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(54) **TRIGGERING AND ALLOWING ARTIFICIAL INTELLIGENCE GENERATED CONTENT IN A GAMING ENVIRONMENT**

(71) Applicant: **IGT**, Las Vegas, NV (US)

(72) Inventors: **Dwayne Nelson**, Las Vegas, NV (US); **Romana Wagner**, Leibnitz (AT); **Michael Russ**, Graz (AT); **Jackie Alvarez**, Las Vegas, NV (US)

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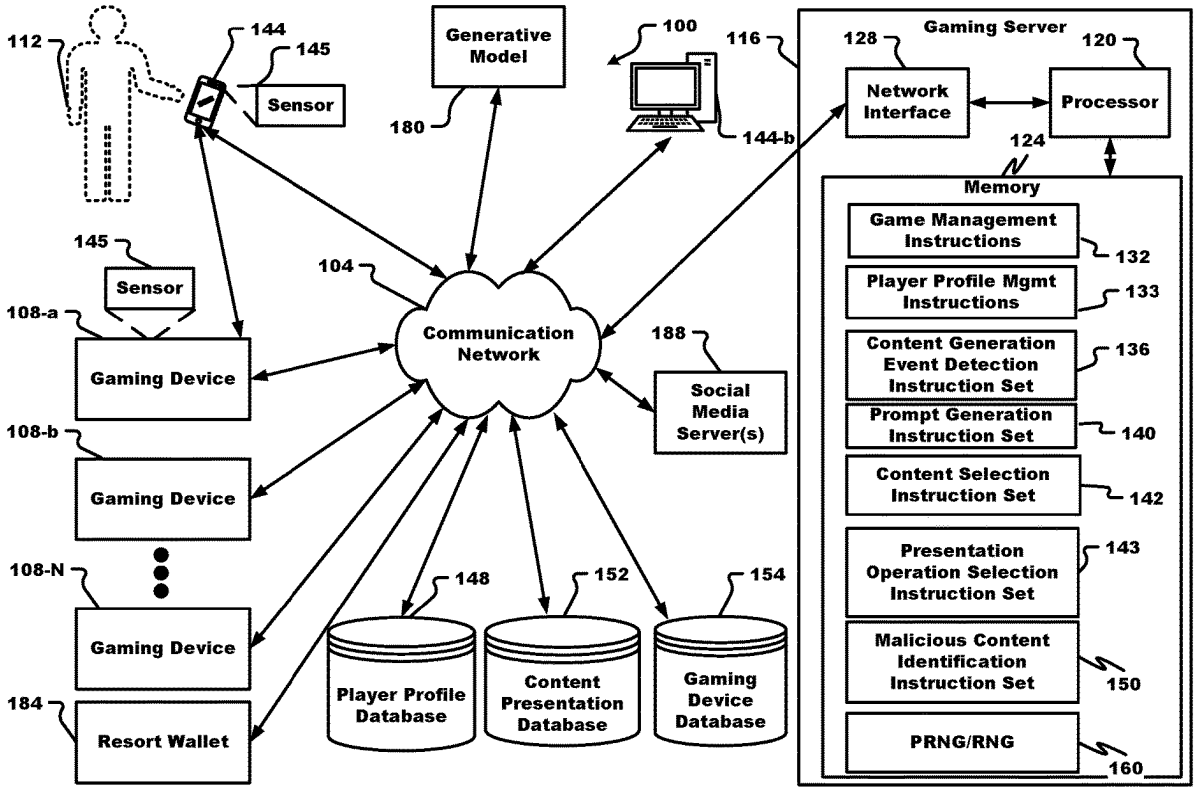
(57) **ABSTRACT**

The present disclosure relates generally to a gaming system, device, and method that in response to the detected content generation event, generate from a set of content preferences associated with a player, and send a prompt to a generative model; select at least a portion of the received content for presentation by a gaming device; and cause the received content to be presented by the gaming device to the player.



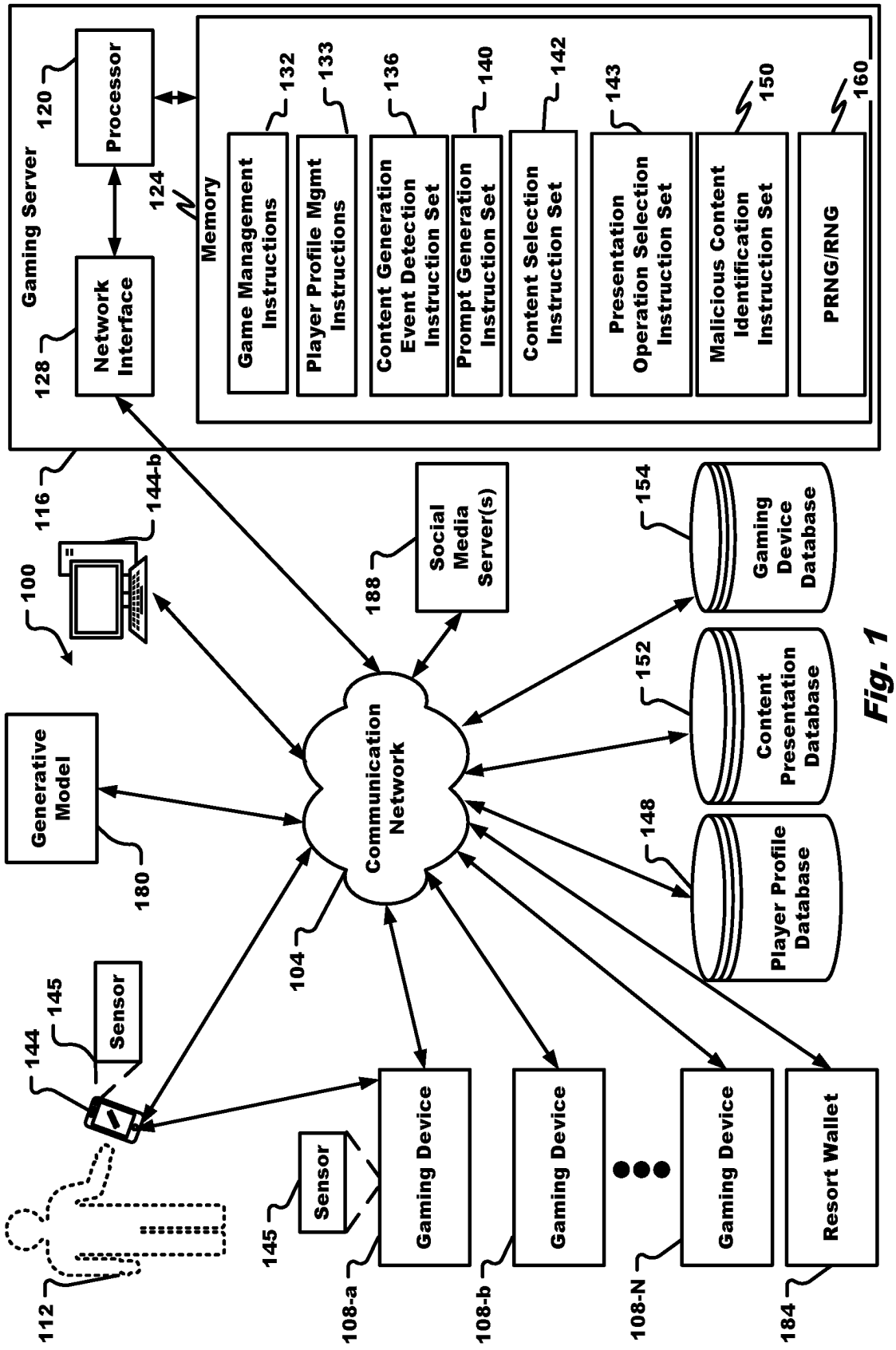

Gaming Server
120
Processor
124
Memory
128
Network Interface
132
Game Management Instructions
133
Player Profile Mgmt Instructions
136
Content Generation Event Detection Instruction Set
140
Prompt Generation Instruction Set
142
Content Selection Instruction Set
143
Presentation Operation Selection Instruction Set
150
Malicious Content Identification Instruction Set
160
PRNG/RNG
116
144-b
100
188
Social Media Server(s)
154
Gaming Device Database
152
Content Presentation Database
148
Player Profile Database
Generative Model
180
Communication Network
104
144
145
Sensor
112
145
Sensor
108-a
Gaming Device
108-b
Gaming Device
108-N
Gaming Device
184
Resort Wallet

Fig. 1

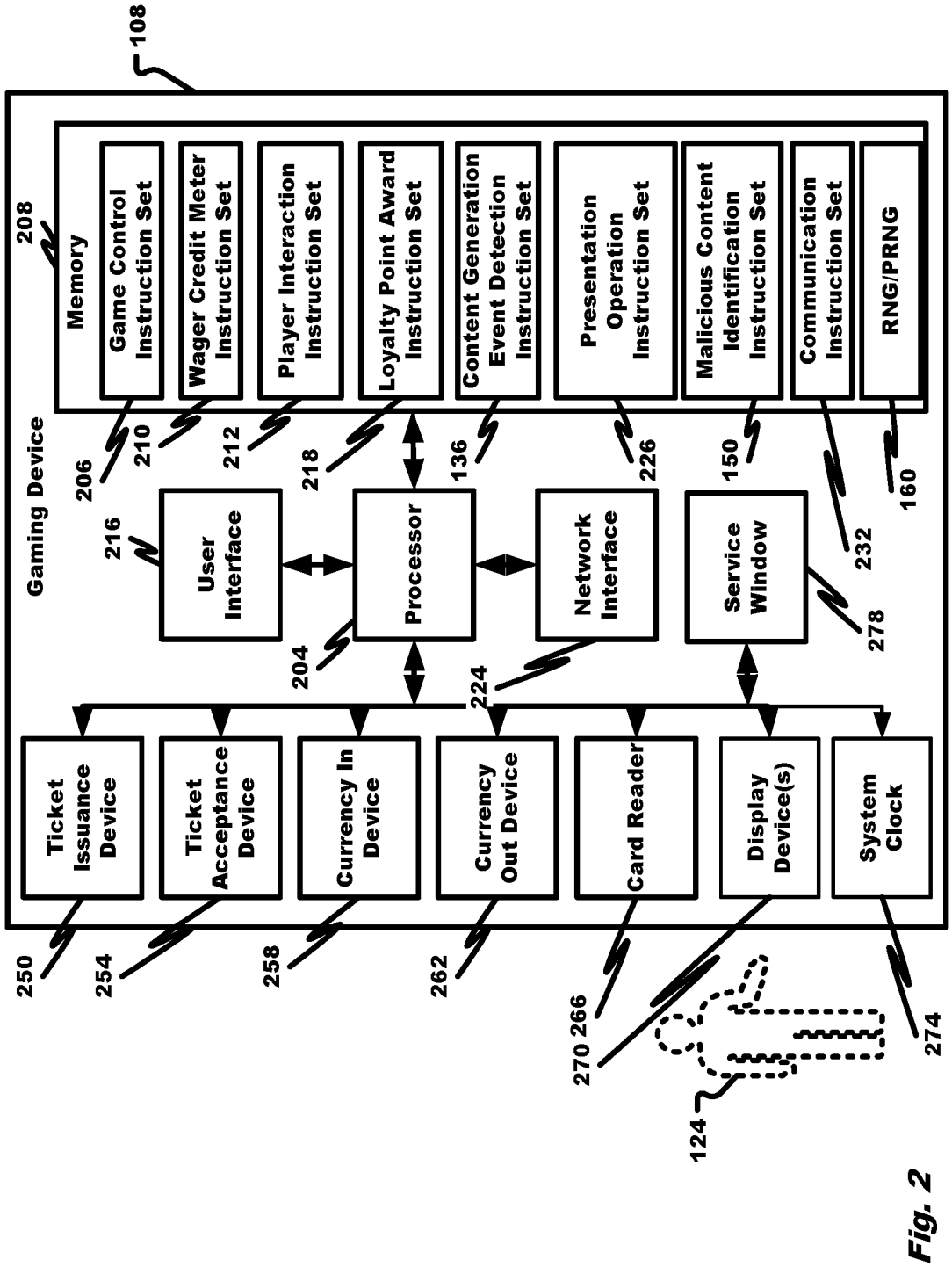

108
Gaming Device
208
Memory
Game Control Instruction Set
Wager Credit Meter Instruction Set
Player Interaction Instruction Set
Loyalty Point Award Instruction Set
Content Generation Event Detection Instruction Set
Presentation Operation Instruction Set
Malicious Content Identification Instruction Set
Communication Instruction Set
RNG/PRNG
206
210
212
218
136
226
150
160
216
User Interface
Processor
Network Interface
Service Window
232
278
204
224
Ticket Issuance Device
Ticket Acceptance Device
Currency In Device
Currency Out Device
Card Reader
Display Device(s)
System Clock
250
254
258
262
270
266
274
124

Fig. 2

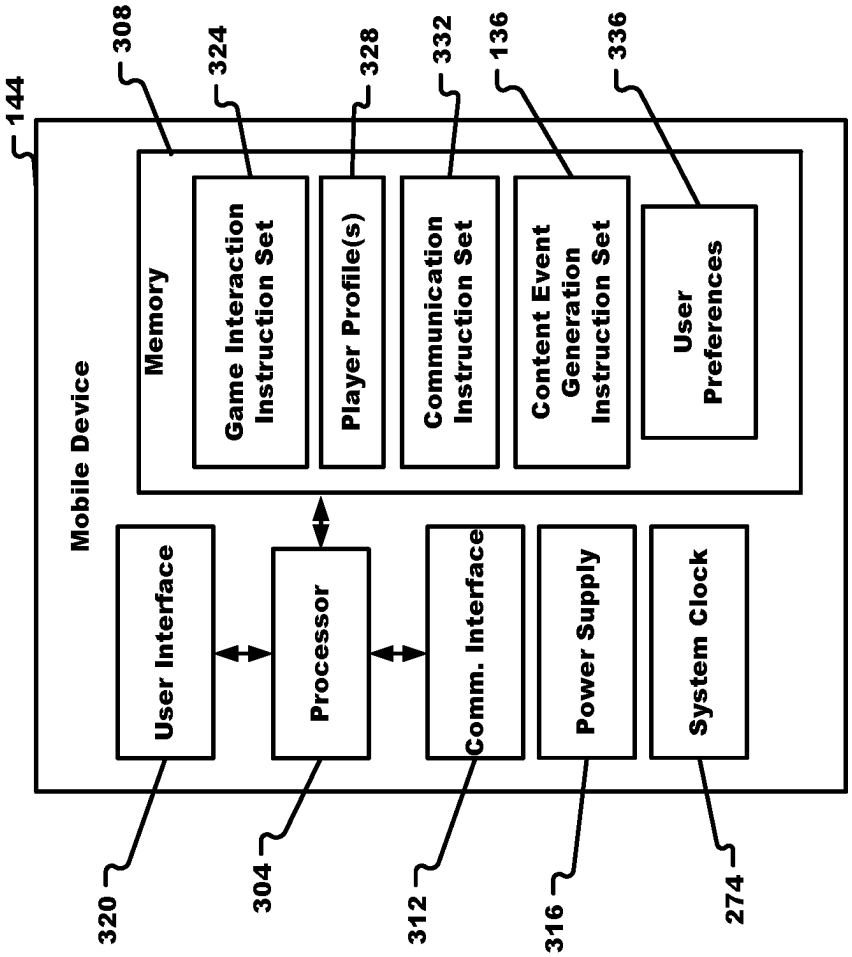

144
Mobile Device
308
Memory
324
Game Interaction Instruction Set
328
Player Profile(s)
332
Communication Instruction Set
136
Content Event Generation Instruction Set
336
User Preferences
User Interface
Processor
Comm. Interface
Power Supply
System Clock
320
304
312
316
274

Fig. 3

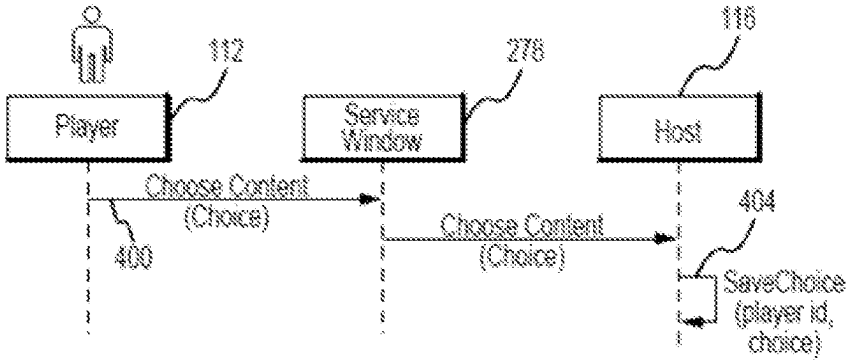

Player
112
Service Window
276
Host
116
Choose Content (Choice)
400
Choose Content (Choice)
404
SaveChoice (player id, choice)

FIG.4A

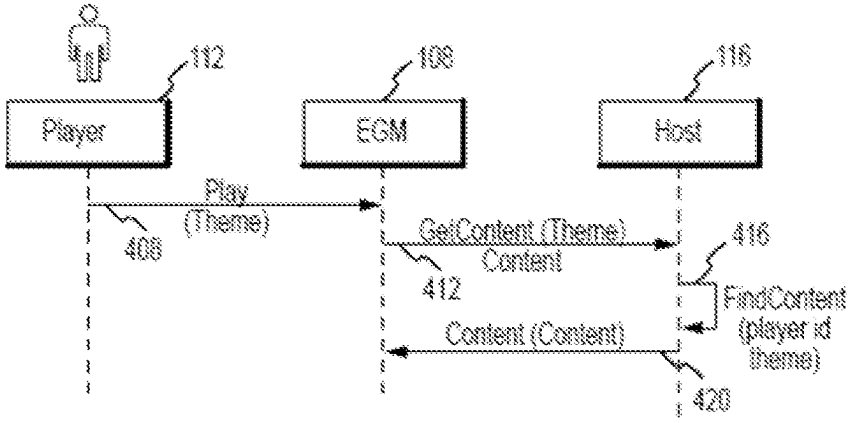

Player
112
EGM
108
Host
116
Play (Theme)
408
GetContent (Theme)
Content
412
416
FindContent (player id theme)
Content (Content)
420

