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(54) **SYSTEM FOR PROVIDING A
METAVERSE-BASED VIRTUALIZED IMAGE
AND METHOD THEREFOR**

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(2013.01)

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H04N 7/18; **H04N 7/183**

USPC 345/419
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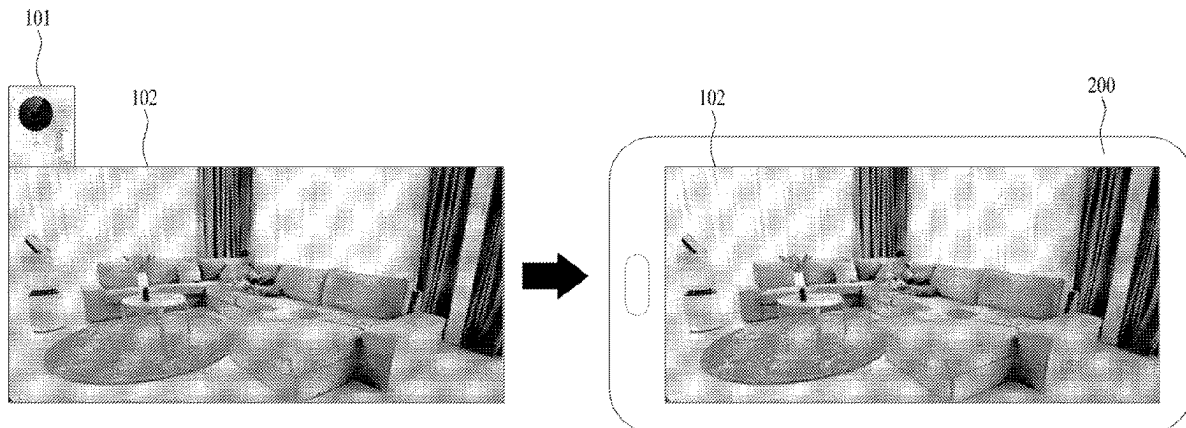
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(57) **ABSTRACT**

The present disclosure provides a method of providing a metaverse-based virtualized image, the method including capturing an image in real time via an IP camera, storing the captured image, recognizing at least one face and object from the captured image, virtualizing the recognized at least one face and object, and outputting a virtualized image information including a virtualized character and a virtual object.

