further include at least one of a blitz, a dive tackle, and a special move.

6. The computer program product of claim 1, wherein the one or more current circumstances include a spatial position of one or more opposing avatars.

7. The computer program product of claim 1, wherein the one or more current circumstances include at least one of time, score, and a spatial position of one or more avatars.

8. The computer program product of claim 1, wherein the one or more current circumstances include an archetype of one or more avatars.

9. The computer program product of claim 1, wherein the one or more events includes movement of an avatar.

10. The computer program product of claim 1, wherein the multi-user computer game is a basketball game, the one or more events include at least one of a jump shot, a slam dunk, and a special move, and the one or more current circumstances include at least one of score and time.

11. The computer program product of claim 1, wherein the multi-user computer game is a first-person shooting game having an avatar controlled by the user and an opposing avatar, the one or more events include a direction of movement of the avatar controlled by the user, and the one or more current circumstances include at least one of a score and a position of the opposing avatars.

12. The computer program product of claim 1, wherein the simulating process includes invoking a default response if there is no value in the one or more data fields.

13. A system for simulating a first user of a multi-user interactive computer video game, comprising:

a simulator configured to learn a first user's behavioral interactions with the multi-user interactive computer video game and enable a second user to interact via the multi-user interactive computer video game with a substantial simulation of the first user operating the multi-user interactive computer video game; and

a database coupled to the simulator and configured to store data that enables the simulator to substantially simulate the first user, wherein the database includes a user profile corresponding to the first user, wherein the user profile stores the first user's response to one or more events and one or more situations, and wherein the simulator is configured to monitor the occurrence of the one or more events and subsequently analyze one or more current circumstances and a statistical occurrence of possible responses to determine a representation of the first user's response to the occurrence of the one or more events given the one or more current circumstances during the substantial simulation of the first user, wherein the one or more first user inputs includes inputs by a substantial simulation of the first user.

14. The system of claim 13, wherein the simulator is configured to assign a statistical range of values for each occurrence of a type of response, wherein each statistical range of values is determined by a number of occurrences of the respective type of response, and wherein the type of response having the largest number of occurrences is assigned the largest range of values, and the system is configured to randomly select a statistical value within the ranges of statistical values in determining a response during the substantial simulation of the first user.

15. The system of claim 14, wherein the simulator is configured to designate the selected value as unavailable until all possible statistical values have been selected.

16. The system of claim 13, wherein the simulator and the computer video game are located in a video game console and the database is located in a remote computer system accessible by a video game console.

17. The system of claim 13, wherein the computer video game is located in a local processor and the simulator and the database are located in a remote server accessible by the local processor via a wide area network.

18. The system of claim 13, wherein the computer video game, the simulator, and the database are located in a remote server accessible by the local processor via a wide area network.

19. The system of claim 13, wherein the computer video game is located in a local processor and the simulator and the database are located on portable memory device enabled to be directly connected to the local processor.

20. The system of claim 13, wherein the multi-user interactive computer video game is a football game having a first team of avatars and a second team of avatars, and the simulator is configured to substantially simulate the first user controlling the second team of avatars playing against the first team of avatars.

21. A method enabling a second user to interact via a multi-user interactive computer video game with a substantial simulation of a first user operating the multi-user interactive computer video game, comprising the steps of:

analyzing a first user's interaction with a multi-user interactive computer video game,

storing data related to the first user's interaction with the multi-user interactive computer video game, including a range of values indicating a statistical occurrence of a first user's response during the first user's interaction, and

simulating the first user's interaction with the multi-user interactive computer video game during a second user's interaction with the multi-user interactive computer video game, wherein the one or more first user inputs includes inputs by a substantial simulation of the first user.

22. The method of claim 21, wherein the analyzing step includes monitoring the first user's interaction with the computer game for the occurrence of one or more events, and analyzing one or more current circumstances during input of one or more first user inputs upon the occurrence of the one or more events.

23. The method of claim 21, wherein the step of storing data includes recording one or more first user inputs in response to the occurrence of the one or more events, storing the one or more first user inputs in one or more data fields and one or more statistical values with the one or more first user inputs, and associating the one or more data fields with the one or more events and the one or more current circumstances.

24. The method of claim 21, wherein the simulating step includes:

monitoring the computer game for the one or more events;

analyzing the one or more current circumstances upon the occurrence of the one or more events;

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retrieving the one or more data fields associated with the one or more events and the one or more current circumstances; and

invoking a response based on the one or more statistical values of the one or more user inputs within the one or more data fields subsequent to the occurrence of the one or more events and the one or more current circumstances.

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