FIG.4B

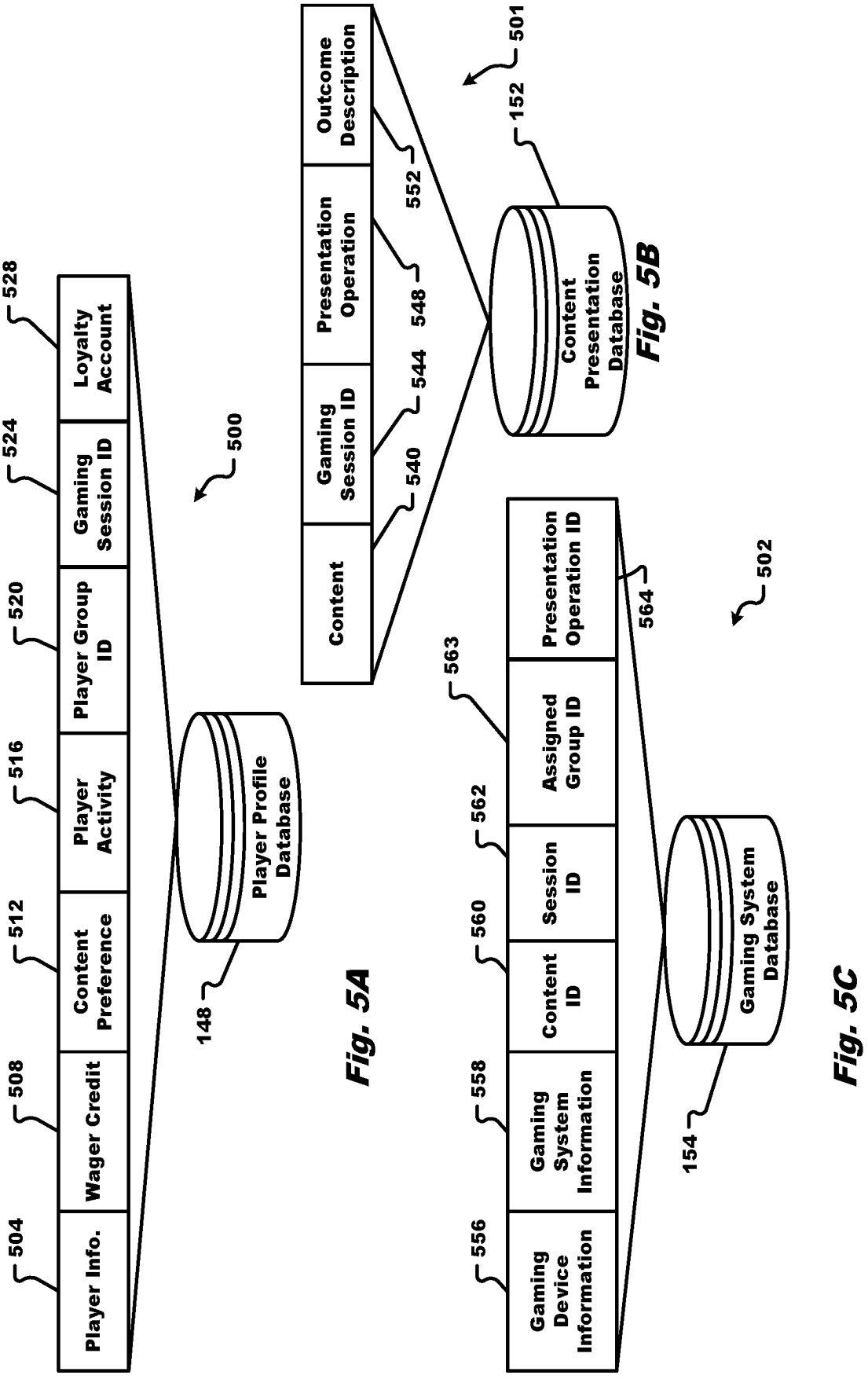


Fig. 5A

Fig. 5B

Fig. 5C


Prompt: Image of Cat and Sports Car as Cartoon in Beach Theme
600
604

FIG.6

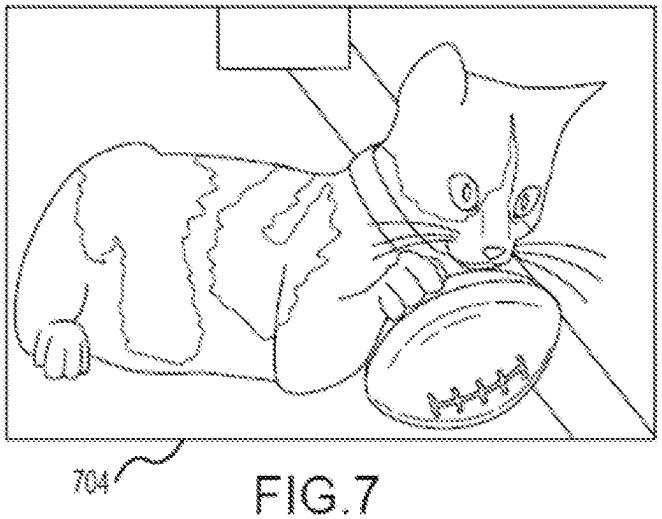

Prompt: Image of Cat Playing Football in Football Field Theme
700
704

FIG.7

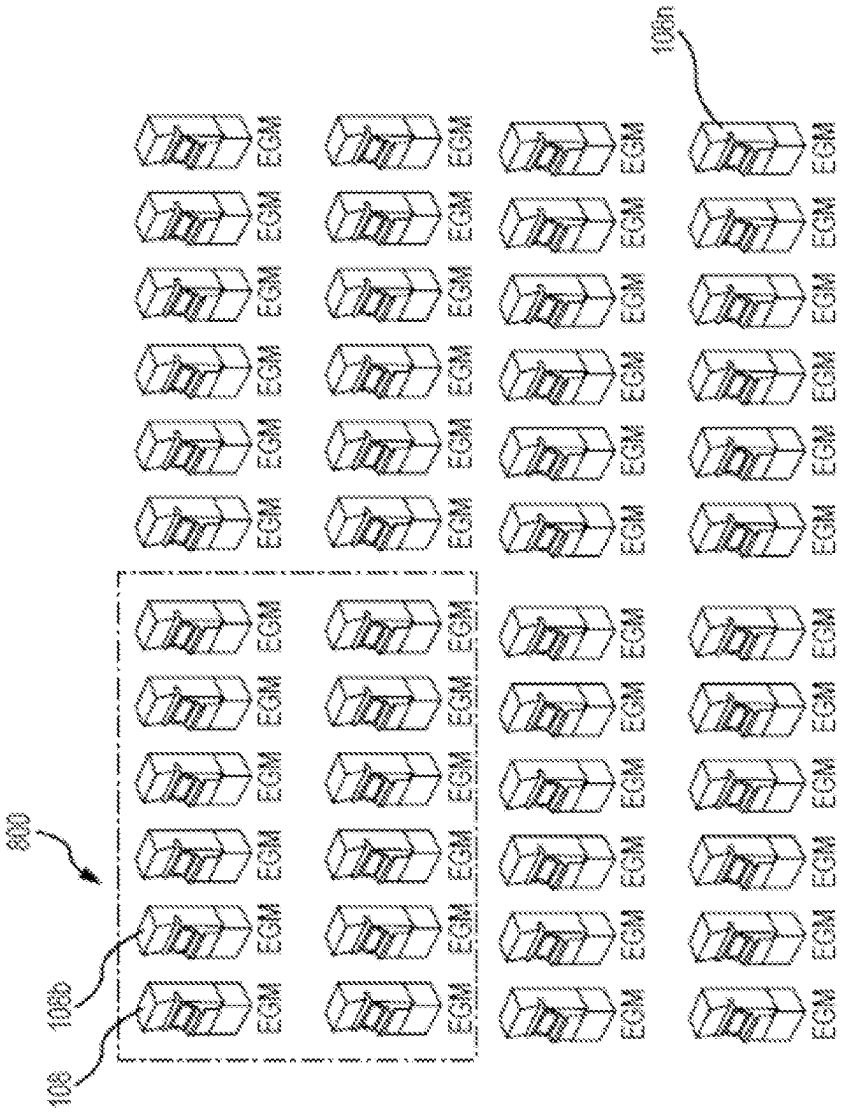


FIG. 8

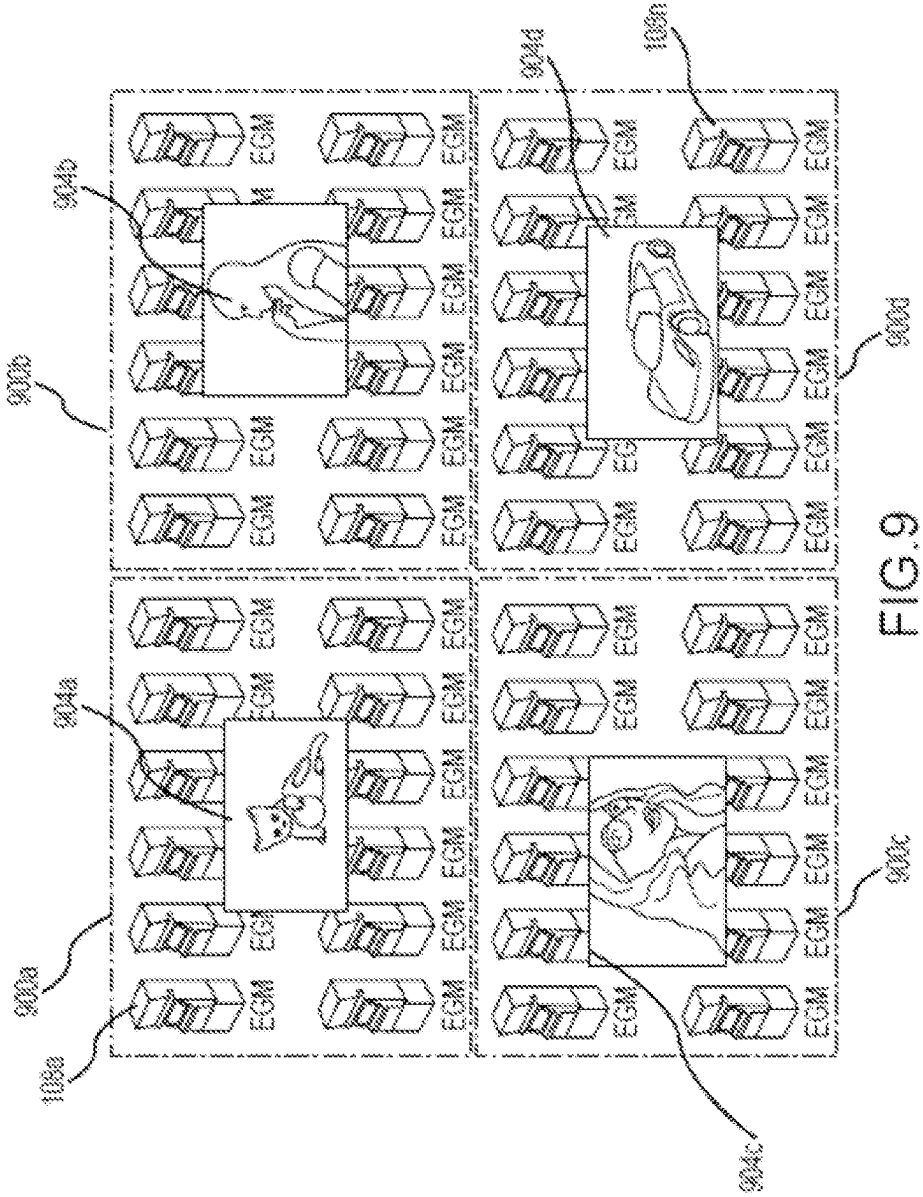


FIG. 9

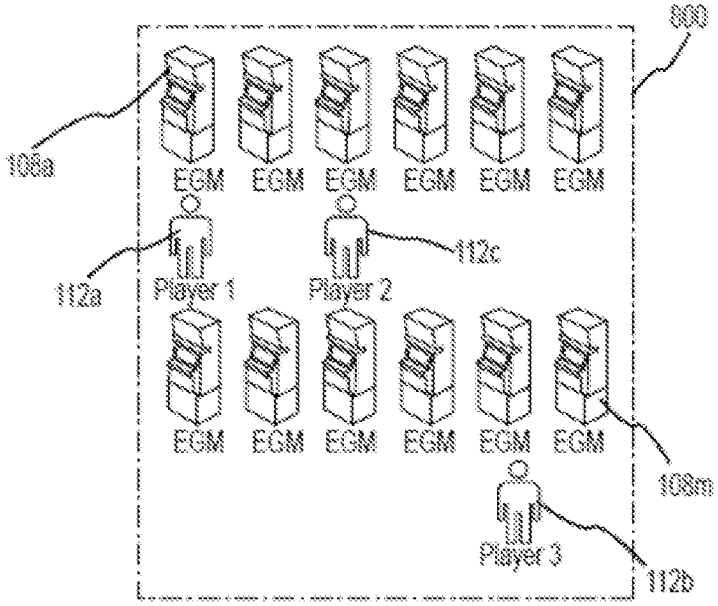

800
108a
EGM
EGM
EGM
EGM
EGM
EGM
112a
Player 1
Player 2
112c
EGM
EGM
EGM
EGM
EGM
EGM
108m
Player 3
112b

FIG. 10

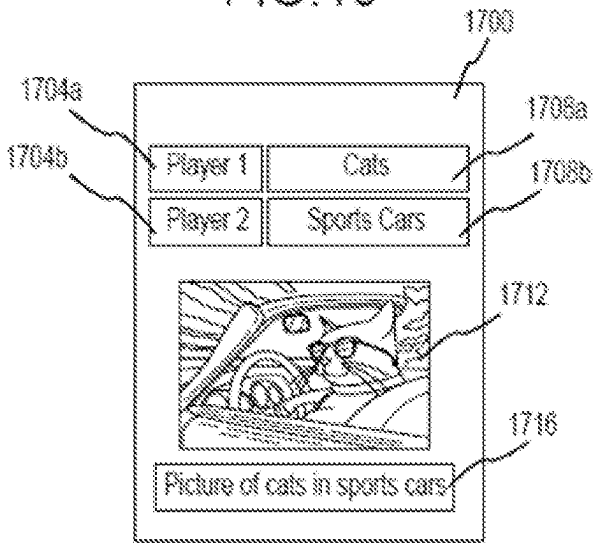

1700
1704a
1706a
1704b
Player 1
Cats
1706b
Player 2
Sports Cars
1712
1716
Picture of cats in sports cars

FIG. 17

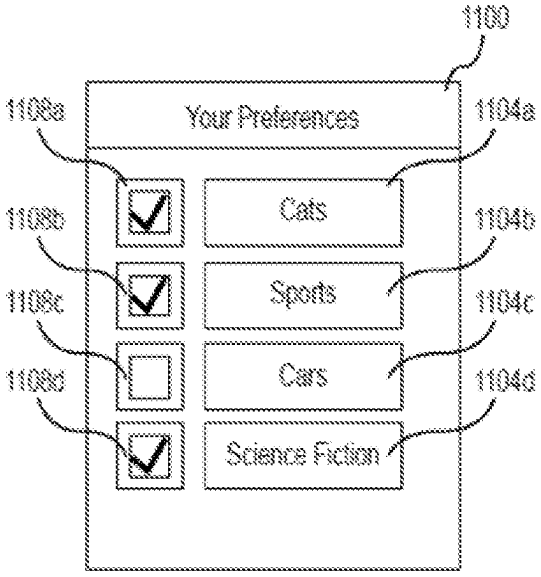

1100
Your Preferences
1108a
1104a
Cats
1108b
1104b
Sports
1108c
1104c
Cars
1108d
1104d
Science Fiction

FIG.11

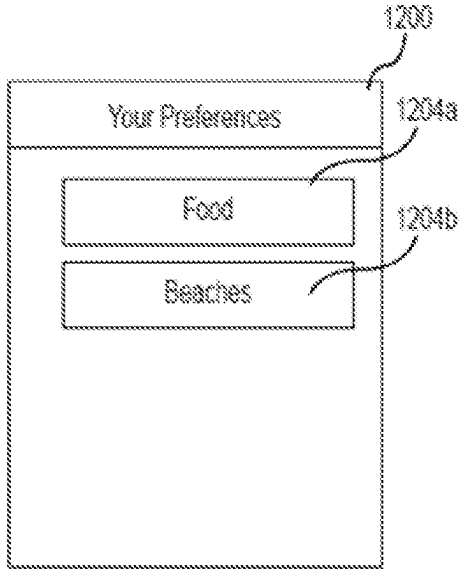

1200
Your Preferences
1204a
Food
1204b
Beaches

FIG.12

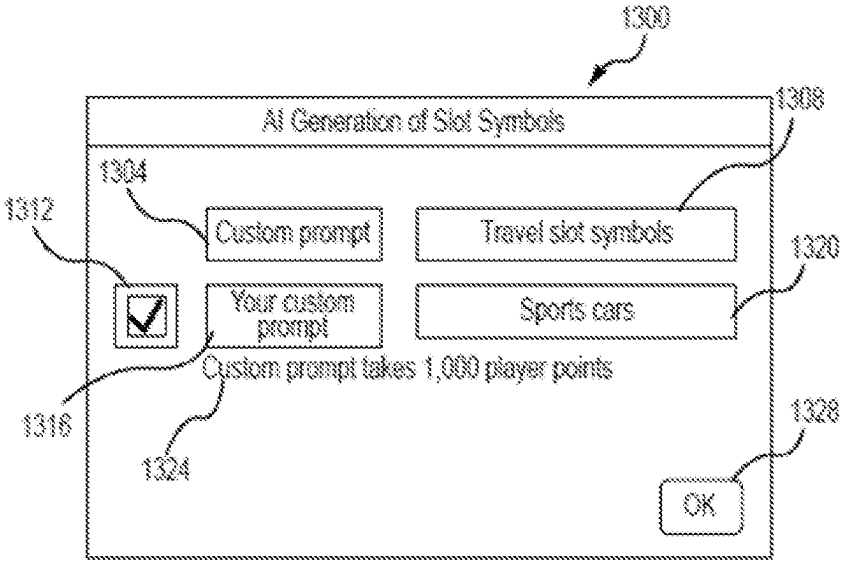

1300
AI Generation of Slot Symbols
1308
1304
1312
Custom prompt
Travel slot symbols
1320
Your custom prompt
Sports cars
Custom prompt takes 1,000 player points
1316
1324
1328
OK

FIG.13

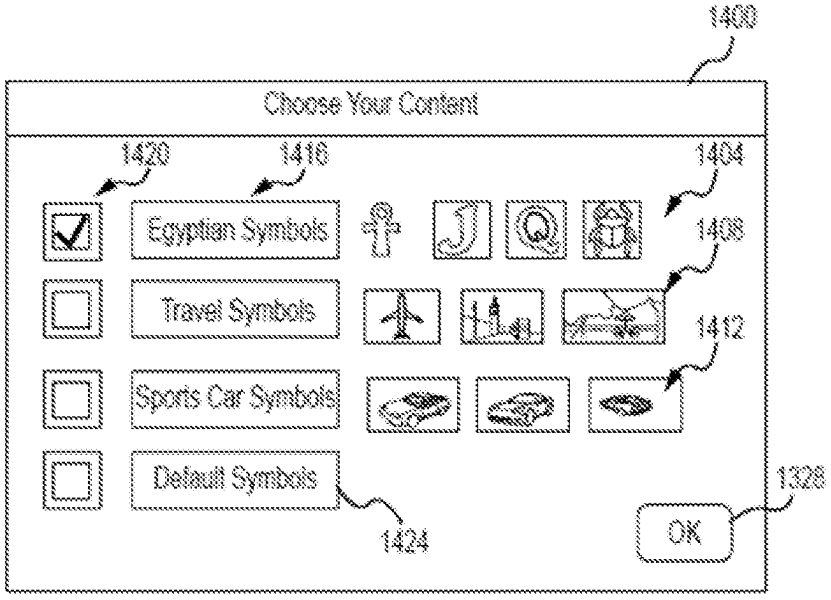

1400
Choose Your Content
1420
1416
1404
Egyptian Symbols
1408
Travel Symbols
1412
Sports Car Symbols
Default Symbols
1424
1328
OK

FIG.14

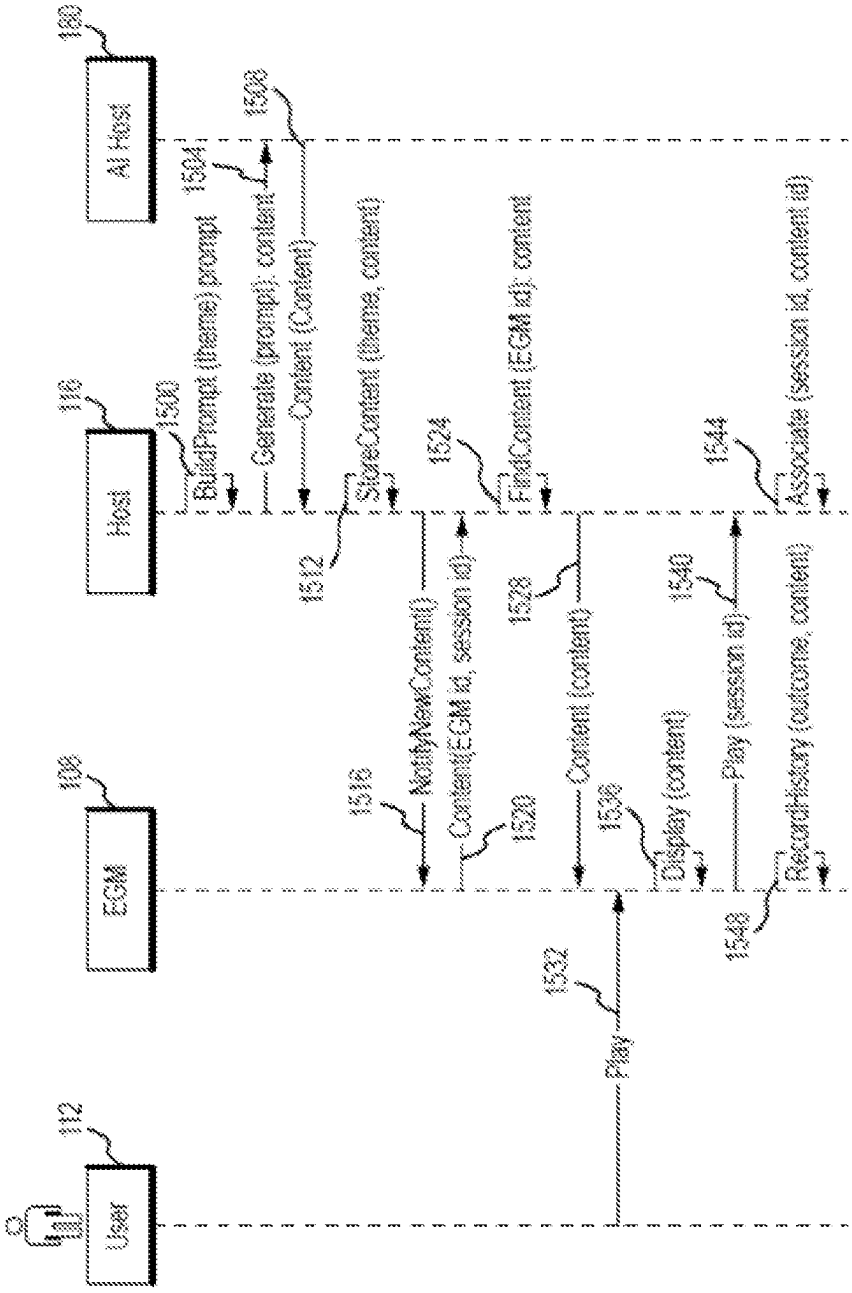

User
112
EGM
108
Host
116
AI Host
180
Play
1532
NotifyNewContent()
1516
ContentEGM id, session id)
1520
BuildPrompt (theme) prompt
1500
Generate (prompt), content
1504
Content (Content)
1508
StoreContent (theme, content)
1512
FindContent (EGM id), content
1524
Content (content)
1528
Display (content)
1536
Play (session id)
1540
Associate (session id, content id)
1544
RecordHistory (outcome, content)
1548