12 Claims, 13 Drawing Sheets



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FIG. 1

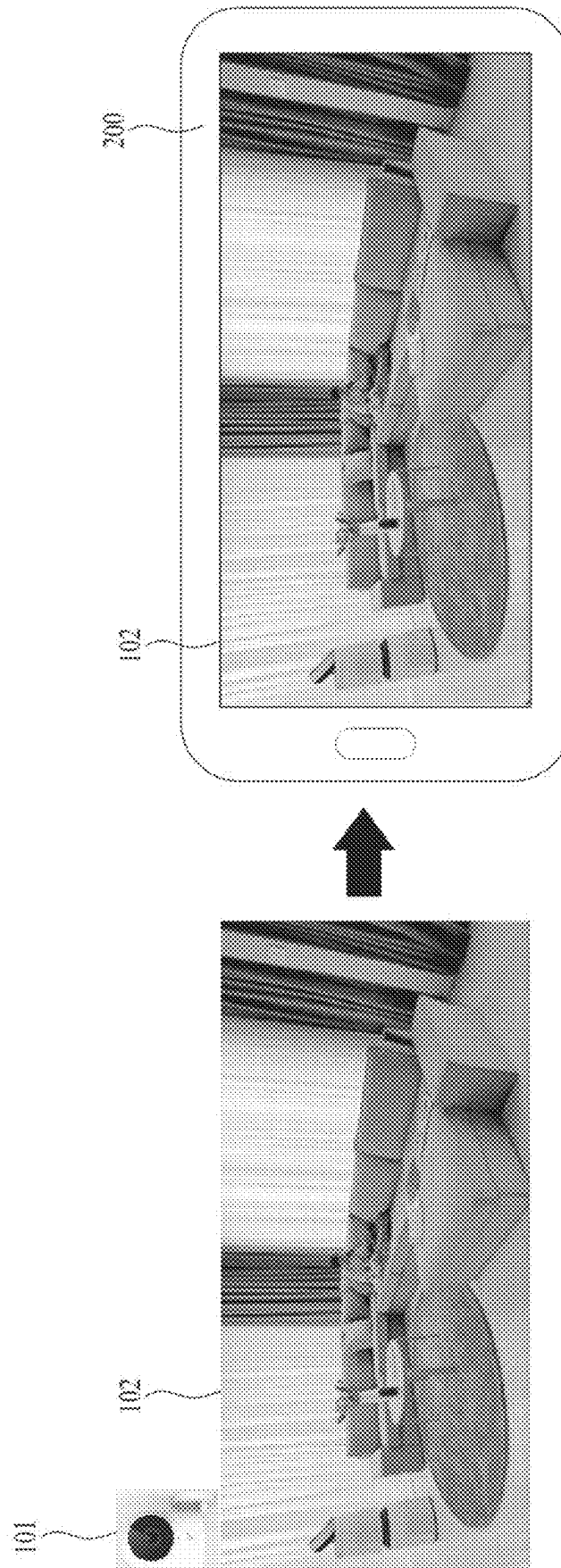


FIG. 2

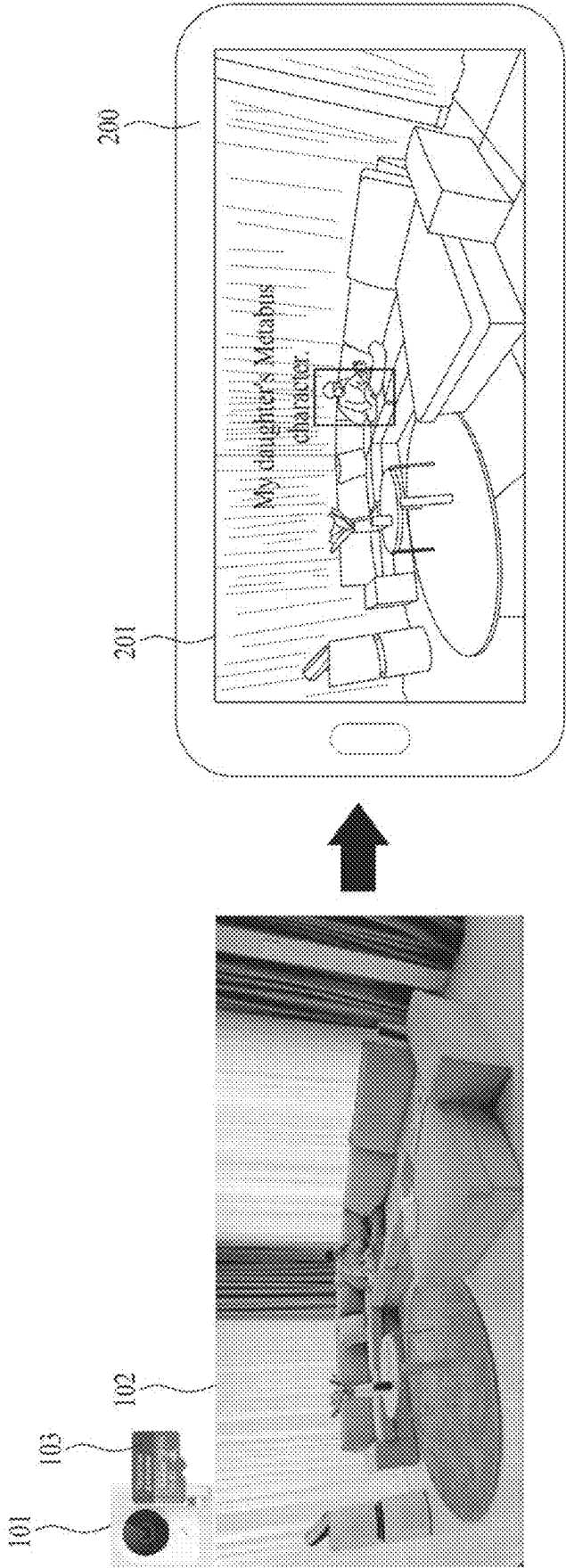


FIG. 3

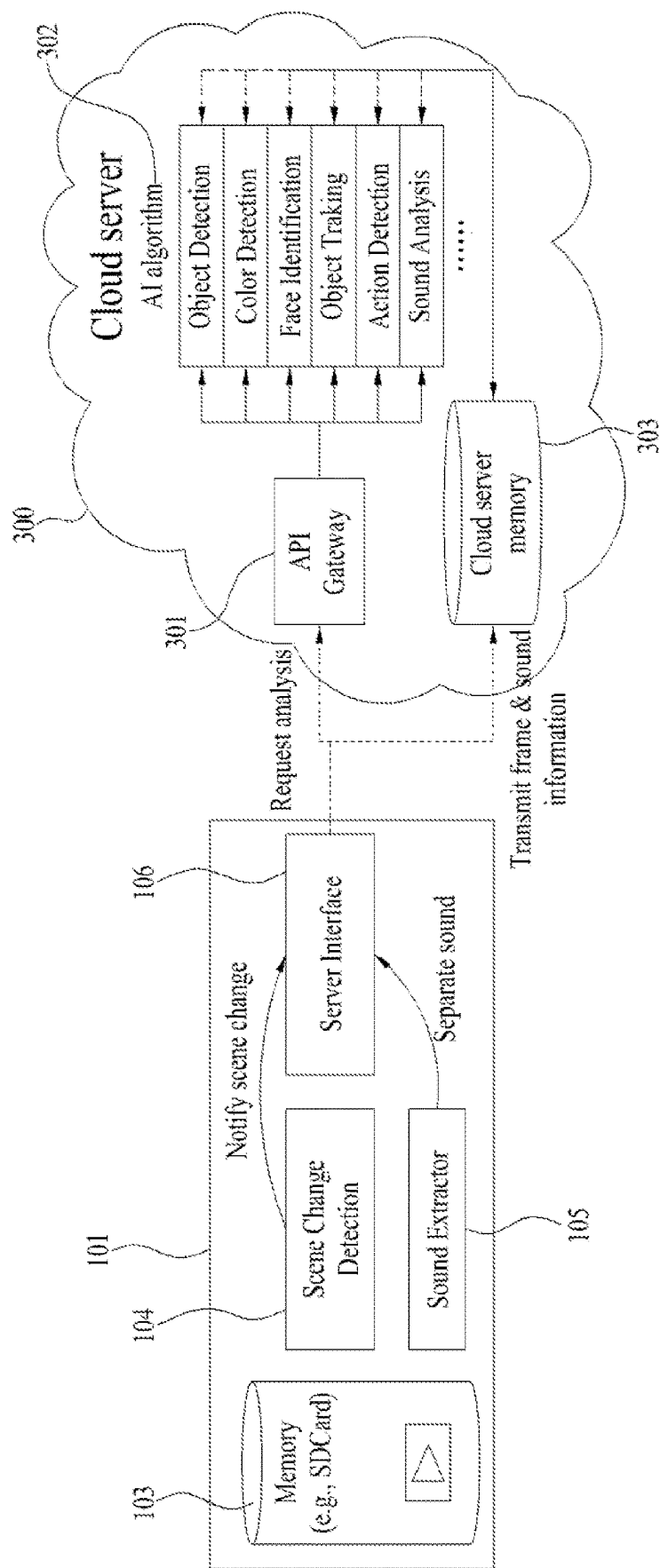


FIG. 4