FIG. 15

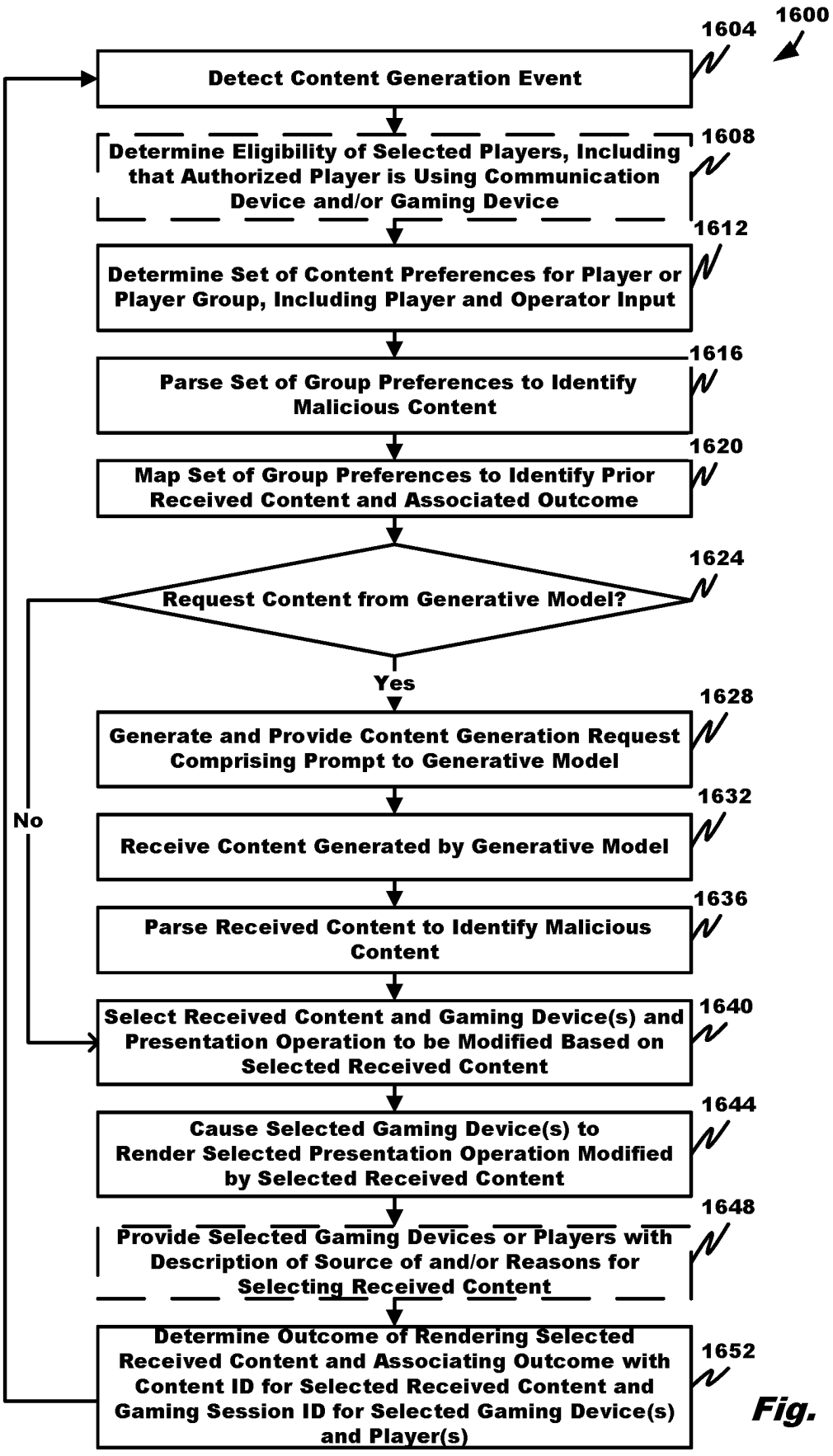

1600
1604
Detect Content Generation Event
1608
Determine Eligibility of Selected Players, Including that Authorized Player is Using Communication Device and/or Gaming Device
1612
Determine Set of Content Preferences for Player or Player Group, Including Player and Operator Input
1616
Parse Set of Group Preferences to Identify Malicious Content
1620
Map Set of Group Preferences to Identify Prior Received Content and Associated Outcome
1624
Request Content from Generative Model?
Yes
No
1628
Generate and Provide Content Generation Request Comprising Prompt to Generative Model
1632
Receive Content Generated by Generative Model
1636
Parse Received Content to Identify Malicious Content
1640
Select Received Content and Gaming Device(s) and Presentation Operation to be Modified Based on Selected Received Content
1644
Cause Selected Gaming Device(s) to Render Selected Presentation Operation Modified by Selected Received Content
1648
Provide Selected Gaming Devices or Players with Description of Source of and/or Reasons for Selecting Received Content
1652
Determine Outcome of Rendering Selected Received Content and Associating Outcome with Content ID for Selected Received Content and Gaming Session ID for Selected Gaming Device(s) and Player(s)

Fig. 16

TRIGGERING AND ALLOWING ARTIFICIAL INTELLIGENCE GENERATED CONTENT IN A GAMING ENVIRONMENT

BACKGROUND

[0001] The present disclosure is generally directed towards gaming devices and systems and, more specifically, self-evolving, artificial intelligence (AI)-based content generative models.

[0002] Casino models have employed AI to analyze casino floor performance, propose to operators where and how many EGMs to place in their venue, and provide other casino floor performance recommendations.

BRIEF SUMMARY

[0003] In certain aspects, the present disclosure relates to a gaming system, device, and method supportive of self-evolving, AI-based content generative models.

[0004] In an aspect, a system includes a communication interface, a processor coupled with the communication interface, and a computer-readable storage medium coupled with the processor.

[0005] The computer readable storage medium stores a set of instructions thereon that enables the processor to:

[0006] detect a content generation event;

[0007] in response to the detected content generation event, generate, at least in part from a set of content preferences associated with a player, a prompt to a generative model;

[0008] provide a content generation request comprising the prompt to the generative model;

[0009] in response to the content generation request, receive content generated by the generative model;

[0010] select at least a portion of the received content for presentation by a gaming device in communication with the communication interface; and

[0011] cause the received content to be presented by the gaming device to the player.

[0012] In an aspect, a method includes the steps of:

[0013] detecting, by a processor, a content generation event;

[0014] in response to the detected content generation event, generating, by the processor at least in part from a set of content preferences associated with a player, a prompt to a generative model;

[0015] providing, by the processor, a content generation request comprising the prompt to the generative model;

[0016] in response to the content generation request, receiving, by the processor, content generated by the generative model;

[0017] selecting, by the processor, at least a portion of the received content for presentation by a gaming device; and

[0018] causing, by the processor, the received content to be presented by the gaming device to the player.

[0019] In an aspect, a method includes the steps of:

[0020] detecting, by a processor, a content generation event;

[0021] in response to the detected content generation event, generating, by the processor at least in part from a set of content preferences associated with a player, a prompt to a generative model;

[0022] providing, by the processor, a content generation request comprising the prompt to the generative model;

[0023] in response to the content generation request, receiving, by the processor, content generated by the generative model;

[0024] parsing, by the processor, the received content for malicious content;

[0025] when the received content is free of malicious content, selecting, by the processor, at least a portion of the received content for presentation by a gaming device in communication with the communication interface; and

[0026] causing, by the processor, the received content to be presented by the gaming device to the player.

[0027] Additional features and advantages are described herein and will be apparent from the following Description and the figures.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0028] FIG. **1** is a block diagram of a gaming system in accordance with aspects of the present disclosure;

[0029] FIG. **2** is a block diagram of a gaming device in accordance with aspects of the present disclosure;

[0030] FIG. **3** is a block diagram of a mobile device in accordance with aspects of the present disclosure;

[0031] FIG. **4**A is a block diagram illustrating player interaction with a service window of a gaming device in accordance with aspects of the present disclosure;

[0032] FIG. **4**B is a block diagram illustrating player interaction with a gaming device in accordance with aspects of the present disclosure;

[0033] FIG. **5**A is a block diagram illustrating a first example data structure used in accordance with aspects of the present disclosure;

[0034] FIG. **5**B is a block diagram illustrating a second example data structure used in accordance with aspects of the present disclosure;

[0035] FIG. **5**C is a block diagram illustrating a third example data structure used in accordance with aspects of the present disclosure;

[0036] FIG. **6** is a screenshot of a prompt and associated generated content in accordance with aspects of the present disclosure;

[0037] FIG. **7** is a screenshot of a prompt and associated generated content in accordance with aspects of the present disclosure;

[0038] FIG. **8** is a block diagram illustrating banks of gaming devices in accordance with aspects of the present disclosure;

[0039] FIG. **9** is a block diagram illustrating banks of gaming devices with differing generated content in accordance with aspects of the present disclosure;

[0040] FIG. **10** is a block diagram of a bank of gaming devices interacting with players within a defined area of a gaming system in accordance with aspects of the present disclosure;

[0041] FIG. **11** is a screen shot of a display rendering a user interface of inputted player preferences in accordance with aspects of the present disclosure;

[0042] FIG. **12** is a screen shot of a display rendering a user interface of inputted player preferences in accordance with aspects of the present disclosure;

[0043] FIG. **13** is a screen shot of a display rendering a user interface before content generation in accordance with aspects of the present disclosure;

[0044] FIG. **14** is a screen shot of a display rendering a user interface of inputted player preferences in accordance with aspects of the present disclosure;

[0045] FIG. **15** is a block diagram illustrating component interactions in content generation in accordance with aspects of the present disclosure;

[0046] FIG. **16** is a process flow illustrating aspects of content generation in accordance with aspects of the present disclosure; and

[0047] FIG. **17** is a screen shot of a gaming device showing player preferences used in content generation in accordance with aspects of the present disclosure.

DETAILED DESCRIPTION

[0048] Aspects of the present disclosure will be described in connection with self-evolving, artificial intelligence (AI)-based models (also referred to as self-learning, AI-based content models such as generative models) in an environment such as, for example, a casino environment. While some examples in the present disclosure may reference the use of an Electronic Gaming Machine (EGM) as a gaming device via which players may participate in gaming activity, it should be appreciated that aspects of the present disclosure are not so limited. For example, any computing device, personal gaming device, or collection of computing devices may be used to facilitate invoking and implementing self-evolving AI-based content generation models.

[0049] Although a gaming server of the gaming system typically itself hosts or is in communication with a host of an AI-based content generation model, the gaming system can use a virtual EGM, game or application on the EGM, EGM game theme, or other component of the gaming system (i.e., gaming system component) to create the impression that content is generated by that component of the gaming system. The gaming system can use a rule-based or AI or machine learning (ML) model that generates new content to create the impression that one or more EGMs has a unique personality catered to the player. While the AI content generation model can be executed completely on an EGM, it is typically hosted on the gaming system or a server external to the gaming network. Using a gaming system or external server as a host can allow the content generation model to work across different gaming device manufacturers and even across product types.

[0050] In an exemplary embodiment, the gaming system detects a content generation event; in response to the detected content generation event, generates, from a set of content preferences associated with an eligible player (e.g., player likes, dislikes, or other type of player preference), a prompt to a generative model; provides a content generation request comprising the prompt to the generative model; in response to the content generation request, receives content generated by the generative model; selects at least a portion of the received content for presentation by one or more gaming devices; and causes the received content to be presented by the gaming device(s) to one or more eligible players. When the player is part of a group of players, the generation of the set of content preferences can include determining a set of group content preferences based on different sets of individual player content preferences associated with different players in the group of players, with at least part of the set of group content preferences being included in the prompt.

[0051] Player eligibility can be determined in a number of ways. In some embodiments, the player must be authenticated successfully by the gaming system for the content preferences of the player to be considered in prompt generation. Authentication can be done by any suitable authentication techniques, such as single use passwords or passcodes, digital certificate, image recognition based on gaming system camera still or video images, and other knowledge-based, physiological biometrics-based, behavioral biometrics-based, and two/multi-factor authentication techniques. In some embodiments, the player is not able to participate in a gaming session using generated content and/or content preferences in prompt generation without the player's prior consent.

[0052] The detected content generation (or trigger) event can include one or more of: successful authentication of a player of the group of players by the gaming system, detection of a location of a mobile device associated with a player of the group of players, detection of at least a threshold level of gameplay by a player of the group of players, occurrence of a predetermined state of the gaming system, occurrence of a predetermined player loyalty activity by the gaming system, detection that gameplay on another gaming device currently presenting different selected content is below a threshold level of gameplay, detection that a presentation duration of the different selected content is at least a threshold duration, detection of a new content preference associated with a player of the group of players occurrence of a predetermined random or pseudorandom number, occurrence of at least a threshold loyalty point balance or loyalty status associated with a player of the group of players, occurrence of a predetermined clock value, entrance of a player or player(s) of the group players into a defined area of the gaming system, occupancy of at least a threshold number of players of the group players in the defined area of the gaming system, and departure of a player or player(s) of the group players from the defined area of the gaming system.

[0053] In some embodiments, the content generation (or trigger) event is based or contingent upon a number of factors including a state of the gaming system, a state of a gaming session with the player, and/or current and/or historic player behavior data. The state of the gaming session can be based on observed real-time gameplay data of the player during a concurrent gaming session (considering factors such as game outcome, game theme, speed of play, cash in amount, cash out amount, play session length, additional in-session cash in amounts, wager behavior (e.g., change of wager behavior, average wager amount, Min/Max wager amount, wager to win correlation, number of lines played, denomination selected, side bet features activated/deactivated, and playing double-up or similar features and other metrics of wager behavior), wagering speed, idle time, etc. The state of the gaming system can be based on the collective gameplay and configuration data for multiple gaming sessions, including the gameplay and configuration data associated only with the particular gaming session.

[0054] In some embodiments, the content generation (or trigger) event for a particular session state is based on one or more of a credit amount at the start of a gameplay session (e.g., 'SumCashInAmount'), a credit amount at the end of a

prior gameplay session (e.g., 'SumCashOutAmount'), quantity of wager adjustments during a temporal period and/or during a gameplay session (e.g., 'No. of bet changes'), a ratio of a wager amount to a player bankroll (e.g., 'Wager-Bank-Ratio'), gameplay duration associated with gameplay session (e.g., 'TimePlayed'), average wager amount for a primary game (base game) (e.g., 'AverageWagerPrimary'), an average win amount associated with a primary game (e.g., 'AveragePrimaryWinAmount'), quantity of primary games played during a temporal period and/or during a gameplay session (e.g., 'No.PrimaryGamesPlayed'), quantity of secondary games (bonus games) played during a temporal period and/or during a gameplay session (e.g., 'No. SecondaryGamesPlayed), and the like.

[0055] In some aspects, the gameplay data may be data (e.g., gameplay data, sensor data, etc.) collected directly via a gaming device associated with a player and a gameplay session. The data may be collected via a central game management system, a player tracking system, a casino management system, a controller/data aggregator (e.g., iLink-type device), or the like. The tracked inputs may include active inputs (e.g., a gameplay decision, a button press, a handle pull, etc.) and/or passive inputs (e.g., a measured biometric parameter) In some examples, the gaming device may track and forward gameplay results (e.g., resulting game outcomes).

[0056] The prompt typically comprises a content preference associated by player profile(s) with a player or one or more players in the group of players, content preference(s) associated with a social website posting of the player or one or more players in the group of players, content preference (s) received from a mobile device of a player of the group of players, a game theme associated with the plurality of gaming devices, a player activity detected by the gaming system, input received from the player or one or more players in the group of players, captured image(s) of the player or one or more players in the group of players, loyalty level(s) of the player or one or more players in the group of players, and loyalty point balance(s) of the player or one or more players in the group of players. In some embodiments, the selection of the content preferences to be used in the prompt can be based at least in part on player input, such as by polling players or receiving votes from players regarding which content preference of a plurality of content preferences is to be used in the prompt. In some embodiments, the gaming system can indicate to a group of players which set of preferences and/or the corresponding players for the set of preferences and/or the reasons the sets of preferences are used in determining the set of group preferences.

[0057] To conserve processing resources and decrease processing latency associated with gaming, the gaming system can map a content preference associated with the content generation event against previously generated prompts and associated gameplay performance levels to determine whether to provide a prior prompt to the generative model in lieu of generating new content by the generative model. In other words, a set of content preferences for one or more players may have been used in a prior selection operation, and the gaming system, using historical information, can use the same rationale employed previously and quickly generate a prompt. In some embodiments, the analysis considers the historical outcome from using the prior prompt and selects the prior prompt when the outcome was desirable. When the outcome was undesirable, the gaming system selects a different set of preferences associated with the player or group of players for the prompt or a different prompt having a determined level of relatedness to the selected preferences but having a different and more desirable outcome. The mapping can be done efficiently by mapping a prompt ID against a content ID. The ID can be a hash, pixel comparison, or other summary or description of the corresponding prompt or content, respectively, to decrease mapping latency.

[0058] The content preference and content can comprise one or more of a text, image, music, audio, color, style, animation, and video information. The generated content can include a plurality of discrete content recommendations from which the gaming system selects the content for presentation by one or more gaming devices. The selection can be based on one or more parameters, including relatedness of the selected received content to a current game theme of the gaming device, an outcome of using similar content for a presentation operation in a prior gaming session, a rule set of the gaming system setting forth desirable and undesirable content for the presentation operation, type of game, relatedness of the selected content to existing content of other presentation operations of the gaming device that are to be used concurrently with the selected received content, and the like. As will be appreciated, a game theme can be any genre, storyline, or basis of a game or game type. Examples include a movie or TV program such as Lord of the Rings™, Stranger Things™, James Bond™, Willy Wonka™, and Game of Thrones™, a gameshow such as Wheel of Fortune™. The Price is Right™, Pyramid™. Let's Make a Deal™ or Jeopardy™, a historical event or person such as historical events including Romans, Egyptians, Cowboys and the Amazon and historical or living persons including Caesar, Cleopatra, John Wayne, and other genres, storylines, or game bases that are compatible with games and/or attractive to players.

[0059] The gaming system can improve content and presentation operation selection outcomes by tracking historical behaviors. In one embodiment, the gaming system associates a game or session identifier associated with a game played by the player on the gaming device while the received content is presented by the gaming device to the player and gameplay information associated with the played game with a content identifier and presentation operation identifier associated with the at least a portion of the selected content. The association can include an outcome description indicating whether or not the content and associated content modified presentation operation produced a desirable or undesirable outcome for the gaming system and players. The outcome for instance can indicate a level of gameplay of and/or wagering one or more players while the content is rendered, a level of popularity of the game as modified by the content, a level of occupancy of gaming devices providing the game modified by the content, other gameplay or loyalty information, and the like.

[0060] In some embodiments, the outcome is based on a number of factors, including for example player input on the appropriateness of the generated content, an actual behavior of the player identified as being in response to the generated content and presentation operation pairing, and a difference between a target player behavior associated with the generated content and the actual behavior of the player in response thereto. The target behavior can be selected based on a variety of criteria, including the physical location, type, and

state of a gaming device in the gaming system. The target and actual behaviors can relate, for example, to an action of the player performed within a defined time interval of the gaming system rendering generated content to a player.

[0061] The player preference can be considered individually or as part of a set of player group content preferences. The gaming system can determine the set of group content preferences by weighting a first set of content preferences of a first player of the group of players more than a second set of content preferences of a second player of the group of players. The weighting of a particular set of player preferences can be, for example, one or more of: an amount a player has played over a period of time, an amount a player has won over a period of time, a recent game event at the gaming system involving a player in the group (such as a game outcome in which the player has won such as a jackpot and other award (e.g., bonuses, free spins, etc.)), an amount of time the player has been in the area or been playing, a game theme the player is playing, a wager amount associated with the player, a domination played by the player, a player loyalty account or the status of that account, a number of player loyalty points in the account, a rank of the player (e.g., platinum, gold or silver), an amount of player loyalty points or money spent by the player over a determined time period (e.g., the player spends points to be chosen/included in the AI generation), a player selected randomly based on a RNG or PNRG output, a predetermined permissible or impermissible player preference, a number of times the player has been at the gaming system property within the last n (casino defined) days, and whether the player has spent >=n (casino defined) number of dollars within the last n (casino defined) days. Other selection techniques include without limitation popularity of a content preference in the sets of content preferences of the players in the group of players, a relatedness of a content preference to an assigned game theme of the gaming devices played by the group of players, and the like.

[0062] The generative model can be any type of content generative model and typically includes a prompt encoder trained to map the prompt to a representation space and an image decoder that stochastically generates an image representing the representation space. Common generative models include one of a variational autoencoder (VAE), generative adversarial network (GAN), autoregressive model, diffusion model, and transformer-based model. Neural networks used in generative models include recurrent neural networks (NNs) and convoluted neural networks (CNNs). Examples of generative models include DALL-ETM and MIDJOURNEY™.

[0063] The generated image can be presented by the gaming device before or during a gaming session with the player. The gaming system can select a presentation operation from among plural presentation operations to be modified by the received content. The selection can be based on one or more parameters, including relatedness of the selected received content to a current game theme of the gaming device, an outcome of using similar content for a selected presentation operation in a prior gaming session, a rule set of the gaming system setting forth desirable and undesirable content, type of game, relatedness of the selected content to existing content of other presentation operations of the gaming device that are to be used concurrently with the selected received content, and the like. Exemplary presentation operations include rendering one or more of a slot symbol used in a game played on the gaming device, background image displayed by displays of the plurality of gaming devices, payline used in the game played on the plurality of gaming devices, button panels of the plurality of gaming devices, sound emitted by the plurality of gaming devices, animation rendered by the displays, card back or face used in a game played on the plurality of gaming devices, icon rendered by the displays, avatar rendered by the displays, character rendered by the displays, shader rendered by the displays, border, title, or frame rendered by the displays, signage rendered by the displays, and a message provided to the players in the group of players by the plurality of gaming devices.