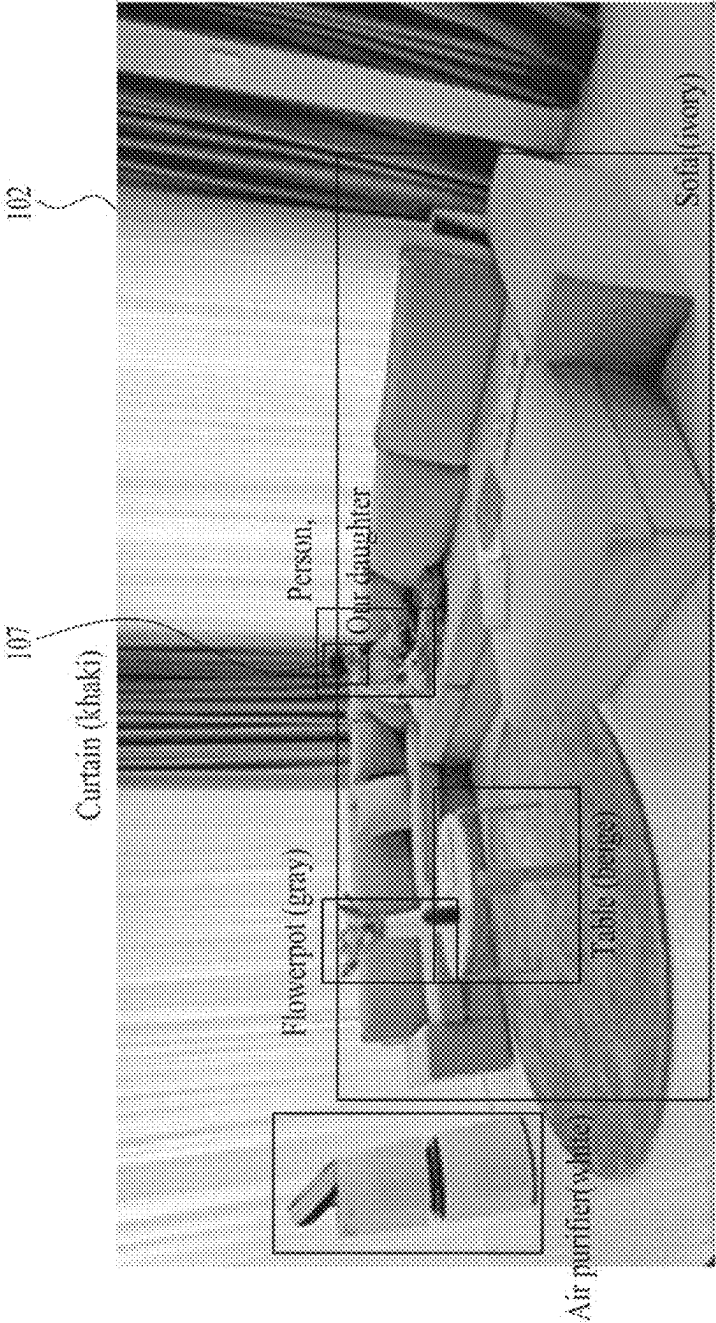


FIG. 5

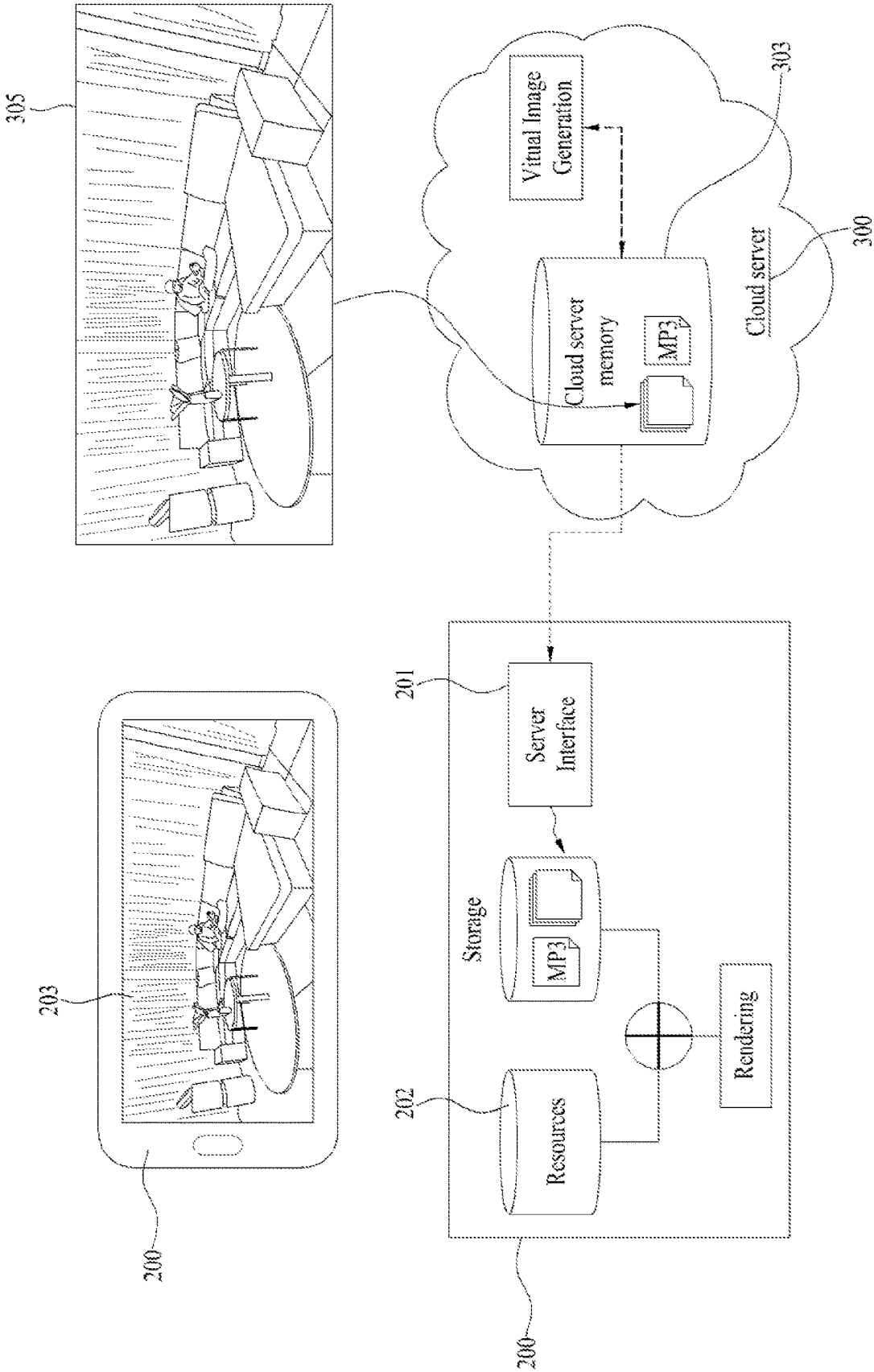


FIG. 6

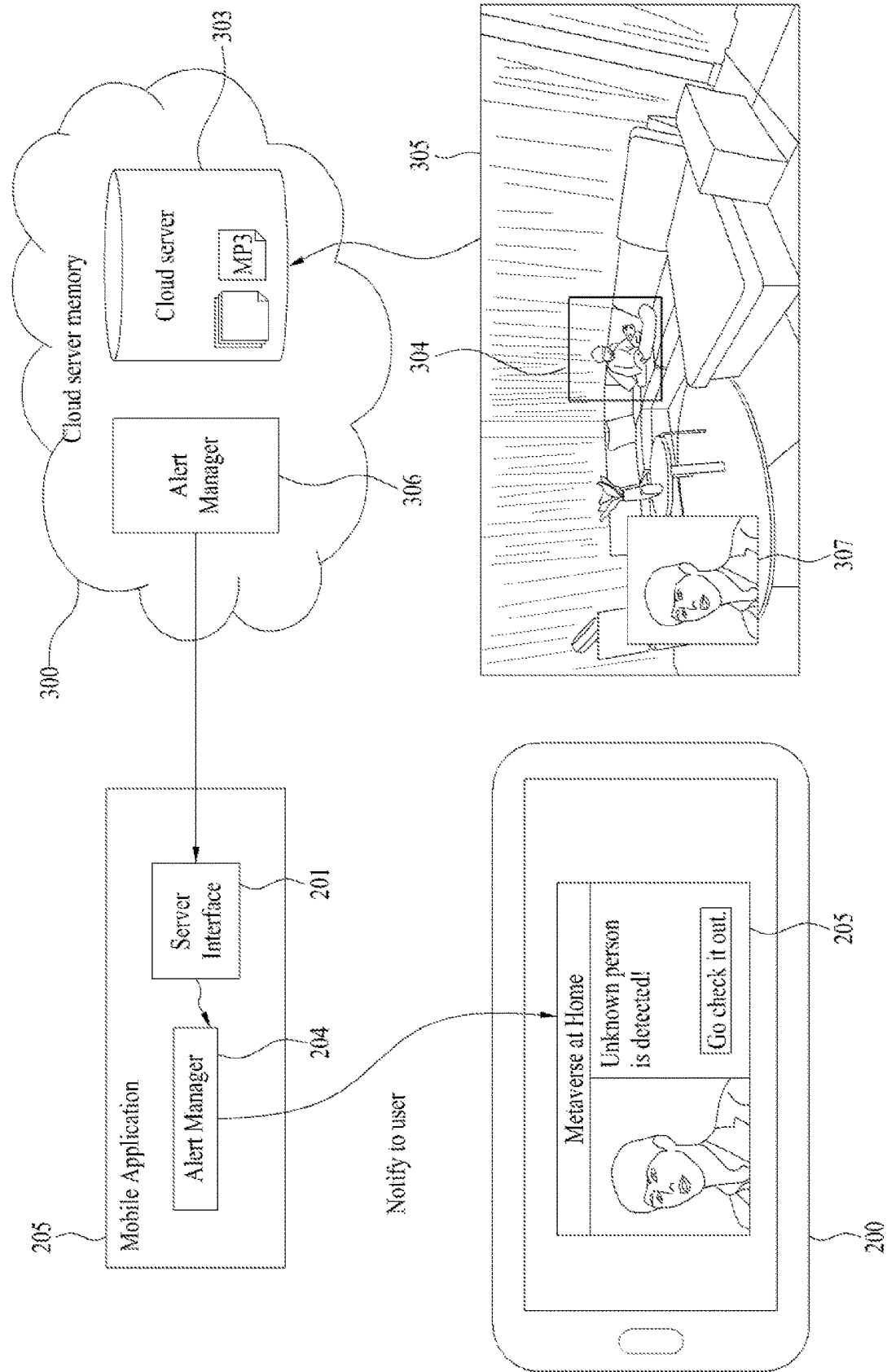


FIG. 7

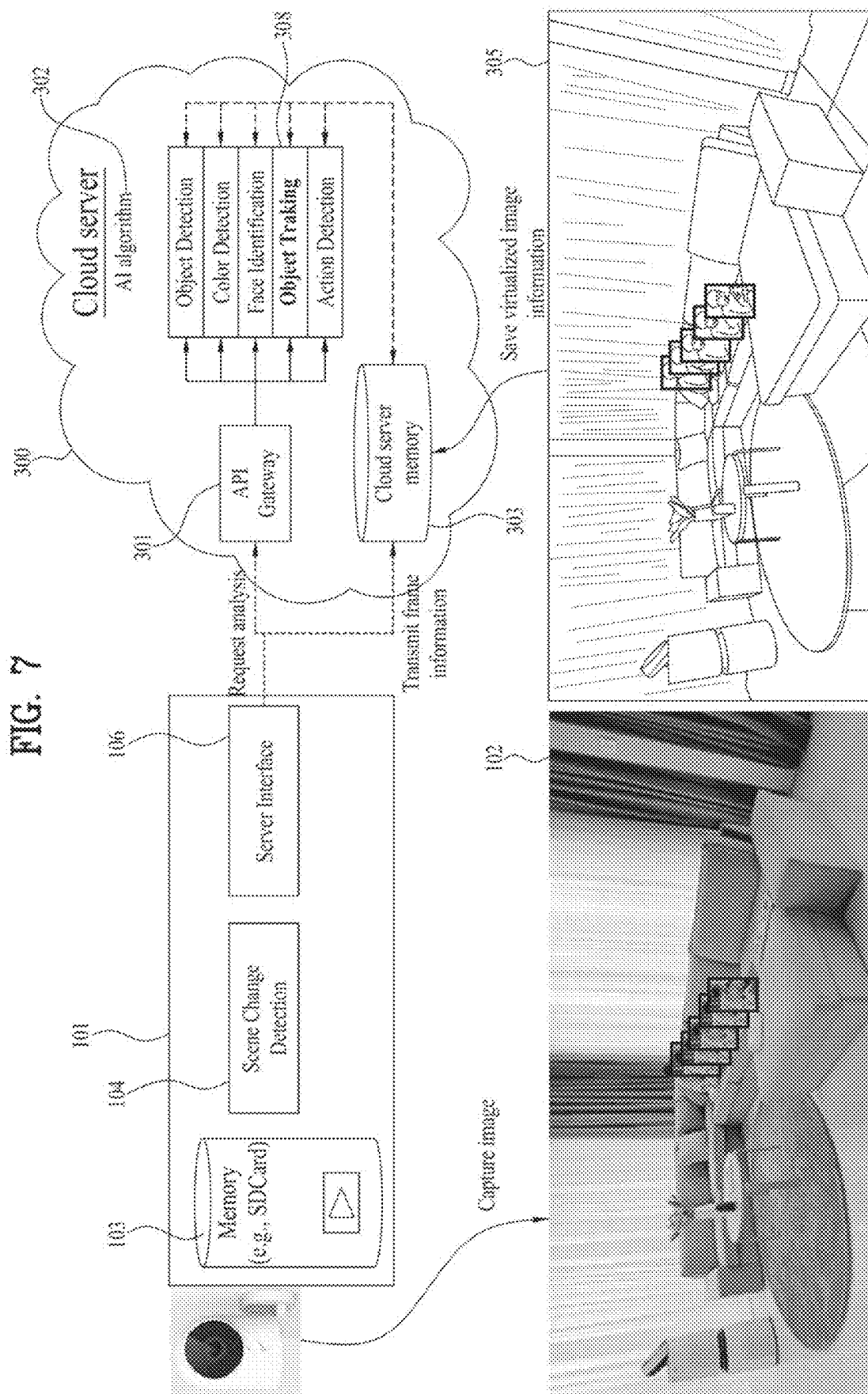