[0064] The gaming devices can be treated individually or as part of a group or bank of gaming devices in connection with rendering or otherwise providing selected generated content. Stated differently, a plurality of gaming devices can be logically grouped together as a bank of gaming devices in a defined area of the gaming system and a different second plurality of gaming devices logically grouped together as a second bank of gaming devices in a nonoverlapping second defined area of the gaming system. The plurality of gaming devices and second plurality of gaming devices can have one or more of a different game theme, a different type of game, and a different type of gaming device. A selected portion of second received content can be presented by the second plurality of gaming devices to a different group of players, with the selected portion of the second received content being different from the selected portion of the received content, with the different received contents being generated from different prompts. Alternatively or additionally, common selected received content can be rendered or otherwise provided by the differing banks of gaming devices for different types of games or presentation operations.

[0065] The prompt generation and generated content and presentation operation selection operations can be performed by an AI model, such as a machine learning model or data set that is useable in a neural network and that has been trained by one or more data sets that describe selected preferences in prompts and resulting generated content and selected generated content and/or presentation operations and associated outcome, respectively. The model(s) may be stored as a model data file or any other data structure that is usable within a neural network or an AI system. In addition to a data set that describes selected preferences in prompts and/or resulting generated content and selected generated content and presentation operations and associated outcome, the model may be trained using gameplay data, player information, and other gaming system state information, such as slot machine configurations and operations, payment methods, money transfer methods, game mechanics, and other gameplay and gaming system information.

[0066] In one embodiment, the gaming system has a single AI-enabled model for all types of gaming devices, games, and/or players while in other embodiments a unique model is maintained for each gaming device type, game type, or player group. One or more models can be concurrently assigned to one or more gaming sessions. The model(s) can receive gameplay data of multiple gaming sessions of multiple different players on different gaming devices and/or configuration data associated with each of the gaming devices.

[0067] The AI-enabled models can make a real-time determination of which generated content and which presentation

operation pairing has the highest likelihood of producing a desired or target player behavior by using not only general information relating to the gaming system state but also real-time and historic gameplay data of one or more players, including the player in question. AI can observe and compare in real time one or more players' behaviors and the respective revenues realized by the players as a function of time—which cannot be done mentally.

[0068] To avoid using potentially sensitive information of a player as a player content preference in prompt generation, the gaming system can require prior player approval before a player content preference is used in a prompt. In addition, the gaming system can be restricted from using sensitive information of the player by including sensitivity tags or other metadata in sensitive fields of the player's profile.

[0069] The prompt generation, content generation, and content and presentation operation selection models can be fully executed by an AI system without the involvement of casino or gaming staff to assist in message formulation. The AI system(s) can enable the gaming system to use auto-generated content not only in various presentation operations to produce desired or target behaviors but also to modify gaming device functions, operations, and configurations at the request of a player.

[0070] The various model(s) can induce an illusion of gaming system familiarity and awareness of the player's needs, desires, and activities, which can enhance player trust in the gaming system and player satisfaction, increase player engagement, and enable gaming systems operators to have higher levels of floor (e.g., casino gaming device) utilization by selecting EGMs in less occupied areas of the floor for modification by rendering selected generated content. The gaming system can increase player engagement and trust of the gaming system by allowing a player to engage with a gaming device providing content customized to the player's preferences. By way of illustration, the player feels that he/she is communicating directly with a customized and personalized gaming system component even though the gaming device is actually receiving content from a server hosting the generative model.

[0071] In gaming systems, security is a paramount concern. Introduction of new technologies in a gaming system can render new vulnerabilities for malware and other malicious content. To maintain gaming system security, the gaming system can employ multiple levels of security monitoring. For example, the prompt provided to the generative model can be parsed to identify malicious content, particularly when the prompt comprises user inputted preferences. The gaming system can further parse generated content received from the generative model to identify malicious content.

[0072] Malicious content in player content preferences, the prompt itself, or received auto-generated content can take many forms, including one or more of a quick response ("QR") code, malware, a malformed image file, and content violating a game rule. An example of the former is a QR code incorporated in a player provided image that directs a different player to a website represented by the QR code. The website can be used to collect sensitive player information that may be employed for identity theft, unlawful access to a gaming system account of the player, an advertising page of a competitor, a page providing negative advertising regarding the gaming system, and the like. Examples of malware include viruses, worms, Trojan viruses, spyware, adware, and ransomware. An example of a malformed image file is an image file that violates a set of gaming device image display rules, such as an incorrect image size, style, pixel dimension, pixel resolution, format, or other parameter of an image, a wrong number of layers, or an inconsistent color set, etc. An example of content violating a game rule is content that itself violates a game rule creating player confusion or induces player behavior that violates a game rule. By way of illustration, the prompt could include a player preference regarding a description of an image that resembles an image of a wild symbol, scatter symbol, and/or multiplier symbol that causes the generative model to generate content that is confusingly similar to the symbol type, thereby causing player confusion.

[0073] In some gaming environments (e.g., casino environments), an EGM may include a conventional intelligent agent (e.g., a gameplay assistant, a gameplay model, a player companion, etc.) which, when activated during a gameplay session at the EGM, may assist the player and/or server as a personalization enabler. However, in some other implementations of conventional intelligent agents, the player behaviors are hard-coded and created with either common player traits (e.g., generic behaviors, personalities, etc.) and/or are based upon a relatively limited number of parameters. A technical problem of such conventional intelligent agents is their inability to behave "intelligently" (e.g., in more complex gameplay situations) in supporting user-tailored experiences. For example, in some systems, such intelligent agents are not fed with additional data (e.g., feedback, gameplay data, etc.) and are unable to evolve beyond a base model. In some cases, the conventional intelligent agents are incapable of drawing on self-learning implications.

[0074] A further technical problem of conventional intelligent agents is how to create, update, maintain and use output from gaming system operations in self-evolving AI-based models to enhance performance of a gaming system. Data processing to maintain these models, in real-time across many players at one-second intervals, is computationally challenging and intensive. How to incorporate such models into existing gaming systems to enhance gaming system operation and player enjoyment without undue computational costs and processing latency creates yet another technical problem.

[0075] A technical solution provided by some embodiments of the present disclosure inputs player content preferences and optionally gaming system operational information into one or more AI prompt generation, content generation, and content and/or presentation operation selection models in a casino environment (e.g., associated with EGMs) in which the various models are capable of self-evolving (also referred to herein as self-learning) based on associated outcomes (e.g., gameplay events, gameplay operations, gameplay decisions (such as gameplay choices, slot pulls, bonus selections, etc.), gameplay outcomes and behaviors (or gameplay data such as average speed of play, average cash in amount, average cash out amount, average play session length, average additional in-session cash in amounts, average wager behavior, average wagering speed, and average idle time for historical gameplay sessions), and other player related or gaming system-related parameters (e.g., behavioral shifts in gameplay decisions, biometric data, wager behavior, etc.)) to provide more appropriate player customized content for presentation operations. For

example, a gaming system may support initial training and creation of a baseline generative model, in which the baseline generative model is associated with a corresponding object (e.g., individual player, representative player, gaming system, gaming device, or presentation operation). The gaming system may continuously feed the content and/or presentation operation selection model with historic or real time player content preferences and resulting prompts. The gaming system may continuously feed the generative model with historic or real time prompts and associated selected received generated content. The gaming system may continuously feed the prompt generation model with historic or real time selected content and presentation operation pairings and associated outcomes (e.g., gameplay decisions, behavioral shifts, button inputs, etc.)) generated by the player or EGM or other gaming system component(s) in association with a gameplay session. In some aspects, via AI mechanisms, each model may self-evolve to enhance itself to optimize the messaging interaction between the gaming system and the player. In addition to the models' abilities to use real-time gameplay data to maintain/update/improve model capabilities, the models can provide output to the operator that can be used internally (for in-depth analysis purposes). Aspects of the present disclosure describe example techniques associated with generating such models, example methods of implementing the models in a gameplay environment (e.g., casino environment), examples of modifying the models, and example use-cases thereof.

[0076] In an example, the models described herein may support learning or evolving based on multiple different input sources (e.g., player data, player-related parameters (e.g., speed of play, cash in amount, cash out amount, play session length, additional in-session cash in amounts, wager behavior, wagering speed, and idle time), etc.) to increase the complexity and range of functionality of the models. Accordingly, for example, the prompt generation, generative, and content and presentation operation selection models can collectively generate prompts and associated content and select content and presentation operations, from a plurality of prompts, generated content, and content and presentation operation pairing selections, to induce a player to behave in a targeted manner or produce a target behavior. The accuracy of the prediction can be used to update or modify the models to yield more accurate predictive performance in future player interactions.

[0077] Aspects of the present disclosure may provide explicit improvements through AI. For example, systems described herein may support more accurate recommendations (e.g., content and presentation operation selection recommendations by the various models) and/or predictions of behaviors (e.g., target player behaviors) based on a large number of historical player behavior data. In some aspects, multiple thousands (e.g., millions) of historical events may be incorporated into the model(s) described herein. Aspects of the present disclosure support modifying (e.g., changing, adjusting) the model(s) over time, based on single events (e.g., per each instance of a gameplay event such as granular gameplay data), groups of events (e.g., per multiple instances of gameplay events such as summarized gameplay data). Example techniques described herein may provide reduced processing overhead (e.g., computing power, calculation time, etc.) compared to other techniques that analyze all single entries of historical data and compare the entries against new data, instead of using an AI model.

[0078] Aspects of the present disclosure may support output-learnings. For example, the gaming server (e.g., using a machine learning network and a model, etc.) may compare an action or event (e.g., a new content preference, prompt, received generated content, content and presentation operation selection, etc.) to previous actions and/or events (e.g., a prior content preference, prompt, received generated content, selected generated content and/or presentation operation or outcome) (also referred to herein as historical actions and/or historical events). In an example, the gaming server may determine that there is a match between the action or event and a previous action or event. For example, the gaming server may determine that the action or event is the same as a previous action or event (or similar to the previous action or event with respect to a deviation threshold) under similar gameplay conditions. This comparison could be rigid, or another factor could be introduced in order to induce some randomness into the behavior.

[0079] With reference initially to FIG. **1**, details of an illustrative gaming system **100** will be described in accordance with at least some embodiments of the present disclosure. The components of the gaming system **100**, while depicted as having particular instruction sets and devices, are not necessarily limited to the examples depicted herein. Rather, a gaming system according to embodiments of the present disclosure may include one, some, or all of the components depicted in the gaming system **100** and does not necessarily have to include all of the components in a single device. For example, the components of a server may be distributed amongst a plurality of servers and/or other devices (e.g., a gaming device, a portable user device, etc.) in the gaming system **100** without departing from the scope of the present disclosure.

[0080] The gaming system **100** may include a communication network **104** that interconnects and facilitates machine-to-machine communications between one or multiple gaming devices **108** (e.g., any of gaming device **108**-*a* through **108**-N) and a gaming server **116**. It should be appreciated that the communication network **104** may correspond to one or many communication networks without departing from the scope of the present disclosure. In some embodiments, gaming device **108**-*a* through gaming device **108**-N and gaming server(s) **116** may be configured to communicate using various nodes or components of the communication network **104**. The communication network **104** may include any type of known communication medium or collection of communication media and may use any type of protocols to transport messages between endpoints. The communication network **104** may include wired and/or wireless communication technologies. The Internet is an example of the communication network **104** that constitutes an Internet Protocol (IP) network consisting of many computers, computing networks, and other communication devices located all over the world, which are connected through many telephone systems and other means. Other examples of the communication network **104** include, without limitation, a standard Plain Old Telephone System (POTS), an Integrated Services Digital Network (ISDN), the Public Switched Telephone Network (PSTN), a Local Area Network (LAN), a Wide Area Network (WAN), a cellular network, and any other type of packet-switched or circuit-switched network known in the art. In addition, it can be appreciated that the communication network **104** need not

be limited to any one network type, and instead may be comprised of a number of different networks and/or network types. Moreover, the communication network **104** may include a number of different communication media such as coaxial cable, copper cable/wire, fiber-optic cable, antennas for transmitting/receiving wireless messages, and combinations thereof.

[0081] A generative model **180** can be in communication with the gaming system **100** via the communication network **104**. The generative model **180** can be any content generation model that converts a prompt into one or more content sets. Common generative models include one of a variational autoencoder (VAE), generative adversarial network (GAN), autoregressive model, diffusion model, and transformer-based model. In some embodiments, the generative model is on the internet while in other embodiments the generative model is on a closed local network accessible only to the gaming system or multiple gaming systems.

[0082] In some embodiments, the encoder and decoder are configured as variational autoencoders (VAEs). In VAEs, the encoder extracts from the prompt input sequence all features in the sequence, converts them into vectors (e.g., vectors representing the semantics and position of a word in a sentence), and then passes them to the decoder. The decoder works on the target output sequence. Each decoder receives the encoder layer outputs, derives context from the outputs, and generates the output sequence. Both the encoder and the decoder in the transformer include multiple encoder blocks piled on top of one another. The output of one block becomes the input of another.

[0083] In some embodiments, the generative model is configured as a generative adversarial network or GAN. The GAN is a machine learning algorithm that employs, in an adversarial relationship, two neural networks, namely a generator and discriminator. The generator is a neural net that creates fake input or fake samples from a random input vector (a list of mathematical variables each of whose value is unknown) and the discriminator is a neural net that takes a given sample from the generator and decides whether or not it is a fake sample from a generator or a real sample from the domain. In some embodiments, the discriminator is a binary classifier that returns a probability of whether or not the sample is a fake. The generator and discriminator can be implemented as CNNs (Convolutional Neural Networks).

[0084] The generative model can perform many different types of transformations or translations of the prompt to content, including without limitation a style transfer of a prompt image to a generated image, sketch in the prompt to a realistic image, prompt text to an image, prompt text to speech or other audio output, prompt text to video, prompt text to lighting sequences, and a prompt image or video to a higher or lower resolution image or video.

[0085] When the prompt comprises text, a text-to-image models may be employed that generally combines a (natural) language model for transforming the input text into a latent representation, and the generative image model, which produces an image conditioned on that representation.

[0086] A resort wallet **184** (and associated casino wallet, retail wallet, sports/mobile wallet, and patron manager (not shown)) can be in communication with the gaming system **100** via the communication network **104**. The patron manager manages the award of loyalty points and balance of players' loyalty points accounts. Typically, the patron manager monitors gaming events of players on gaming devices **108** and changes in the balance of the resort wallet **184** (including casino wallet, retail wallet, and sports/mobile wallet, and other player transactions with the gaming establishing or casino and, applying promotional rules, increments or decrements a player's loyalty point balance in the resort wallet **184**.

[0087] Social media server(s) **188** of a social networking service can be in communication with the gaming system **100** via the communication network **104**. The social networking service or SNS (or social networking site) can be any online social media platform used by members to build social networks or relationships with other members who share similar personal or career content, interests, activities, backgrounds or real-life connections. Social networking sites allow users to share ideas, digital photos and videos, posts, and to inform others about online or real-world activities and events with people within their social network. Examples include Facebook™, Instagram™, X™ or Twitter™, and the like.

[0088] In some embodiments, the gaming devices **108** (e.g., gaming device **108**-*a* through gaming device **108**-N) may be distributed throughout a single property or premises (e.g., a single casino floor), or the gaming devices **108** (e.g., gaming device **108**-*a* through gaming device **108**-N) may be distributed among a plurality of different properties. In a situation where the gaming devices **108** are distributed in a single property or premises, the communication network **104** may include at least some wired connections between network nodes. As a non-limiting example, the nodes of the communication network **104** may communicate with one another using any type of known or yet-to-be developed communication technology. Examples of such technologies include, without limitation, Ethernet, SCSI, PCIe, RS-232, RS-485, USB, ZigBee, WiFi, CDMA, GSM, HTTP, TCP/IP, UDP, etc.

[0089] The gaming devices **108** (e.g., gaming device **108**-*a* through gaming device **108**-N) may utilize the same or different types of communication protocols to connect with the communication network **104**. It should also be appreciated that the gaming devices **108** (e.g., gaming device **108**-*a* through gaming device **108**-N) may present the same type of game or different types of games to a player **112**. For example, the gaming device **108**-*a* may correspond to a gaming machine that presents a slot game to the player **112**, the gaming device **108**-*b* may correspond to a video poker machine, and other gaming devices **108** may present other types of games (e.g., keno, sports wagering, etc.) or a plurality of different games for selection and eventual play by the player **112**.

[0090] In some aspects, some of the gaming devices **108** (e.g., gaming device **108**-*a* through gaming device **108**-N) may communicate or exchange data with one another via the communication network **104**. In some embodiments, one or more of the gaming devices **108** may be configured to communicate directly with a centralized management server and/or the gaming server **116**. Although not depicted, the gaming system **100** may include a separate server or collection of servers that are responsible for managing the operation of the various gaming devices **108** in the gaming system **100**.

[0091] It should also be appreciated that the gaming server **116** may or may not be co-located with one or more gaming devices in the same property or premises. Thus, one or more gaming devices may communicate with the gaming server

116 over a WAN, such as the Internet. In such an event, a tunneling protocol or Virtual Private Network (VPN) may be established over a portion of the communication network 104 to ensure that communications between an EGM and the server 116 (e.g., a remotely-located server) are secured.

[0092] The gaming devices 108 (e.g., gaming device 108-*a* through gaming device 108-N) may correspond to a type of device that supports interaction by a player 112 in connection with playing games of chance. Examples of a gaming device 108 may include any type of known gaming device such as an EGM, a slot machine, a table game, an electronic table game (e.g., video poker), a skill-based game, etc. In addition to playing games on a gaming device 108, the player 112 may also be allowed to interact with and play games of chance on a communication device 144*a, b*.

[0093] The gaming system 100 may support interaction with one or more communication devices 144. A communication device 144 (e.g., communication device 144-*a*) may be a mobile device of a player 112 (e.g., a personal communication device such as a smart phone, a tablet, a smart watch, etc.) or to a device issued by a casino to the player 112. It should be appreciated that the player 112 may play games directly on the communication device 144. Alternatively, or additionally, the communication device 144 may establish a communications (e.g., over a wireless or wired connection) with a gaming device 108 such that the communication device 144 provides an interface for the player 112 to interact with the gaming device 108. As shown in FIG. 1, the communication device 144 may be in communication with the communication network 104 or in direct communication (e.g., via Bluetooth, WiFi, etc.) with a gaming device 108. Non-limiting examples of a communication device 144 include a cellular phone, a smart phone, a tablet, a wearable device, an augmented reality headset, a virtual reality headset, a laptop, a Personal Computer (PC), or the like. In some cases, another communication device 144 (e.g., communication device 144-*b*) may be a mobile device, a PC, or the like of a casino operator (e.g., a floor attendant, a casino manager, etc.).

[0094] In some cases, the gaming system 100 may support "carding in" of a player at a gaming device 108 with a physical card (e.g., a player club card). In other cases, the gaming system 100 may support "carding in" of a player at a gaming device 108 via a mobile application on a communication device 144. In some aspects, the mobile application may support fund transfers between a player account and the gaming device 108 (e.g., a server, the casino). For example, using the mobile application, the player may transfer funds to a gameplay session.

[0095] In an example of "carding in," the communication device 144 may exchange information with the gaming device 108 over a wireless connection (e.g., near field communication (NFC), Bluetooth, etc.) when the communication device 144 is within a threshold distance of the gaming device 108. In another aspect, the communication device 144 may "card in" and exchange information with the gaming device 108 when the communication device 144 is connected to the gaming device 108 using a physical communications link (e.g., a communications cable). In an example, when "carding in," the communication device 144 may provide player identification information (e.g., player identity, player club status, player preference information, etc.) to the gaming device, the server, and/or the gaming system. The gaming server 116 (or the gaming device 108) may establish a gameplay session at the gaming device 108 for the player based on the information provided during the "card in."

[0096] In an embodiment, the gaming system only enables auto-generated content modification of presentation operations in gaming sessions with a player after he or she successfully cards in to the gaming system. Stated differently, no auto-generated content is presented to the player before he or she successfully cards in or after he or she cards out.

[0097] The gaming server 116 may support example aspects described herein of acquiring sensor data associated with a gameplay session using any combination of sensors 145 (e.g., sensor 145-*a*, sensor 145-*b*, etc.) (also referred to herein as sensor devices). The sensors 145 may be implemented at (e.g., integrated in) any combination of gaming devices 108 and/or communication devices 144. In some aspects, the sensors 145 may be standalone devices capable of communicating with any component (e.g., a gaming device 108, a gaming system 100, a database, etc.) of the gaming system 100, for example, via the communication network 104. In some aspects, the sensors 145 may provide the sensor data to a machine learning engine 141, aspects of which are described later herein.

[0098] In some aspects, the sensors 145 may include any combination of: an image sensor, an eye tracking sensor, a heart rate sensor, an infrared sensor, an audio sensor (e.g., a microphone), a pulse sensor, an oxygen sensor, a temperature sensor, a pressure sensor (e.g., integrated within a button, a keypad, etc.), a touch screen sensor, a vibration sensor, a motion sensor, an accelerometer, or the like. In some cases, the sensors 145 may be integrated within a physical interface of a gaming device 108 or a communication device 144. In some cases, the sensors 145 may be integrated at or within a threshold distance of a gaming device 108. For example, the sensors 145 may be integrated with a seat cushion, an arm rest, a seat back, a pull handle, a "spin" button, etc.

[0099] In some examples, the sensors 145 may capture or measure, as part of gameplay data, biometric data (e.g., facial features, facial response, eye movement, pupil dilation, heart rate, temperature, pulse, speech or speech patterns, breathing pattern, etc.) of a player with respect to a decision event, a gameplay decision, and/or a gameplay result in association with a gameplay session. The sensors 145 may detect changes and/or patterns in biometric data in association with a decision event, a gameplay decision, and/or a gameplay result in association with a gameplay session. In some aspects, the sensors 145 may include smart sensors capable of scanning and/or measuring a player's biometric parameters such as pulse, breathing rate, heart rate, eye focus, body movement, attention, electroencephalogram (EEG) parameters (e.g., electrical activity of the brain), electrocardiogram (ECG or EKG) parameters (e.g., heard rhythm and electrical activity), voice, speech pattern, etc.

[0100] In some other examples, the sensors 145 may capture or measure, as part of gameplay data, a value (e.g., force, velocity, etc.) corresponding to physical inputs (e.g., button presses, etc.) by the player at a gaming device 108 in association with a decision event, a gameplay decision, and/or a gameplay result in association with a gameplay session. For example, a sensor 145 (e.g., sensor 145-*a*) at a gaming device 108 (e.g., gaming device 108-*a*) may be a

pressure sensor integrated within a button (e.g., a "spin" button, a "bet" button, etc.) at the gaming device **108**, and the sensor **145** may capture or measure a value indicating a force at which the player presses the button.

[0101] In some other examples, the sensors **145** enable player tracking using a location-based tracking service in which an application or other software in the sensor uses global positioning service (GPS), radio frequency identifier (RFID), Wi-Fi or cellular data to trigger a pre-programmed action when a communication device **144** or RFID tag carried by the player enters or exits a virtual boundary set up around a geographical location.

[0102] The sensor data (e.g., biometric data, value corresponding to a physical input, etc.) may be used as part of the gameplay data to determine an outcome associated with a prompt, autogenerated content, or pairing of selected generated content and presentation operation or to predict player real-time location in the casino or gaming system.

[0103] The gaming server **116** is further shown to include a processor **120**, a memory **124**, and a network interface **128**. These resources may enable functionality of the gaming server **116** as will be described herein. For example, the network interface **128** provides the server **116** with the ability to send and receive communication packets or the like over the communication network **104**. The network interface **128** may be provided as a network interface card (NIC), a network port, drivers for the same, and the like. Communications between the components of the server **116** and other devices connected to the communication network **104** may all flow through the network interface **128**.

[0104] The processor **120** may correspond to one or many computer processing devices. For example, the processor **120** may be provided as silicon, as a Field Programmable Gate Array (FPGA), an Application-Specific Integrated Circuit (ASIC), any other type of Integrated Circuit (IC) chip, a collection of IC chips, a microcontroller, a collection of microcontrollers, or the like. As a more specific example, the processor **120** may be provided as a microprocessor, Central Processing Unit (CPU), or plurality of microprocessors that are configured to execute the instructions sets stored in memory **124**. Upon executing the instruction sets stored in memory **124**, the processor **120** enables various authentication functions of the gaming server **116**.

[0105] The memory **124** may include any type of computer memory device or collection of computer memory devices. The memory **124** may be volatile or non-volatile in nature and, in some embodiments, may include a plurality of different memory devices. Non-limiting examples of memory **124** include Random Access Memory (RAM), Read Only Memory (ROM), flash memory, Electronically-Erasable Programmable ROM (EEPROM), Dynamic RAM (DRAM), etc. The memory **124** may be configured to store the instruction sets depicted in addition to temporarily storing data for the processor **120** to execute various types of routines or functions. Although not depicted, the memory **124** may include instructions that enable the processor **120** to store data to and retrieve data from a player profile database **148**, a content presentation database **152**, and/or a gaming device database **154**.

[0106] Alternatively or additionally, the player profile database **148** or data stored thereon may be stored internal to the any of the communication device **144**, a gaming device **108**, and/or the server **116** (e.g., within the memory **124** of the server **116** rather than in a separate database). Alternatively or additionally, the content presentation database **152** or data stored therein may be stored internal to the server **116**. Alternatively or additionally, the gaming device database **154** or data stored thereon may be stored internal to the server **116**.

[0107] The databases described herein (e.g., player profile database **148**, content presentation database **152**, and gaming device database **154**) may include a relational database, a centralized database, a distributed database, an operational database, a hierarchical database, a network database, an object-oriented database, a graph database, a NoSQL (non-relational) database, etc. In some aspects, the databases may store and provide access to, for example, any of the stored data described herein.

[0108] In some aspects, the gaming system **100** may be implemented using a fully software-based solution. In some other aspects, the gaming system **100** may be implemented using a combination of software and hardware accelerators for offloading AI processing tasks and/or AI data handled at the gaming system **100**. Aspects of the present disclosure and solutions thereof may be used locally at an EGM (e.g., a gaming device **108**), a local server (e.g., gaming server **116** or a different server), and/or on a cloud server (e.g., gaming server **116** or a different server). Example processors (also referred to herein as co-processors) usable for offloading the AI processing tasks and/or AI data may include any combination of GPUs, ASICs, FPGAs, or the like. In some aspects, the processors (e.g., co-processors) may be located at a gaming device **108** and/or the gaming server **116**. In some other aspects, processors (e.g., co-processors) located at a communication device **144** (e.g., a cellular phone, a smart phone, a tablet, a wearable device, an augmented reality headset, a virtual reality headset, etc.) may be used for offloading the AI processing tasks and/or AI data.

[0109] The illustrative instruction sets that may be stored in memory **124** include, without limitation, a game management instruction set **132**, player profile management instruction set **133**, content generation event detection instruction set **136**, prompt generation instruction set **140** (which may be a self-evolving AI model), content selection instruction set **142** (which may be a self-evolving AI model), presentation operation instruction set **143** (which may be a self-evolving AI model), and malicious content identification set **150**. Functions of the server **116** enabled by these various instruction sets will be described in further detail herein. It should be appreciated that the instruction sets depicted in FIG. **1** may be combined (partially or completely) with other instruction sets or may be further separated into additional and different instruction sets, depending upon configuration preferences for the server **116**. Said another way, the particular instruction sets depicted in FIG. **1** should not be construed as limiting embodiments described herein.

[0110] The game management instruction set **132**, when executed by the processor **120**, may enable the gaming server **116** to manage the various games played by a player **112** at the gaming devices **108** (e.g., gaming device **108**-*a* through gaming device **108**-N) and/or a communication device **144** carried by the player **112**. For example, any game played by the player **112** at any of the gaming devices **108** and/or communication device **144** may be managed, partially or entirely, by execution of the game management instruction set **132**. The game management instruction set **132** may also be configured to track a status of wager events

(e.g., non-EGM wager games, sporting events, bingo, keno, lottery, etc.) and whether a player **112** has placed a wager on such events. In some embodiments, when a wager event has come to completion such that wagers made on the event become payable (e.g., at the end of a gameplay decision at a gaming device **108** and/or communication device **144**, at the end of a sporting event when the final score of the event is determined), the game management instruction set **132** may update states and/or values of tickets/vouchers issued for the event appropriately.

[0111] In some aspects, the game management instruction set **132**, when executed by the processor **120**, may enable the gaming server **116** to manage and/or monitor data associated with a gameplay session at a gaming device **108**. For example, the gaming server **116** may support example aspects described herein of monitoring user information (e.g., member identification information, player club status, etc.), gameplay data (e.g., quantity of plays, quantity of spins, duration of gameplay, credits spent, credits earned, etc.), and other gameplay data described above. The gaming server **116** may update the gaming device database **154**, obtain information from the gaming device database **154**, and notify the game management instruction set **132**, etc.

[0112] The player profile management instruction set **133**, when executed by the processor **120**, may enable the gaming server **116** to manage one or more player profiles within the player profile database **148**. In some embodiments, the player profile management instruction set **133** may be configured to manage a player loyalty profile including settings for such player profiles, available wager credits for such profiles, determine player wager history, loyalty reward account balance, loyalty reward eligibility, and/or determine which, if any, tickets/vouchers are associated with a particular player. It should also be appreciated that the player profile management instruction set **133** may be configured to manage player profiles of players that do not have loyalty accounts or any other predetermined player account.

[0113] In some aspects, the player profile management instruction set **133**, when executed by the processor **120**, may be configured to manage a player activity, current and/or historical, associated with gameplay sessions.

[0114] In some aspects, the content generation event detection instruction set **136**, when executed by the processor **120**, monitors gameplay data, gaming system state, and/or sensor input, detects a content generation event that triggers auto-generation of a prompt and content by the generative model.

[0115] In some aspects, the prompt generation instruction set **140**, when executed by the processor **120**, determines a set of group content preferences based on different sets of content preferences associated with players in a group of players, in response to the detected content generation event, generates, from at least part of the set of group content preferences, a prompt to a generative model, and generates and provides a content generation request comprising the prompt to the generative model.

[0116] In some aspects, the content selection instruction set **142** and presentation operation instruction set **143**, when executed by the processor **120**, receive content generated by the generative model in response to the content generation request, selects at least a portion of the received content for presentation by a plurality of gaming devices associated with the group of players in communication with the communication interface, selects one or more presentation operations for the selected at least a portion of the received content, and causes the received content to be presented by the plurality of gaming devices to the group of players via one or more selected presentation operations.

[0117] In some aspects, the malicious content identification instruction set **150**, when executed by the processor **120**, parses both player preferences and other received player input and the received auto-generated content for malicious content.

[0118] Some or all of the instructions or instruction sets stored in the memory **124** and some functions of the gaming server **116**, gaming devices **108**, and/or communication devices **144** may be implemented using machine learning techniques. In some embodiments, the neural network used by the prompt generation, content selection, and presentation operation selection model(s) and generative model may be, for example, a machine learning network and may include a machine learning architecture. In some aspects, the neural network may be or include an artificial neural network (ANN). In some other aspects, the neural network may be or include any machine learning network such as, for example, a deep learning network, a convolutional neural network, a long-short term memory (LSTM) neural network, or the like. In some cases, the machine learning techniques may include reinforcement learning. In some cases, the machine learning uses unsupervised learning techniques.

[0119] To enable game event selection, the gaming server **116** can include a pseudorandom number generator (PRNG) or random number generator (RNG) **160**. The RNG or PRNG generates a sequence of numbers or symbols that cannot be reasonably predicted better than by random chance. RNGs are typically hardware random-number generators (HRNGs) that generate random numbers, wherein each generation is a function of the current value of a physical environment's attribute that is constantly changing in a manner that is practically impossible to model. In contrast, PRNGs generate numbers that only look random but are in fact pre-determined and can be reproduced simply by knowing the state of the PRNG.

[0120] With reference to FIG. **2**, additional details of the components that may be included in a gaming device **108** will be described in accordance with at least some embodiments of the present disclosure.

[0121] The gaming device **108** is depicted to include a processor **204**, memory **208**, a network interface **224**, a user interface **216**, a ticket issuance device **250**, a ticket acceptance device **254**, a currency-in device **258**, a currency out device **262**, a card reader **266**, display device(s) **270**, and system clock **274**. In some embodiments, the processor **204** may include example aspects of the processor **120**. In other words, the processor **204** may correspond to one or many microprocessors, CPUs, microcontrollers, or the like. The processor **304** may be configured to execute one or more instruction sets stored in memory **308**.

[0122] The network interface **224** may include example aspects of network interface **128**. The nature of the network interface **224**, however, may depend upon whether the network interface **224** is provided in a gaming device **108** or a communication device **144**. Examples of a network interface **312** include, without limitation, an Ethernet port, a USB port, an RS-232 port, an RS-485 port, a NIC, an antenna, a driver circuit, a modulator/demodulator, etc. The network interface **224** may include one or multiple different network interfaces depending upon whether the gaming device **108** is

connecting to a single communication network **104** or multiple different types of communication networks **104**. For instance, the gaming device **108** may be provided with both a wired network interface and a wireless network interface without departing from the scope of the present disclosure.

[0123] The user interface **216** may correspond to any type of input and/or output device that enables the player **112** to interact with the gaming device **108**. As can be appreciated, the nature of the user interface **216** may depend upon the nature of the gaming device **108**. For instance, if the gaming device **108** is a traditional mechanical reel slot machine, then the user interface **216** may include one or more mechanical reels with symbols provided thereon, one or more lights or LED displays, one or more depressible buttons, a lever or "one armed bandit handle," a speaker, or combinations thereof. If the gaming device **108** is a digital device, then the user interface **216** may include one or more touch-sensitive displays, LED/LCD display screens, etc. In some cases, the user interface **216** may include a combination of a physical interface (e.g., mechanical reels, depressible buttons, a lever, etc.) and other user interfaces (e.g., touch-sensitive displays, LED/LCD display screens, etc.). In some cases, the user interface **216** may include a biometric scanning device (e.g., a fingerprint scanner) supportive of biometric inputs by a user. In some examples, the user interface **216** may include any combination of sensors **145** described with reference to FIG. **1** (e.g., an image sensor, an eye tracking sensor, a heart rate sensor, an infrared sensor, an audio sensor, a pulse sensor, an oxygen sensor, a temperature sensor, a pressure sensor, a touch screen sensor, a vibration sensor, a motion sensor, an accelerometer, etc.).

[0124] In some examples, the user interface **216** may include an interactive service window. Machine-to-machine communications and player input can be improved using the interactive service window. The service window has an electronic address on the gaming or communications network different from an address of the host gaming device itself, to exchange directly in bound and out bound electronic messages with the gaming server **116** and display content provided by the gaming server **116** to the player. The service window can slide into view either from the right, left, or top of the gaming display and offer interactive touch screen capabilities to the player. The content of the game theme on the display is unaffected or independent of the service window, which can be opened or closed by the player. The service window can be a fully interactive touch screen menu that players can use to activate bonus features, receive and send messages to the gaming server **116**, and view messages or advertisements from the gaming server **116**.

[0125] The memory **208** may include one or multiple computer memory devices that are volatile or non-volatile. The memory **208** may include volatile and/or non-volatile memory devices. Non-limiting examples of memory **208** include Random Access Memory (RAM), Read Only Memory (ROM), flash memory, Electronically-Erasable Programmable ROM (EEPROM), Dynamic RAM (DRAM), etc.

[0126] The memory **208** may be configured to store the instruction sets depicted in addition to temporarily storing data for the processor **204** to execute various types of routines or functions. The instruction sets can enable user interaction with the gaming device **108** and game play at the gaming device **108**. Examples of instruction sets that may be stored in the memory **208** include a game control instruction set **206**, wager credit meter instruction set **210**, player interaction instruction set **212**, loyalty point award instruction set **218**, content generation event detection instruction set **136**, presentation operation instruction set **226**, malicious content identification instruction set **150**, communication instruction set **232**, and random number generator or pseudorandom number generator (collectively referenced as PRNG/RNG) **236** that is used by the game control instruction set **160**, for example, to provide game outputs.

[0127] In some embodiments, the game control instruction set **206**, when executed by the processor **204**, may enable the gaming device **108** to facilitate one or more games with the player(s) **112**. In some embodiments, the game control instruction set **206** may include subroutines that receive electronic messages from player(s) and others comprising an indication of consideration (e.g., a wager, mini wager, side wager, etc.) for occurrence of a predicted level of player performance in the game, subroutines that stream a video of the game to gaming and personal gaming devices **144** of other non-players or third parties, subroutines that create, maintain and update player profiles of the player(s) to the game, subroutines that generate, such as by PRNG/RNG **160**, an outcome of the game, subroutines that alter, modify, or select game or display operations or functions in response to the player incentivization program, subroutines that calculate whether an outcome of the game has resulted in a win or loss during the game, subroutines for determining winnings and award payouts for the player(s) and others in the event of a win, subroutines for exchanging communications with another device, such as another gaming device **108** or gaming server **116**, and any other subroutine useful in connection with facilitating game play at the gaming device **108**.

[0128] The wager credit meter instruction set **210**, when executed by the processor **204**, may enable the gaming device **108** to facilitate a tracking of activity at the gaming system **100** for reporting to the gaming server **116** or patron manager. In some embodiments, the wager credit meter instruction set **210** may be used to store or log information related to various player **112** activities and events that occur at the gaming device **108**. The types of information that may be maintained in the wager credit meter instruction set **210** include, without limitation, player information, available credit information, wager amount information, changes in wager credit meter balance as a function of time, and other types of information that may or may not need to be recorded for purposes of accounting for wagers placed at the gaming device **108** and payouts made for a player **112** during a game of chance or skill played at the gaming device **108**. In some embodiments, the wager credit instruction set **210** may be configured to track coin in activity, coin out activity, coin drop activity, jackpot paid activity, bonus paid activity, credits applied activity, external bonus payout activity, ticket/voucher in activity, ticket/voucher out activity, timing of events that occur at the gaming device **108**, and the like. In some embodiments, certain portions of the wager credit meter instruction set **210** may be updated in response to outcomes of a game of chance or skill played at the gaming device **108**. In some embodiments, the gaming device **108** does not include a wager credit meter instruction set **210**.

[0129] The player interaction instruction set **212** and content generation event detection instruction set **136**, when

executed by the processor **204**, detect player activity at the gaming device **108** and notifies the gaming server **116** or patron manager of an instance of detected player **112** interaction, a type of player **112** interaction detected, and a timestamp from a system clock and associated with the player **112** interaction and enable the gaming device **108** to monitor operations of components of the gaming system **100** in response to interaction with players. The player gaming server **116** can use this input from the gaming device to detect content generation events, such as a predetermined gameplay activity by the player, a content preference associated with the player, a predetermined random or pseudo-random number, and a threshold loyalty point or credit meter balance associated with the player, that triggers auto-generation of content.

[0130] The loyalty point award instruction set **218**, when executed by the processor **204**, applies promotional rules to the monitored operations to reward loyalty points to eligible players. These functions can also be performed by the patron manager independently of the gaming device or as part of the gaming server **116**.

[0131] The presentation operation instruction set **226** receives selected auto-generated content from the gaming server **116** and modifies presentation operations to incorporate the content. As noted above, the presentation operation can include, for example, a slot symbol used in a game played on the gaming device, background image displayed by a display of the gaming device, payline used in the game played on the gaming device, button panel of the gaming device, sound emitted by the gaming device, animation rendered by the display, card back or face used in a game played on the gaming device, icon rendered by the display, avatar rendered by the display, character rendered by the display, shader rendered by the display, border, title, or frame rendered by the display, signage rendered by the display, and a message provided to the player by the gaming device.

[0132] The gaming device **108** may be provided with appropriate hardware to facilitate acceptance and issuance of tickets/vouchers. Specifically, the gaming device **108** may be provided with a ticket acceptance device **254** that is configured to accept or scan physically-printed tickets/vouchers and extract appropriate information therefrom. In some embodiments, the ticket acceptance device **254** may include one or more machine vision devices (e.g., a camera, IR scanner, optical scanner, barcode scanner, etc.), a non-visual scanning device (e.g., an RFID reader, an NFC reader), a physical ticket acceptor, a shredder, etc. The ticket acceptance device **254** may be configured to accept physical tickets and/or electronic tickets without departing from the scope of the present disclosure. An electronic ticket/voucher may be accepted by scanning a visual code (e.g., a one-dimensional barcode, a two-dimensional barcode, any other type of barcode, a quick response (QR) code, etc.) displayed on a printed ticket/voucher or a communication device **144**, for example. In another example, an electronic ticket/voucher may be accepted by scanning a tag (e.g., an RFID tag, an NFC tag, a contactless smart card, or the like) storing the ticket/voucher information.

[0133] The ticket issuance device **250** may be configured to print or provide physical tickets/vouchers to players **112**. In some embodiments, the ticket issuance device **250** may be configured to issue a ticket/voucher consistent with an amount of credit available to a player **112**, possibly as indicated within the credit meter. In some cases, the ticket/voucher may be an e-TITO voucher including a reprogrammable electronic display and an RFID tag.

[0134] The currency-in device **258** may include a bill acceptor, a coin acceptor, a chip acceptor or reader, or the like. In some embodiments, the currency-in device **258** may also include credit card reader hardware and/or software. In some aspects, the currency-in device **258** may include one or more machine vision devices (e.g., a camera, IR scanner, optical scanner, barcode scanner, etc.) or non-visual scanning devices (e.g., an RFID reader/writer, an NFC reader/writer).

[0135] The currency-out device **262**, like the ticket issuance device **250**, may operate and issue cash, coins, tokens, or chips based on an amount indicated within the credit meter. In some embodiments, the currency-out device **262** may include a coin tray or the like and counting hardware configured to count and distribute an appropriate amount of coins or tokens based on a player's **112** winnings or available credit within the credit meter. In some aspects, the currency-out device **262** may include one or more machine vision devices or non-visual scanning devices.

[0136] The card reader **266** may include hardware and/or software configured to read or accept any type of card, or portable credential (e.g., NFC, Bluetooth, Wi-Fi, etc.). In some embodiments, the card reader **266** may include hardware and/or software that enable contactless reading of a card, token, or portable credential. In some embodiments, the card reader **266** may include hardware and/or software that enable contact-based reading of a card, token, or portable credential (e.g., magstripe, chip reader, electrodes, card-receiving slot, etc.). It should be appreciated that the card reader **266** may be configured to receive and reader a card or portable credential, token, in any type of format (e.g., portable plastic card, magstripe card, key fob, etc.). It should also be appreciated that the card reader **266** may be configured to write information or data onto a card or portable credential. Furthermore, in some embodiments, the card reader **266** may be configured to read a player loyalty card in the form of a plastic credit-card shaped credential. In some embodiments, the card reader **266** may enable communications with a loyalty application operating on a player's personal gaming device.

[0137] The gaming device **108** may include one or more display devices **270** configured to render information, live video, communications windows, wagering interface windows, games, interactive elements, and/or other visual output to one or more display screens. The gaming device **108** may include one or more display controllers configured to control an operation of the display device **270**. This operation may include the control of input (e.g., player input via the user interface **216**, command input via the instruction sets in memory **208**, combinations thereof, etc.), output (e.g., display, rendered images, visual game behavior, etc.) and/or other functions of the display device **270**.

[0138] In an embodiment, the display device **270** comprises one or more display screens that are configured to selectively activate pixels and/or display elements to render one or more games, windows, indicators, interactive elements, icons, characters, lights, images, etc. Non-limiting examples of the display screen may include, but are in no way limited to, a liquid crystal display (LCD), a light-emitting diode (LED) display, an electroluminescent display (ELD), an organic LED (OLED) display, and/or some other

two-dimensional and/or three-dimensional display. In some embodiments, the one or more display screens may be separated into a main display and a secondary display.

[0139] In an embodiment, the display device **270** comprises one or more projectors to project virtual reality or augmented reality images during the escape room game. The projector(s) can be any projecting device that can project a computer image onto a projection augmented model (PA model) and/or a spatially augmented reality (SAR) model to provide the players **124** with augmented reality, augmented virtuality, and/or virtual reality computer-generated game environments. As will be appreciated, projection mapping, video mapping or SAR typically uses one or more optical devices or projectors that project a beam of light onto a selected escape room space to provide the player with the augmented reality, augmented virtuality, and/or virtual reality computer-generated game environments.

[0140] In an embodiment, the display device **270** comprises head-mounted displays worn by the players **112** to view the augmented reality, augmented virtuality, or virtual reality computer-generated game environments.

[0141] The display device **270** may include a display driver, a power supply, an input/output, and/or other components configured to enable operation of the display device **270**. The display driver may receive commands and/or other data provided by the processor **204** and one or more of the instruction sets in memory **208**. In response to receiving the commands, the display driver may be configured to generate the driving signals necessary to render the appropriate images to the display screen. The power supply may provide electric power to the components of the display device **270**. In some embodiments, the power supply may include a transformer and/or other electronics that prevent overloading, condition power signals, and/or provide backup power to the display device **270**. The input/output may correspond to one or more connections for receiving or exchanging information and/or video from components of the gaming device **108**. The input/output may include an interconnection to the network interface **224**. By way of non-limiting example, the input/output may include a high-definition multimedia interface (HDMI) input, Ethernet, composite video, component video, H.264, or other video connection.

[0142] The gaming device **108** can further include a system clock **274** for timestamp creation. The system clock can be implemented in hardware (e.g., a quartz crystal oscillator) or software that generates and sends out a timing signal on a regular or periodic basis to all other computer components of the gaming device **108** to synchronize the various components operations. In some embodiments, the gaming device **108** comprises both a hardware clock known as the Real Time Clock and a software clock.

[0143] In some embodiments, the gaming device comprises a service window **278** that exchanges electronic messages with the gaming server **116** and controls one or more of the display device(s) **270**.

[0144] With reference now to FIG. **3**, additional details of the components that may be included in a mobile device **144** will be described in accordance with at least some embodiments of the present disclosure. The mobile device **144** is shown to include a processor **304**, memory **308**, a communication interface **312**, and a user interface **320**. In some embodiments, the processor **304** may be similar or identical to any of the other processors **120** depicted and described herein and may correspond to one or many microprocessors, CPUs, microcontrollers, Integrated Circuit (IC) chips, or the like. The processor **304** may be configured to execute one or more instruction sets stored in memory **308**. In some embodiments, the instruction sets stored in memory **308**, when executed by the processor **304**, may enable the mobile device **144** to provide game play functionality, interact with gaming machines **108**, pair with gaming machines **108**, or any other type of desired functionality.

[0145] The communication interface **312** may be similar or identical to the network interface **224** and/or communication interfaces **312** depicted and described herein. The nature of the communication interface **312** may depend upon the type of communication network **108** for which the mobile device **144** is configured. Examples of a suitable communication interfaces **312** include, without limitation, a WiFi antenna and driver circuit, a Bluetooth antenna and driver circuit, a cellular communication antenna and driver circuit, a modulator/demodulator, etc. The communication interface **312** may include one or multiple different network interfaces depending upon whether the mobile device **144** is connecting to a single communication network **108** or multiple different types of communication networks. For instance, the mobile device **144** may be provided with both a wired communication interface **312** and a wireless communication interface **312** without departing from the scope of the present disclosure.

[0146] The user interface **320** may include a combination of a user input and user output device. For instance, the user interface **320** may include a display device, a microphone, a speaker, a haptic feedback device, a light, a touch-sensitive display, a button, or a combination thereof. The user interface **320** may also include one or more drivers for the various hardware components that enable user interaction with the mobile device **144**.

[0147] The memory **308** may be similar or identical to other memory **208**, **308** depicted and described herein and may include one or multiple computer memory devices that are volatile or non-volatile. The memory **308** may be configured to store instruction sets that enable player interaction with the mobile device **144** and that enable game play at the mobile device **144**. Examples of instruction sets that may be stored in the memory **308** include a game interaction instruction set **324**, player profile(s) **328**, content event generation instruction set **136**, user preferences **336**, and a communication instruction set **332**. In addition to the instruction sets, the memory **308** may also be configured to store data that is useable by the various instruction sets.

[0148] In some embodiments, the game interaction instruction set **324**, when executed by the processor **304**, may enable the mobile device **144** to facilitate one or more games of chance or skill and management of one or more player engagement indicator sets.

[0149] The player profile(s) **328** include a variety of player-specific data structures including player identification and login credentials.

[0150] The communication instruction set **332**, when executed by the processor **304**, may enable the mobile device **144** to communicate via the communication network **108**. In some embodiments, the communication instruction set **332** may be similar or identical to the communication instruction set **232** and may be particular to the type of communication network **108** used by the mobile device **144**. As an example, the communication instruction set **332** may be configured to enable cellular, WiFi, and/or Bluetooth

communications with other devices. The communication instruction set **332** may follow predefined communication protocols and, in some embodiments, may enable the mobile device **144** to remain paired with a gaming machine **108** as long as the mobile device **144** is within a predetermined proximity (e.g., 20-30 feet, an NFC communication range, or a Bluetooth communication range) and paired with the gaming machine **108**. In some embodiments, the communication instruction set **332** enables a mobile device application of the mobile device to negotiate a secure, authenticated connection with the proper functionality, versions and security settings.

[0151] The user preferences **336** may correspond to gaming or wager or player engagement preferences that are desired by the player **124** of the mobile device **144**, including content preferences.

[0152] The mobile device **144** is also shown to include a power supply **316**. The power supply **316** may correspond to an internal power supply that provides AC and/or DC power to components of the mobile device **144**. In some embodiments, the power supply **316** may correspond to one or multiple batteries. Alternatively or additionally, the power supply **316** may include a power adapter that converts AC power into DC power for direct application to components of the mobile device **144**, for charging a battery, for charging a capacitor, or a combination thereof.

[0153] With reference now to FIGS. **5**A through **5**C, additional details of data structures will be described in accordance with at least some embodiments of the present disclosure. It should be appreciated that the data structures depicted and described herein may be stored within a central database or may be distributed among a number of data storage nodes. Alternatively or additionally, some or all of the fields of the data structures may be maintained in devices of the gaming system **100** such as the gaming server **116**, a gaming device **108**, and/or a communication device **144***a,b* without departing from the scope of the present disclosure.

[0154] With reference initially to FIG. **5**A, details of a data structure **500** that may be maintained as part of a player profile will be described in accordance with at least some embodiments of the present disclosure. The database **148** may be configured to store one or multiple data structures **500** that are used in connection with tracking player progress and gaming history. In some embodiments, the data stored in the data structure **500** may be stored for a plurality of different player profiles or for a single player profile. As a non-limiting example, the data structure **500** may be used to store player loyalty information, player activity information, and the like. Even more specifically, the data structure **500** may include a plurality of data fields that include, for instance, a player information field **504**, a wager credit field **508**, a content preference field **512**, a player activity field **516**, a player group ID field **520**, a gaming session ID field **524**, and a loyalty account field **528**.

[0155] The player information field **504** may be used to store any type of information that identifies a player or a group of players. In some embodiments, the player information field **504** may store one or more of username information for a player **112**, password information for a player account, player status information, contact information for the player, accommodations associated with the player **112**, and any other type of customer service management data that may be stored with respect to a player **112**.

[0156] The wager credit field **508** may be used to store data about the available credit of a player **112** with a device, with a sports book, with a casino, and/or with a plurality of casinos. For instance, the wager credit field **508** may store an electronic record of available credit in the player's account and whether any restrictions are associated with such credit. The wager credit field **508** may further store information describing a player's available credit over time, cash out events for the player, winning events for the player **112**, wagers placed by the player **112**, tickets/vouchers issued to the player **112**, and the like.

[0157] The content preference field **512** may be used to store data about one or more content preferences of a player **112**. For instance, the content preferences include whether or not the player opts in or out of using his or her content preferences for auto-generation of content, content preferences obtained from monitoring activity of the player with respect to the gaming system, content preferences obtained by monitoring player posted content on a social media server **188**, and content preference inputted by the player for use in auto-generating images.

[0158] The player activity field **516** may be used to store historical data for events that occur with respect to the player **112** (e.g., gameplay data associated with gameplay sessions of the player **112**). For example, the player activity field **516** may store information associated with the player **112** in relation to an outcome in a game of chance, an outcome in a game of skill, a celebration event for a person other than the player **112**, involvement in a celebration event, visits to a predetermined location, gameplay information with respect to a particular game, player interactions with a communication device **144**, player interactions (e.g., gameplay decisions, player feedback with respect to a baseline player behavior, etc.) with a gaming device **108**, wagers placed by the player **112**, tickets/vouchers issued for the player **112**, tickets/vouchers redeemed by the player **112**, etc.

[0159] In some aspects, the player activity field **516** may store sensor data (e.g., biometric data, pressure sensor data, etc. described herein) associated with a player in relation to gameplay sessions. For example, the player activity field **516** may store sensor data associated with gameplay data (e.g., gameplay behavior, gameplay decisions, etc.) and/or gameplay events (e.g., gameplay decision events, gameplay outcomes, gameplay recommendations or predictions by a player behavior model linked to the player, etc.).

[0160] The player group ID field **520** may store information associated with a player group of which the player is a member. The group ID may describe the group and its members along with sessions historically or currently being played by the members or comprise an ID that references another data field containing this information.

[0161] The gaming session ID field **524** may store an identifier of a gaming session in which the player is involved. The gaming session ID may be generated by the gaming system to reference another data field further describing the gaming session.

[0162] The loyalty account field **528** may store information regarding the corresponding player's loyalty account status and other information, such as player loyalty tier ranking (e.g., gold, silver, bronze, etc.).

[0163] With reference now to FIG. **5**B, details of another data structure **501** that may be used within the gaming system **100** will be described in accordance with at least

some embodiments of the present disclosure. The database **152** may be configured to store one or multiple data structures **501** that are used in connection with AI-based models. Even more specifically, the data structure **501** may include a plurality of data fields that include, for instance, a content field **540**, gaming session ID field **544**, presentation operation field **548**, and outcome description field **552**.

[0164] The content field **540** may include any information related to a corresponding auto-generated content. In some aspects, the content field **540** may store any data associated with an auto-selected generated content. For example, the content field **540** may store data associated with the selected content such as one or more of an identifier (ID) assigned to the selected content, prompt (or the seed) corresponding to the selected content, presentation operation modified by the selected content, and outcome associated with the selected content. The data may be used to develop and train baseline models, modified versions of the AI-based models, or the like.

[0165] The presentation operation field **548** may include any data describing or associated with a presentation operation modified by the selected content. The field may include meta data tags describing the presentation operation, such as an identifier of the corresponding presentation operation(s) modified by the selected content.

[0166] The outcome description field **552** may include any data describing an outcome associated with the selected content or the pairing of the selected content with the presentation operation. The outcome typically includes an outcome description indicating whether or not the content and associated content modified presentation operation produced a desirable or undesirable outcome for the gaming system and players. The outcome for instance can indicate a level of gameplay of and/or wagering one or more players while the content is rendered, a level of popularity of the game as modified by the content, a level of occupancy of gaming devices providing the game modified by the content, other gameplay or loyalty data, and the like.

[0167] With reference to FIG. **5**C, details of a data structure **502** that may be maintained as part of a gaming device profile will be described in accordance with at least some embodiments of the present disclosure. The gaming system database **154** may be configured to store one or multiple data structures **502** that are used in connection with tracking a gameplay mode of a gaming device **108**. In some embodiments, the data stored in the data structure **502** may be stored for a plurality of different gaming devices **108** or a single gaming device **108**. As a non-limiting example, the data structure **502** may be used to store gaming device information, and the like. Even more specifically, the data structure **502** may include a plurality of data fields that include, for instance, a gaming device information field **556**, a gaming system information field **558**, a content ID field **560**, a session ID field **562**, an assigned group ID field **563**, and presentation operation ID field **564**.

[0168] The gaming device information field **556** may be used to store any type of information that identifies a gaming device **108** or a group of gaming devices **108**. In some embodiments, the gaming device information field **556** may store identification information for a gaming device **108** (e.g., a unique serial number assigned to the gaming device **108**) and any other type of gaming device management data that may be stored with respect to a gaming device **108**.

[0169] The gaming system information field **558** may be used to store any type of gameplay and other gaming information including granular and/or summarized gameplay data, gaming system (e.g., casino floor) map showing gaming device location and current usage (e.g., heat map), game theme, game or gaming session type, and the like.

[0170] The content ID field **560** may be an identifier of the content field **540**, such as a database link or address of the field **540**.

[0171] The session ID field **562** may be an identifier of the gaming session for which the content in content ID field was presented.

[0172] The assigned group ID field **563** may be an identifier of the player group ID field **520**, such as a database link or address of the field **520** to indicate which players had content preferences used to generate the content in content ID field.

[0173] The presentation operation ID field **564** may be an identifier of the presentation operation field **548**, such as a database link or address of the field **548** to indicate which presentation operation(s) were modified by the content in content ID field.

[0174] A number of examples of auto-generated content and associated prompts will be discussed to demonstrate the present disclosure.

[0175] With reference to FIG. **6**, a text prompt **600** comprising text regarding an image of cat and sports car in beach game theme was used by the generative model to generate the image **604**. The prompt **600** results from a first player having a first content preference, namely images of cats; a second player having a second content preference, namely images of sports cars; and the gaming system operator configuring the gaming devices being played by the first and second players in a beach game theme.

[0176] Another example is illustrated in FIG. **7** in which a text prompt **700** comprising text regarding an image of cat playing football in a football field game theme was used by the generative model to generate the image **704**. The prompt **700** results from the first player having the first content preference, namely images of cats; a third player having a third content preference, namely images of football related objects; and the gaming system operator configuring the gaming devices being played by the first and second players in a football game theme.

[0177] The prompt can be in any format. The prompt can be text, image, music, audio, and video information and a combination thereof. Prompts can be in any format, such as binary, XML, json or other format that can provide the information desired. The prompt can be based on a content preference of an individual player, a group of players (such as for all high rollers), and/or a gaming system operator.

[0178] In another example in accordance with at least some embodiments of the present disclosure, the auto-generated content is created for a player at the beginning of a gaming session. When the player cards in, the content is auto-generated by the generative model for that player. Since generating the content takes time, the player can play a game without the auto-generated content until the content is ready at which point one or more presentation operations of the game can be modified to include the selected generated content.

[0179] In another example in accordance with at least some embodiments of the present disclosure, the gaming system triggers auto-generation of content before the player

starts a gaming session. For example, when the gaming system detects a trigger event such as the player's presence, the gaming system triggers auto-generation of the content so that the content is ready for the player. The triggering event could come, for instance, from a loyalty activity, such as the player checking in at a hotel desk associated with the gaming system. The trigger could come from the gaming system wirelessly detecting the presence and/or location of the player's mobile phone or the mobile phone application in spatial proximity to the gaming system. The trigger could come from sensing biometric identification of the player, such as one or more of the sensors **145** performing facial recognition that the player is in the casino or near the gaming area.

[0180] In another example in accordance with at least some embodiments of the present disclosure, the gaming system triggers auto-generation of the content in response to a player gaming activity reaching some threshold, such as wagering a certain amount of money or a period of time, winning a certain amount of money over a period of time or triggering a bonus. For example, the player wagers $1,000 in one hour so the gaming system triggers auto-generation of content for the player.

[0181] In another example in accordance with at least some embodiments of the present disclosure, the gaming system triggers auto-generation of content when the gaming system detects that existing auto-generated content is not being used or chosen by players as much as desired. The operator might have a setting or threshold in the outcome that triggers the regeneration based on lack of use or other indication of a lack of interest. For example, "trigger new AI content when players have not used auto-generated content (associated with a preference of the player) in one week".

[0182] In another example in accordance with at least some embodiments of the present disclosure, the gaming system triggers auto-generation of content when the gaming system detects that the game performance or one or more game themes is below some outcome threshold. The threshold could be games played, money wagered, or money won over a period of time, such as "Trigger AI content if a game theme is played less than 10,000 times this week". The outcome threshold could also be based on how "old" the game is such that new content is created more often the longer the game theme is installed on a casino floor. In this manner, a new game would not initially have auto-generated content because the game's default content is new, but over time the gaming system would allow auto-generation of new content to replace the aging default content of the game.

[0183] In another example in accordance with at least some embodiments of the present disclosure, the gaming system triggers auto-generation of the content when the gaming system learns something new about the player that constitutes a new content preference. For example, the player updates their account with the casino or posts on social media. The gaming system now has an additional content preference about the player so the gaming system generates new content based on this information. In a similar embodiment, the trigger comes from the gaming system analyzing and categorizing the player's activity and in response generates new content. For example, the gaming system analyzes the player's content and determines that the player is a high roller. The gaming system, in response, generates new content for a player based on this information. Triggers of this category could also include the player joining a loyalty club, playing games, or using casino services or engaging in other loyalty activities.

[0184] In another example in accordance with at least some embodiments of the present disclosure, the auto-generated content is used by the player indefinitely or for a predetermined period of time or until a termination event occurs, such as the duration of a current gaming session, the duration of a visit to the casino, or for a fixed period of time (e.g., one week). The termination event can be detected by the gaming system, such as the player carding out, leaving a defined spatial area, checking out of a hotel, or cashing out the credit meter.

[0185] In another example in accordance with at least some embodiments of the present disclosure, the player can extend the period of time the content is available through gaming activities. For example, the time period is extended another day for each day the player continues to gamble or use casino services.

[0186] In another example in accordance with at least some embodiments of the present disclosure, the player can trigger the auto-generation of content using player loyalty points. This could be achieved using the service window of the gaming device.

[0187] In another example in accordance with at least some embodiments of the present disclosure, the auto-generation of content is throttled such that the gaming system only auto-generates content at a certain frequency or at certain clock values, such as a limit of once per day or in response to occurrence of predetermined gaming system states.

[0188] In another example in accordance with at least some embodiments of the present disclosure, once the player is determined to be eligible the gaming system prompts the player if he or she wants to trigger auto-generation.

[0189] In an exemplary embodiment shown in FIG. **4**A, the player indicates that he or she wants to trigger auto-generation and selects one or more content preference(s) (operation **400**), such as through a service window **278** of the gaming device **108** to be saved (operation **404**), for use in prompt generation to obtain auto-generated content in a current or subsequent gaming session. For instance, the player may play a game theme, such as a Lucky Larry slot game, and the player uses the service window to enter their content preferences (choices). The gaming server or host saves the player choice by associating the content preference choices with the player's profile and optionally associating the choices with the current Lucky Larry game theme on the gaming device.

[0190] In another example in accordance with at least some embodiments of the present disclosure, the player is able to trigger auto-generation because he or she is determined to be eligible for a content generation event. The player is allowed to provide or edit the prompt given to the generative model. For example, the player might enter text or other user interface elements to request auto-generation of content related to sports cars. This could be the entire prompt or combined with a gaming system generated prompt, such as related to a gaming theme. For example, the gaming system generates the prompt "Travel slot symbols" and combines that prompt with the player's inputted prompt for "sports cars" yielding a combined prompt to the generative model of "Travel slot symbols with sports cars".

[0191] In an exemplary embodiment discussed with reference to FIG. **13**, a user interface **1300** entitled "AI Gen-

eration of Slot Symbols" is provided to a player **112** before auto-generation of content. The interface **1300** shows the player the gaming system prompt **1304** (e.g., "Travel slot symbols" **1308**) and allows the player to choose (via the checkbox **1312**) the option of entering a custom prompt **1316** ("Sports cars" **1320**). The user interface **1300** informs the player that the custom prompt text option **1324** will cost 1,000 player loyalty points and an acceptance prompt **1328**. As shown in FIG. **13**, the player must use or spend loyalty account points to use the option of providing customized prompt text.

[0192] In another example in accordance with at least some embodiments of the present disclosure, the triggering of the event depends on the player loyalty status and/or the player loyalty status determines how many content auto-generation events are available to the player.

[0193] In another example in accordance with at least some embodiments of the present disclosure, the player is allowed to choose from multiple received auto-generated contents. For example, three sets of auto-generated content are received from the generative model and presented to the player, and the player selects none or one or more of them to be used in the gaming system. The player can further select the presentation operation to be used for each selected content.

[0194] The information used in the prompt to auto-generate the content can be used to provide each player with unique auto-generated content, thereby providing each player with a customized experience. In an exemplary embodiment, the auto-generated content is based on the player's social media information from the social media server(s) **188**, which is incorporated into the prompt. For instance, the gaming system determines that Bob likes to travel based on the published information on Bob's Facebook™ account. In response, the gaming system uses the prompt "Slot symbols for traveling to Europe" when generating content for Bob. In an exemplary embodiment, the auto-generated content uses the player's activity (such as gameplay information or loyalty activities) in the casino to generate the prompt. In one example, the player Bob saw the "Cirque du Soleil" show at the casino and therefore the gaming system uses the prompt "Cirque du Soleil slot symbols" or "Circus background" or "Circus music" as the content preference for the prompt. In another example, Bob plays many video poker games, so the gaming system uses the prompt "Poker symbols for a slot symbol" based on the perceived content preference of Bob for video poker. In another exemplary embodiment, a prompt could be based on multiple content preferences associated with player Bob, such as the prompt "Poker symbols on a vacation" because Bob likes to travel (based on his Facebook™ account) and plays poker frequently (based on his gameplay activities in the casino). In an embodiment, the prompt comprises images or sounds from the player's Facebook™ account and incorporates the player's images or sounds into the auto-generated content.

[0195] In another example in accordance with at least some embodiments of the present disclosure, the player can explicitly enter his or her content preferences to be used in auto-generation of content. FIG. **11** is a screenshot **1100** provided to a player, such as through a service window, gaming device display unit, or mobile phone application. The screenshot **1100** comprises a predetermined (fixed) list of content preferences **1104***a* (images of cats), b (images of sports), c (images of cars), and-d (science fiction images) with associated checkboxes **1108***a-d* that may be consistent with a game theme set by an operator. In the screenshot **1100**, the user has selected content preferences **1104***a, c*, and d. In some embodiments, the user can assign a rank to each of the content preferences. The use of a predetermined list of content preferences narrows the choices and avoids the ability of the player to enter obscene or inappropriate preferences.

[0196] FIG. **12** shows a screenshot **1200** in which the user is not provided with a predetermined list of content preferences but is able to enter text for his or her content preferences. The screenshot **1200** comprises first and second text boxes **1204***a* and *b* in which the user can enter a content preference, shown as food in text box **1204***a* and beaches in text box **1204***b*. In some embodiments, the user can assign a rank to each of the content preferences.

[0197] While the various examples herein focus on textual content preferences and prompts and auto-generated images, it is to be understood that the content preferences, prompts, and auto-generated content can be in any form, including not only text but also images, videos, lighting colors and sequences, and sounds.

[0198] While the various examples herein simplistically use content preferences, prompts and auto-generated images, such as cars, sports and cats, it should be appreciated that content preferences, prompts, and auto-generated content can be much more complex and include multiple types of media as well as style, content suggestions, colors or color scheme, a composition, an attribute of a picture, an animation or sound created by the generative model, and the like. Prompts, for example, can be complex such as "Picture of a sports car, with a cat facing left, in the style of Vincent van Gogh". In another example, the gaming system notices that the player has many portrait photos on their Facebook™ page, so the gaming system uses the prompt "Portraits of a cat" instead of "Pictures of a cat". These increasingly complex examples can require more complex user interfaces and logic to build the prompts from the content preferences with artificial intelligence being an example of such complex logic.

[0199] In another example in accordance with at least some embodiments of the present disclosure, the player can choose whether to use normal gaming content or the auto-generated content for one or more presentation operations. Similarly, in an exemplary embodiment the player can choose which presentation operation(s) from among plural presentation operations are to be used for selected auto-generated content particularly when more than one auto-generated content set is available.

[0200] FIGS. **4**A and **14** show an exemplary message flow and player-facing user interface **1400** which allows the player to choose which content or prompt to use. The user interface could be displayed directly by the gaming device display or the service window. The player is shown a plurality of sample contents **1404**, **1408**, and **1412**, each sample content being associated with a corresponding prompt description field **1416** and checkbox **1420** to indicate the player selection. FIG. **14** comprises a "Default Symbols" prompt field **1424** so that the player can opt to use no auto-generated content and use the "default" game content instead. In the example, the player has selected the Egyptian Symbols prompt and associated content **1404**. As shown in FIG. **4**A, when the prompt or content is selected, the choice

is saved by the gaming server or host in the player profile of the player and in connection with the gaming session ID involving the player. As will be appreciated, the user interface could be modified to include a presentation operation selection option that would enable the player to select a prompt for one or more selected presentation operations and not others. The choice of prompt, content, and/or presentation operation can be allowed at any time.

[0201] In an exemplary embodiment shown in FIG. **4**B, the player can choose via the gaming device or service window which prompt or content to use with which game theme or game type (e.g., poker, keno, etc.). As shown in FIG. **4**B, when the prompt or content and associated game theme or type are selected (operation **408**), the choices are saved by the gaming server or host in the player profile of the player for later retrieval (operations **412**, **416**, and **420**) and in connection with the gaming session ID involving the player. In other embodiments, the player c simply chooses the game to play and the host or gaming server will provide the gaming device with the content to use.

[0202] In another example in accordance with at least some embodiments of the present disclosure, the player is able to "delete" or remove the auto-generated content from the gaming system such that it is not available for use.

[0203] In another example in accordance with at least some embodiments of the present disclosure, the player is prompted to "approve" the auto-generated content before it is used in the gaming device. The content is first be approved by the player before it can be rendered by the gaming device to ensure that the player approves of the auto-generated content. This can be important when using the player social media information in the auto-generated content.

[0204] In another example in accordance with at least some embodiments of the present disclosure, the player can opt out of any auto-generated content. The opt out selection could be associated with the player's profile such that the gaming server knows that the player does not wish to use auto-generated content in a gaming session.

[0205] In other embodiments, a defined area of the gaming system has a game theme that represents the likes, dislikes, or behaviors of the group of players and/or non-players in that area, thereby creating various areas in the casino where people with similar likes and dislikes will move and therefore create social and identity benefits. The different areas of the gaming system can use auto-generated content to automatically game theme the areas of a casino dynamically.

[0206] With reference to FIG. **8**, a plurality of gaming devices **108***a-n*, shown as EGMs, are subdivided into banks of gaming devices as shown by box **800**. This can be done by assigning the gaming devices **108** in the box **800** a common assigned group ID in the gaming system database **154**. The areas can be defined by the gaming system operator in an appropriate manner, such as high roller, poker, new game, bar, sports, and old game areas. The areas could be automatically created by the gaming system by breaking the floor down into banks or a plurality of sets of gaming devices each comprising a specified number of EGMs.

[0207] In another example in accordance with at least some embodiments of the present disclosure, the operator can exclude certain areas of the casino from participating in the auto-generated content. The defined or partitioned areas can be physical, such as in a brick-and-mortar casino or logical or virtual such as in an online virtual casino. This limitation can be useful when the gaming system already has heavily branded areas, and the operator does not desire to use auto-generated content. The operator can provide a prompt (i.e., "virtual player preferences") for an area that is combined with the player preferences. For example, the gaming system has an area that is beach-game themed. The operator enters the prompt "beach theme" for the area and that prompt is combined with the players preferences. Alternatively or additionally, one or more areas are not abstract and rigidly defined by the gaming system but rather dynamically in response to behavior of the players. For example, the gaming system picks a group of players that are spatially near each other and then defines the gaming devices that are near the players to be the area or in the same gaming device grouping.

[0208] The ability of the operator to assign different game themes to different groupings of gaming devices is depicted in FIGS. **9** and **10**. FIG. **10** shows an identified bank of gaming devices **108***a-m* with three players **112***a-c*. The players **112** do not need to be playing at gaming devices **108**. The gaming system **116** has assigned the identified bank of gaming devices with a beach game theme. The gaming system **116** knows the identity of the three players, such as by the players having carded into a gaming device or being tracked by sensors **145**. The gaming system learns the content preferences of these players through the player profiles, the player mobile applications, and/or from the players' social media accounts. The gaming system generates a prompt that combines the preferences of the three players **112***a-c* and the game theme assigned to the gaming devices. For example, the first player **112***a* likes cats, second player **112***b* likes sports cars, and third player **112***c* likes cartoons. The gaming system combines the three player preferences into a "prompt" or other input to the generative model. For example, the gaming system might use the prompt "Pictures of a cat in a sports car as a cartoon in a Beach Theme". FIG. **6** shows an image **604** that the generative model might generate based on the prompt **600**. The auto-generated content is sent to one or more of the gaming devices, signs, kiosks, player mobile devices, progressive controllers and related gaming devices in the area associated with the bank.

[0209] FIG. **9** shows how first, second, third and fourth areas **900***a-d* of the gaming system has a different game theme and auto-generated content, namely content **904***a-d*, respectively. While one image **904** is shown per area, the content can be more than one image. As will be further appreciated, the same or different sets of presentation operations in the first, second, third and fourth areas **900***a-d* can be modified by the corresponding image for that area. For example, the first image **900***a* can be used on signage and lighting in the first area **900***a*, the second image **900***b* can be used on slot symbols in the second area **900***b*, the third image **900***c* can be used on playing card backs in the third area **900***c*, and the fourth image **900***d* can be used on signage, lighting, audio output, and slot symbols in the fourth area **900***d*. As will be further appreciated, the gaming devices in each of the four areas can indicate their different game themes by different color combinations or lighting.

[0210] Content can be auto-generated from a prompt constructed from different content preferences of different players in a player group. By way of illustration, a first content generation trigger event results from a first player entering a defined area of the gaming system. The first player has a content preference for sports cars. At a first time, the gaming

server creates a first prompt using the game theme assigned to the area (for the sake of illustration a beach game theme) and the first player's content preference for images of sports cars. The resulting auto-generated image is used to modify a presentation operation associated with a slot symbol rendered by the first player's gaming device. A second content generation trigger event results from a second player subsequently entering the area of the gaming system while the first player is playing a gaming session on the gaming device. The entry of the second player into the defined area can be determined based on Bluetooth low energy (BLE) energy and application geolocation data of the player's mobile device **144**. The second player has a content preference for images of cats. In response to the second content generation trigger event, the gaming system constructs a second prompt comprising the first player's content preference for sports car images, the second player's content preference for cat images, and the assigned beach game theme for the defined area. FIG. **6** is a possible example of the received auto-generated image generated based on the prompt "Image of cat and sports car as cartoon in beach theme". The image used for the slot symbol can be updated to include the auto-generated image from the second prompt.

[0211] In an example in accordance with at least some embodiments of the present disclosure, a content generation trigger event is not triggered until there are at least a threshold number of eligible players in the defined area having combinable content preferences. For example, the operator might have a threshold, such as three players having associated content preferences, that must be in a defined area before the content is auto-generated. For example, when there is only one person in the area, the gaming system might not auto-generate content. By contrast in another example, when there is one (or less than a threshold number of) players in the area, the gaming system can combine multiple content preferences from that one (or less than a threshold number of) players to create a prompt for auto-generated content.

[0212] In an example in accordance with at least some embodiments of the present disclosure, the player content preferences may be generated from sensor **144** feedback, such as images from cameras. The casino, casino or mobile applications can capture pictures or videos of the players and identify aspects of the players. For example, a first player can be wearing a Las Vegas Raiders shirt, and in response the gaming system determines that the first player likes football, the Raiders, and/or sports and generates a content preference accordingly. For instance, the gaming system might create the prompt "football" based on this information. Returning to the example above, if the second player were also in the defined football-game themed area with the first player, a prompt and image such as that in FIG. **7** could be generated for use in a presentation operation of the gaming devices in the area.

[0213] In an example in accordance with at least some embodiments of the present disclosure, when the gaming system senses that a new person enters a defined area, the prompt and associated content are immediately created (e.g., the gaming system immediately triggers a content generation trigger event that starts the creation) or after a certain period of time has elapsed since the person entered the area. The prompt combines the content preferences of the new player with the game theme of the defined area and content preferences of other players in the area.

[0214] In an example in accordance with at least some embodiments of the present disclosure, the gaming system creates new prompts and associated content periodically based on the players in the area at predetermined time intervals. For example, every 10 minutes the gaming system determines the identities of the players in the area and, using the content preferences of the players, creates new content.

[0215] In an example in accordance with at least some embodiments of the present disclosure, the gaming system ranks the players and chooses only a certain number of players for the prompt generation. For example, there are ten players in the area, but the gaming system only takes the content preferences for the top three players. The ranking of the players can be based on gameplay data, loyalty point balance, player assigned tier ranking (e.g., silver, gold and platinum), and other ranking factors.

[0216] In an example in accordance with at least some embodiments of the present disclosure, the gaming system, in developing the prompt, weights the content preferences of the players based on a player ranking or commonality of content preferences of the players. An example of the former would be the gaming system assigning a first weight to a first player's content preferences and a lower second weight to a second player's content preferences. An example of the latter would be the gaming system assigning a first weight to a content preference shared by multiple players in the area and a lower second weight to a content preference unique to one player in the area. The different weightings can be used to determine whether a content preference is eligible for inclusion in the prompt and therefore auto-generation of the content. Weightings that are less than a selected threshold can be excluded from the prompt.

[0217] In an example in accordance with at least some embodiments of the present disclosure, a player can opt in or opt out of participating in the AI generation. When opted out, the gaming system does not include the player's content preferences in the generation and the player may or may not be eligible to participate, such as by wagering, side-wagering, or playing, in gaming sessions using auto-generated content in a presentation operation. Prohibiting opting out players from participating in gaming sessions can enable other players in the area or participating in the gaming session to know that each of the participating players has the same group of content preferences (have similar likes or dislikes or have commonly created the currently displayed content).

[0218] In an example in accordance with at least some embodiments of the present disclosure, the gaming system informs or notifies one or more players and/or the operator or regulator, which player's content preferences are being used. For example, the operator of the casino can log into the gaming system and see that the High Roller area is using the content preferences from first and second players currently. The notification can include the prompt used to create the current content.

[0219] FIG. **17** is a screenshot **1700** of a user interface that notifies other players of which content preferences of which players are used in the prompt. With reference to FIG. **17**, the screenshot **1700**, which can be displayed by the service window, gaming device display device, or player mobile device, indicates in boxes **1704***a* and *b*, which players are being used for the preferences in the content auto-generation

and each player's associated content preferences **1708***a* and *b*, respectively. For example, the content preference **1708***a* of player **1** is cat images, and the content preference **1708***b* of player **2** is sports car images. The screenshot **1700** includes the selected auto-generated image **1712** and prompt **1716** ("Picture of cats in sports cars"). While the screenshot shows only one selected auto-generated image **1712**, it is to be appreciated that it can show multiple such images generated from the prompt depending on the application and configuration.

[0220] In an example in accordance with at least some embodiments of the present disclosure, players can vote to reject the selected auto-generated content such that the gaming system generates new AI content or vote to select (or reject) which of multiple auto-generated contents is to be used for a selected presentation operation. Voting may increase player enjoyment and enable the players to reject inappropriate content. The players can alternatively or additionally vote to reject the prompt or content preference participation of one or more players. For instance, with reference to FIG. **17** above, assume that player **1** has entered a content preference that is offensive to or disliked by one or more players. Players might vote to reject the content preference of player **1** and, in response to such rejection, the gaming system would generate a new prompt and content excluding the preferences of player**1**. Likewise, players could upvote the content of player **1** so that it is favored, or more heavily weighted, in the content preference ranking.

[0221] In an example in accordance with at least some embodiments of the present disclosure, the auto-generation of content is turned into a game. Players attempt to guess which other players were used in the prompt used for content generation. In the example that player **1** likes cats, other players might see the cat in the generated content and try to guess which player likes cats (i.e., try to guess the identity of player **1**). This might be done through a mobile application. This turns the content generation into a social activity and encourages players to interact with one other. For example, players can "friend" one or more players in the area or players who participated in the content generation.

[0222] The message flows and process flow will be discussed with reference to FIGS. **15** and **16**. FIG. **16** illustrates an example of a process flow **1600** that supports aspects of the present disclosure associated with the generative model **180** interacting with players **112** via the gaming system **116**, communication devices **144** and/or gaming devices **108**. The process flow **1600** supports aspects of the present disclosure associated with autogenerating appropriate content. In some examples, process flow **1600** may implement aspects of gaming system **100**. Further, process flow **1600** may be implemented by a gaming system **100** or components included therein as described with reference to FIGS. **1** through **3**.

[0223] In the following description of the process flow **1600**, the operations may be performed in a different order than the order shown, or the operations may be performed in different orders or at different times. Certain operations may also be left out of the process flow **1600**, or other operations may be added to the process flow **1600**. It is to be understood that any device (e.g., a gaming device **108**, a gaming server **116**, a communication device **144**, components of the system **100**, etc.) may perform the operations shown.

[0224] Referring now to FIGS. **15** and **16**, a method of using the generative model(s) to autogenerate content for modification of presentation operations of the gaming system will be described in accordance with embodiments of the present disclosure.

[0225] The method begins when the gaming server **116** detects a content generation or trigger event to generate content (step **1604**).

[0226] The method continues by optionally determining whether a selected player or group of players associated with the trigger event is eligible to have content preferences used in auto-generating content (step **1608**). Eligibility can be based, for example, on successfully authenticating that the authorized player is using the communication device **144** or gaming device **108**, determining that the player has content preferences that may be used in auto-generating content, and determining that the player has not opted out of permitting his or her content preferences to be used or in using auto-generated content in a gaming session. Authentication can be done by any suitable authentication techniques, such as single use passwords or passcodes, digital certificate, image recognition by gaming system camera still or video images, and other knowledge-based, physiological biometrics-based, behavioral biometrics-based, and two/multi-factor authentication techniques.

[0227] The method continues by determining a set of content preferences for the selected player or group of players, including player and operator input (step **1612**).

[0228] The method continues by parsing the set of content preferences for the selected player or group of players to identify malicious content (step **1616**).

[0229] After filtering out any content preference in the set comprising potential malicious content, the method continues by the gaming system mapping the set of group preferences to other sets of group preferences to identify prior received content and associated outcomes (step **1620**). The comparison can be done by parsing selected content preferences in the current set against selected content preferences in prior sets of content preferences. The comparison is assigned a similarity indicator indicating a level of similarity. Only compared sets of preferences having at least a threshold level of similarity are determined to be similar.

[0230] The method continues in decision diamond **1624** by determining, from the mapping of step **1620**, whether or not to request new content from the generative model. Generally when the filtered set of preferences maps (or has at least a predetermined level of similarity to) to a prior set of preferences used in a prompt and therefore content previously generated using the prompt and the content has an associated outcome that has at least a threshold level of success, the gaming system **116** proceeds to step **1640** (discussed below) using the previously generated content in lieu of new content. When the set of preferences does not have at least a predetermined level of similarity to a prior set of preferences or the previously generated content identified by the mapping does not have at least a threshold level of success, the gaming system proceeds to step **1628**.

[0231] The method continues by generating and providing a content generation request comprising a prompt to the generative model (step **1628**). The prompt is generated using any of the techniques described above. When multiple sets of content preferences are associated with a player group, a set of group content preferences can be extracted from the multiple content preference sets, such as identifying and filtering out duplicates, filtering out content preferences from less desirable or lower ranked players, filtering out

content preferences that have a weighting below a selected threshold, identifying and including more popular content preferences, and filtering out content preferences that violate a game rule or other gaming system rule, are inconsistent with other content preferences in the sets, or inconsistent with a game theme selected by the operator for the gaming devices being played by the player group. As shown by FIG. **15**, once the set of group content preferences is selected, the prompt is constructed from the master set and game theme (operation **1500**) and included in the content generation request. The content generation request is sent (operation **1504**) to the generative model or AI host.

[0232] The method continues by receiving autogenerated content from the generative model (operation **1508** and step **1632**).

[0233] The method continues by parsing the received content to identify malicious content or otherwise undesirable content that might violate one or more prohibited content rules of the gaming system (step **1636**).

[0234] After filtering out any received content comprising potential malicious content, the gaming system saves the filtered content in association with the prompt (operation **1512**) and selects, from among the plurality of sets of received content, received content and gaming device(s) and presentation operations to be modified based on the selected received content (step **1640**). In some applications the gaming system selects multiple sets of received content from the plural sets and assigns each to a different presentation operation.

[0235] The method continues by causing the selected gaming device(s) to cause each of the selected presentation operations to be modified by the appropriate set(s) of received selected content (step **1644**). This can be done by notifying the gaming device (shown as an EGM) that new content is available for an identified presentation operation (operation **1516**).

[0236] The method continues by optionally providing selected gaming devices or players with a description of the source of and/or reasons for selecting the received content (step **1648**). The gaming devices request the gaming server or host to provide the content for the associated presentation operation and identifies the EGM or gaming device ID and session ID (when the content modifies the presentation operation during the gaming session) that will use the selected content (operation **1520**). In response, the gaming server updates the data structures associated with the content to include and gaming device ID and session ID (operation **1524**) and provides the content to the gaming device (operation **1528**). The player(s) then play the gaming device(s) comprising the modified presentation operations (operation **1532**). When the content modifies the presentation operation before the gaming session, the gaming device(s) send the session ID to the gaming server to update the content data structures to include the session ID (operation **1540**).

[0237] The method continues by determining the outcome of rendering selected received content and associating the outcome with a content ID for the selected received content and gaming session ID for the selected gaming device(s) and player(s) (step **1652** and operation **1544**) while the display (s) of the gaming(s) display the content. The gaming device records the history association with the content including the outcome and content ID (operation **1548**).

[0238] A number of variations and modifications of the disclosure can be used. It would be possible to provide for some features of the disclosure without providing others.

[0239] The present disclosure contemplates a variety of different gaming systems each having one or more of a plurality of different features, attributes, or characteristics. A "gaming system" as used herein refers to various configurations of: (a) one or more central servers, central controllers, or remote hosts; (b) one or more electronic gaming machines such as those located on a casino floor; and/or (c) one or more personal gaming devices, such as desktop computers, laptop computers, tablet computers or computing devices, personal digital assistants, mobile phones, and other mobile computing devices. Moreover, an EGM as used herein refers to any suitable electronic gaming machine which enables a player to play a game (including but not limited to a game of chance, a game of skill, and/or a game of partial skill) to potentially win one or more awards, wherein the EGM comprises, but is not limited to: a slot machine, a video poker machine, a video lottery terminal, a terminal associated with an electronic table game, a video keno machine, a video bingo machine located on a casino floor, a sports betting terminal, web browser, or a kiosk, such as a sports betting kiosk.

[0240] In various embodiments, the gaming system of the present disclosure includes: (a) one or more electronic gaming machines in combination with one or more central servers, central controllers, or remote hosts; (b) one or more personal gaming devices in combination with one or more central servers, central controllers, or remote hosts; (c) one or more personal gaming devices in combination with one or more electronic gaming machines; (d) one or more personal gaming devices, one or more electronic gaming machines, and one or more central servers, central controllers, or remote hosts in combination with one another; (c) a single electronic gaming machine; (f) a plurality of electronic gaming machines in combination with one another; (g) a single personal gaming device; (h) a plurality of personal gaming devices in combination with one another; (i) a single central server, central controller, or remote host; and/or (j) a plurality of central servers, central controllers, or remote hosts in combination with one another.

[0241] For brevity and clarity and unless specifically stated otherwise, "EGM" as used herein represents one EGM or a plurality of EGMs, "personal gaming device" as used herein represents one personal gaming device or a plurality of personal gaming devices, and "central server, central controller, or remote host" as used herein represents one central server, central controller, or remote host or a plurality of central servers, central controllers, or remote hosts.

[0242] As noted above, in various embodiments, the gaming system includes an EGM (or personal gaming device) in combination with a central server, central controller, or remote host. In such embodiments, the EGM (or personal gaming device) is configured to communicate with the central server, central controller, or remote host through a data network or remote communication link. In certain such embodiments, the EGM (or personal gaming device) is configured to communicate with another EGM (or personal gaming device) through the same data network or remote communication link or through a different data network or remote communication link. For example, the gaming system includes a plurality of EGMs that are each configured to

communicate with a central server, central controller, or remote host through a data network.

[0243] In certain embodiments in which the gaming system includes an EGM (or personal gaming device) in combination with a central server, central controller, or remote host, the central server, central controller, or remote host is any suitable computing device (such as a server) that includes at least one processor and at least one memory device or data storage device. As further described herein, the EGM (or personal gaming device) includes at least one EGM (or personal gaming device) processor configured to transmit and receive data or signals representing events, messages, commands, or any other suitable information between the EGM (or personal gaming device) and the central server, central controller, or remote host. The at least one processor of that EGM (or personal gaming device) is configured to execute the events, messages, or commands represented by such data or signals in conjunction with the operation of the EGM (or personal gaming device). Moreover, the at least one processor of the central server, central controller, or remote host is configured to transmit and receive data or signals representing events, messages, commands, or any other suitable information between the central server, central controller, or remote host and the EGM (or personal gaming device). The at least one processor of the central server, central controller, or remote host is configured to execute the events, messages, or commands represented by such data or signals in conjunction with the operation of the central server, central controller, or remote host. One, more than one, or each of the functions of the central server, central controller, or remote host may be performed by the at least one processor of the EGM (or personal gaming device). Further, one, more than one, or each of the functions of the at least one processor of the EGM (or personal gaming device) may be performed by the at least one processor of the central server, central controller, or remote host.

[0244] In certain such embodiments, computerized instructions for controlling any games (such as any primary or base games and/or any secondary or bonus games) displayed by the EGM (or personal gaming device) are executed by the central server, central controller, or remote host. In such "thin client" embodiments, the central server, central controller, or remote host remotely controls any games (or other suitable interfaces) displayed by the EGM (or personal gaming device), and the EGM (or personal gaming device) is utilized to display such games (or suitable interfaces) and to receive one or more inputs or commands. In other such embodiments, computerized instructions for controlling any games displayed by the EGM (or personal gaming device) are communicated from the central server, central controller, or remote host to the EGM (or personal gaming device) and are stored in at least one memory device of the EGM (or personal gaming device). In such "thick client" embodiments, the at least one processor of the EGM (or personal gaming device) executes the computerized instructions to control any games (or other suitable interfaces) displayed by the EGM (or personal gaming device).

[0245] In various embodiments in which the gaming system includes a plurality of EGMs (or personal gaming devices), one or more of the EGMs (or personal gaming devices) are thin client EGMs (or personal gaming devices) and one or more of the EGMs (or personal gaming devices) are thick client EGMs (or personal gaming devices). In other embodiments in which the gaming system includes one or more EGMs (or personal gaming devices), certain functions of one or more of the EGMs (or personal gaming devices) are implemented in a thin client environment, and certain other functions of one or more of the EGMs (or personal gaming devices) are implemented in a thick client environment. In one such embodiment in which the gaming system includes an EGM (or personal gaming device) and a central server, central controller, or remote host, computerized instructions for controlling any primary or base games displayed by the EGM (or personal gaming device) are communicated from the central server, central controller, or remote host to the EGM (or personal gaming device) in a thick client configuration, and computerized instructions for controlling any secondary or bonus games or other functions displayed by the EGM (or personal gaming device) are executed by the central server, central controller, or remote host in a thin client configuration.

[0246] In certain embodiments in which the gaming system includes: (a) an EGM (or personal gaming device) configured to communicate with a central server, central controller, or remote host through a data network; and/or (b) a plurality of EGMs (or personal gaming devices) configured to communicate with one another through a communication network, the communication network may include a local area network (LAN) in which the EGMs (or personal gaming devices) are located substantially proximate to one another and/or the central server, central controller, or remote host. In one example, the EGMs (or personal gaming devices) and the central server, central controller, or remote host are located in a gaming establishment or a portion of a gaming establishment.

[0247] In other embodiments in which the gaming system includes: (a) an EGM (or personal gaming device) configured to communicate with a central server, central controller, or remote host through a data network; and/or (b) a plurality of EGMs (or personal gaming devices) configured to communicate with one another through a communication network, the communication network may include a wide area network (WAN) in which one or more of the EGMs (or personal gaming devices) are not necessarily located substantially proximate to another one of the EGMs (or personal gaming devices) and/or the central server, central controller, or remote host. For example, one or more of the EGMs (or personal gaming devices) are located: (a) in an area of a gaming establishment different from an area of the gaming establishment in which the central server, central controller, or remote host is located; or (b) in a gaming establishment different from the gaming establishment in which the central server, central controller, or remote host is located. In another example, the central server, central controller, or remote host is not located within a gaming establishment in which the EGMs (or personal gaming devices) are located. In certain embodiments in which the communication network includes a WAN, the gaming system includes a central server, central controller, or remote host and an EGM (or personal gaming device) each located in a different gaming establishment in a same geographic area, such as a same city or a same state. Gaming systems in which the communication network includes a WAN are substantially identical to gaming systems in which the communication network includes a LAN, though the quantity of EGMs (or personal gaming devices) in such gaming systems may vary relative to one another.

[0248] In further embodiments in which the gaming system includes: (a) an EGM (or personal gaming device) configured to communicate with a central server, central controller, or remote host through a data network; and/or (b) a plurality of EGMs (or personal gaming devices) configured to communicate with one another through a communication network, the communication network may include an internet (such as the Internet) or an intranet. In certain such embodiments, an Internet browser of the EGM (or personal gaming device) is usable to access an Internet game page from any location where an Internet connection is available. In one such embodiment, after the EGM (or personal gaming device) accesses the Internet game page, the central server, central controller, or remote host identifies a player before enabling that player to place any wagers on any plays of any wagering games. In one example, the central server, central controller, or remote host identifies the player by requiring a player account of the player to be logged into via an input of a unique player name and password combination assigned to the player. The central server, central controller, or remote host may, however, identify the player in any other suitable manner, such as by validating a player tracking identification number associated with the player; by reading a player tracking card or other smart card inserted into a card reader; by validating a unique player identification number associated with the player by the central server, central controller, or remote host; or by identifying the EGM (or personal gaming device), such as by identifying the MAC address or the IP address of the Internet facilitator. In various embodiments, once the central server, central controller, or remote host identifies the player, the central server, central controller, or remote host enables placement of one or more wagers on one or more plays of one or more primary or base games and/or one or more secondary or bonus games, and displays those plays via the Internet browser of the EGM (or personal gaming device). Examples of implementations of Internet-based gaming are further described in U.S. Pat. No. 8,764,566, entitled "Internet Remote Game Server," and U.S. Pat. No. 8,147,334, entitled "Universal Game Server."

[0249] The central gaming server, central gaming controller, or remote host and the EGM (or personal gaming device) are configured to connect to the data network or remote communications link in any suitable manner. In various embodiments, such a connection is accomplished via: a conventional phone line or other data transmission line, a digital subscriber line (DSL), a T-1 line, a coaxial cable, a fiber optic cable, a wireless or wired routing device, a mobile communications network connection (such as a cellular network or mobile Internet network), or any other suitable medium. The expansion in the quantity of computing devices and the quantity and speed of Internet connections in recent years increases opportunities for players to use a variety of EGMs (or personal gaming devices) to play games from an ever-increasing quantity of remote sites. Additionally, the enhanced bandwidth of digital wireless communications may render such technology suitable for some or all communications, particularly if such communications are encrypted. Higher data transmission speeds may be useful for enhancing the sophistication and response of the display and interaction with players.

[0250] As should be appreciated by one skilled in the art, aspects of the present disclosure have been illustrated and described herein in any of a number of patentable classes or context including any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof. Accordingly, aspects of the present disclosure may be implemented entirely hardware, entirely software (including firmware, resident software, micro-code, etc.) or combining software and hardware implementation that may all generally be referred to herein as a "circuit," "module," "component," or "system." Furthermore, aspects of the present disclosure may take the form of a computer program product embodied in one or more computer readable media having computer readable program code embodied thereon.

[0251] Any combination of one or more computer readable media may be utilized. The computer readable media may be a computer readable signal medium or a computer readable storage medium. A computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium would include the following: a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an appropriate optical fiber with a repeater, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage medium may be any tangible medium that can contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device.

[0252] A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electromagnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that can communicate, propagate, or transport a program for use by or in connection with an instruction execution system, apparatus, or device. Program code embodied on a computer readable signal medium may be transmitted using any appropriate medium, including but not limited to wireless, wireline, optical fiber cable, RF, etc., or any suitable combination of the foregoing.

[0253] Computer program code for carrying out operations for aspects of the present disclosure may be written in any combination of one or more programming languages, including an object oriented programming language such as Java, Scala, Smalltalk, Eiffel, JADE, Emerald, C++, C#, VB.NET, Python or the like, conventional procedural programming languages, such as the "C" programming language, Visual Basic, Fortran 2003, Perl, COBOL 2002, PHP, ABAP, dynamic programming languages such as Python, Ruby and Groovy, or other programming languages. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide

area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider) or in a cloud computing environment or offered as a service such as a Software as a Service (SaaS).

[0254] Aspects of the present disclosure have been described herein with reference to flowchart illustrations and/or block diagrams of methods, apparatuses (systems) and computer program products according to embodiments of the disclosure. It should be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable instruction execution apparatus, create a mechanism for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

[0255] These computer program instructions may also be stored in a computer readable medium that when executed can direct a computer, other programmable data processing apparatus, or other devices to function in a particular manner, such that the instructions when stored in the computer readable medium produce an article of manufacture including instructions which when executed, cause a computer to implement the function/act specified in the flowchart and/or block diagram block or blocks. The computer program instructions may also be loaded onto a computer, other programmable instruction execution apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatuses or other devices to produce a computer implemented process such that the instructions which execute on the computer or other programmable apparatus provide processes for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

[0256] The term "a" or "an" entity refers to one or more of that entity. As such, the terms "a" (or "an"), "one or more," and "at least one" can be used interchangeably herein. It is also to be noted that the terms "comprising," "including," and "having" can be used interchangeably.

What is claimed is:

1. A gaming system, comprising:

a communication interface;

a processor coupled with the communication interface; and

a computer-readable storage medium coupled with the processor, the computer-readable storage medium comprising instructions that enable the processor to:

detect a content generation event;

in response to the detected content generation event, generate, at least in part from a set of content preferences associated with a player, a prompt to a generative model;

provide a content generation request comprising the prompt to the generative model;

in response to the content generation request, receive content generated by the generative model;

select at least a portion of the received content for presentation by a gaming device in communication with the communication interface; and

cause the received content to be presented by the gaming device to the player.

2. The gaming system of claim **1**, wherein the prompt and received content each comprise one of text, image, music, audio, and video information, wherein the generative model comprises one of a variational autoencoder (VAE), generative adversarial network (GAN), autoregressive model, and transformer-based model, and wherein the prompt comprises a content preference associated by a player profile with the player, a content preference associated with a social website posting of the player, a content preference received from a mobile device of the player, a game theme associated with the gaming device, a player activity detected by the gaming system, input received from the player, a captured image of the player, a loyalty level of the player, and a loyalty point balance of the player.

3. The gaming system of claim **1**, wherein the processor causes the received content to be presented by the gaming device prior to a game played by the player on the gaming device, wherein the detected content generation event comprises one of successful authentication of the player by the gaming system, detection of a location of a mobile device associated with the player, detection of at least a threshold level of gameplay by the player, detection of occurrence of a predetermined state of the gaming system, detection of occurrence of a predetermined player loyalty activity by the gaming system, detection that gameplay on another gaming device currently presenting different selected content is below a threshold level of gameplay, detection that a presentation duration of the different selected content is at least a threshold duration, detection of new a new content preference associated with the player, occurrence of a predetermined random or pseudorandom number, occurrence of at least a threshold loyalty point balance or loyalty status associated with the player, and occurrence of predetermined clock setting.

4. The gaming system of claim **1**, wherein the instructions that enable the processor to cause the received content to be incorporated into a presentation operation of the gaming device, the presentation operation comprising rendering one of a slot symbol used in a game played on the gaming device, background image displayed by a display of the gaming device, payline used in the game played on the gaming device, button panel of the gaming device, sound emitted by the gaming device, animation rendered by the display, card back or face used in a game played on the gaming device, icon rendered by the display, avatar rendered by the display, character rendered by the display, shader rendered by the display, border, title, or frame rendered by the display, signage rendered by the display, and a message provided to the player by the gaming device, and wherein in selecting the at least a portion of the received content, the processor selects the presentation operation from among plural presentation operations to be modified by the received content.

5. The gaming system of claim **1**, wherein the processor adjusts the prompt to reflect player input in generating the content generation request, wherein the processor maps a content preference associated with the content generation event against previously generated content to determine that the content previously generated by the generative model is

to be presented by the gaming device to the player, and wherein the processor selects a presentation operation of the gaming device to be modified by the received content based on player input.

6. The gaming system of claim **1**, wherein the processor maps a content preference associated with the content generation event against previously generated prompts and associated gameplay performance levels to determine to provide a prior prompt to the generative model and wherein in selecting the at least a portion of the received content, the processor determines a relatedness of the received content against a current game theme of the gaming device.

7. The gaming system of claim **1**, wherein the set of preferences comprises a preference regarding one of a text, image, music, audio, color, style, animation, and video information and wherein the processor associates a game or session identifier associated with a game played by the player on the gaming device while the received content is presented by the gaming device to the player and gameplay information associated with the played game with a content identifier associated with the at least a portion of the selected content.

8. A method, comprising:

detecting, by a processor, a content generation event;

in response to the detected content generation event, generating, by the processor at least in part from a set of content preferences associated with a player, a prompt to a generative model;

providing, by the processor, a content generation request comprising the prompt to the generative model;

in response to the content generation request, receiving, by the processor, content generated by the generative model;

selecting, by the processor, at least a portion of the received content for presentation by a gaming device; and

causing, by the processor, the received content to be presented by the gaming device to the player.

9. The method of claim **8**, wherein the prompt and received content each comprise one of text, image, music, audio, and video information, wherein the generative model comprises one of a variational autoencoder (VAE), generative adversarial network (GAN), autoregressive model, and transformer-based model, and wherein the prompt comprises a content preference associated by a player profile with the player, a content preference associated with a social website posting of the player, a content preference received from a mobile device of the player, a game theme associated with the gaming device, a player activity detected by the gaming system, input received from the player, a captured image of the player, a loyalty level of the player, and a loyalty point balance of the player.

10. The method of claim **8**, further comprising:

causing, by the processor, the received content to be presented by the gaming device during a game played by the player on the gaming device, wherein the detected content generation event comprises one of successful authentication of the player by the gaming system, detection of a location of a mobile device associated with the player, detection of at least a threshold level of gameplay by the player, detection of occurrence of a predetermined state of the gaming system, detection of occurrence of a predetermined player loyalty activity by the gaming system, detection that gameplay on another gaming device currently presenting different selected content is below a threshold level of gameplay, detection that a presentation duration of the different selected content is at least a threshold duration, detection of a new content preference associated with the player, occurrence of a predetermined random or pseudorandom number, occurrence of at least a threshold loyalty point balance or loyalty status associated with the player, and occurrence of predetermined clock setting.

11. The method of claim **8**, further comprising causing, by the processor, the received content to be incorporated into a presentation operation of the gaming device, the presentation operation comprising rendering one of a slot symbol used in a game played on the gaming device, background image displayed by a display of the gaming device, payline used in the game played on the gaming device, button panel of the gaming device, sound emitted by the gaming device, animation rendered by the display, card back or face used in a game played on the gaming device, icon rendered by the display, avatar rendered by the display, character rendered by the display, shader rendered by the display, border, title, or frame rendered by the display, signage rendered by the display, and a message provided to the player by the gaming device, and selecting the at least a portion of the received content comprises selecting the presentation operation from among plural presentation operations to be modified by the received content.

12. The method of claim **8**, further comprising:

adjusting, by the processor, the prompt to reflect player input in generating the content generation request;

mapping, by the processor, a content preference associated with the content generation event against previously generated content to determine that the content previously generated by the generative model is to be presented by the gaming device to the player; and

selecting, by the processor, a presentation operation of the gaming device to be modified by the received content based on player input.

13. The method of claim **8**, further comprising mapping a content preference associated with the content generation event against previously generated prompts and associated gameplay performance levels to determine to provide a prior prompt to the generative model, and wherein selecting the at least a portion of the received content comprises determining a relatedness of the received content against a current game theme of the gaming device.

14. The method of claim **8**, further comprising:

associating, by the processor, a game or session identifier associated with a game played by the player on the gaming device while the received content is presented by the gaming device to the player and gameplay information associated with the played game with a content identifier associated with the at least a portion of the selected content.

15. A method, comprising:

detecting, by a processor, a content generation event;

in response to the detected content generation event, generating, by the processor at least in part from a set of content preferences associated with a player, a prompt to a generative model;

providing, by the processor, a content generation request comprising the prompt to the generative model;

in response to the content generation request, receiving, by the processor, content generated by the generative model;

parsing, by the processor, the received content for malicious content;

when the received content is free of malicious content, selecting, by the processor, at least a portion of the received content for presentation by a gaming device in communication with the communication interface; and

causing, by the processor, the received content to be presented by the gaming device to the player.

16. The method of claim **15**, wherein the prompt comprises a content preference associated by a player profile with the player, a content preference associated with a social website posting of the player, a game theme associated with the gaming device, a player activity detected by the gaming system, input received from the player, a loyalty level of the player, and a loyalty point balance of the player and further comprising incorporating input from the player into the prompt and parsing the received input for second malicious content and wherein the second malicious content comprises one of a quick response ("QR") code, malware, and content violating a game rule.

17. The method of claim **15**, wherein the malware comprises one of a quick response ("QR") code, malware, a malformed image file, and content violating a game rule and wherein the processor causes the received content to be presented by the gaming device prior to a game played by the player on the gaming device, wherein the detected content generation event comprises one of successful authentication of the player by the gaming system, detection of a location of a mobile device associated with the player, detection of at least a threshold level of gameplay by the player, detection of occurrence of a predetermined state of the gaming system, detection of occurrence of a predetermined player loyalty activity by the gaming system, detection that gameplay on another gaming device currently presenting different selected content is below a threshold level of gameplay, detection that a presentation duration of the different selected content is at least a threshold duration, detection of a new content preference associated with the player, occurrence of a predetermined random or pseudo-random number, occurrence of at least a threshold loyalty point balance or loyalty status associated with the player, and occurrence of predetermined clock setting.

18. The method of claim **15**, further comprising:

adjusting, by the processor, the prompt to reflect player input in generating the content generation request;

mapping, by the processor, a content preference associated with the content generation event against previously generated content to determine that the content previously generated by the generative model is to be presented by the gaming device to the player; and

selecting, by the processor, a presentation operation of the gaming device to be modified by the received content based on player input.

19. The method of claim **15**, further comprising mapping a content preference associated with the content generation event against previously generated prompts and associated gameplay performance levels to determine to provide a prior prompt to the generative model, wherein selecting the at least a portion of the received content comprises determining a relatedness of the received content against a current game theme of the gaming device.

20. The method of claim **15**, further comprising:

associating, by the processor, a game or session identifier associated with a game played by the player on the gaming device while the received content is presented by the gaming device to the player and gameplay information associated with the played game with a content identifier associated with the at least a portion of the selected content.

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