FIG. 8

Extending a virtual space for me
only in our house

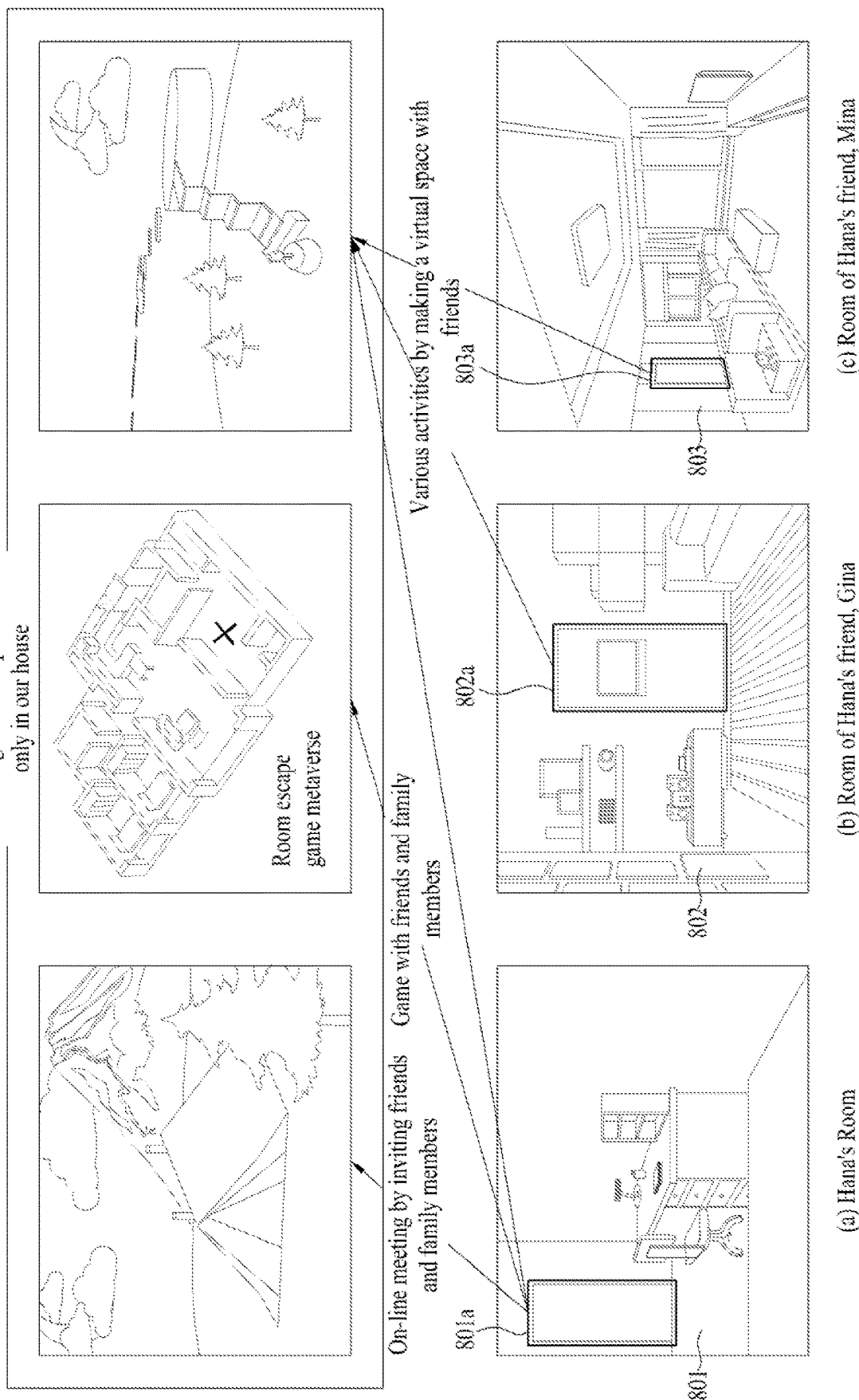


FIG. 9

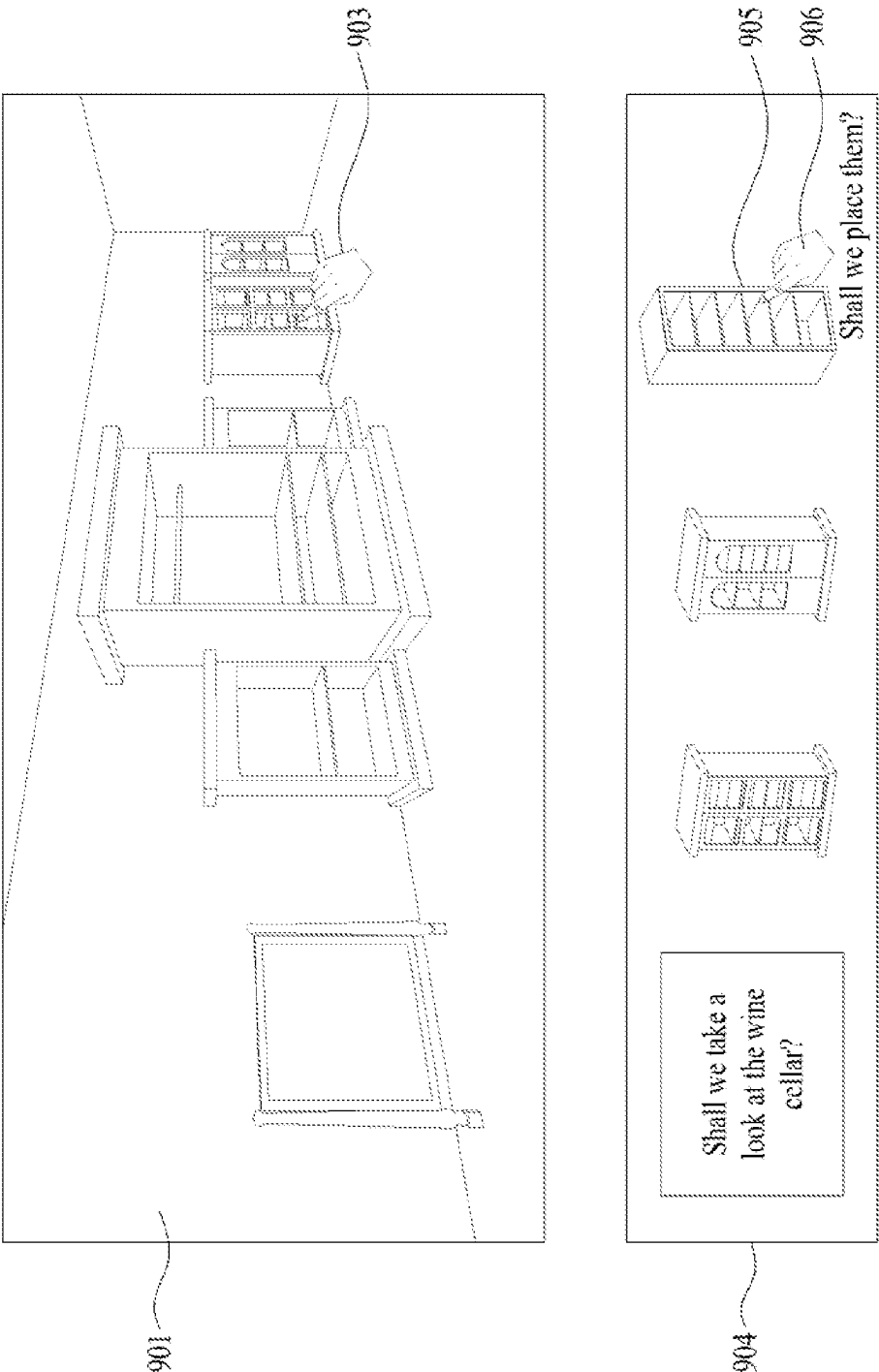
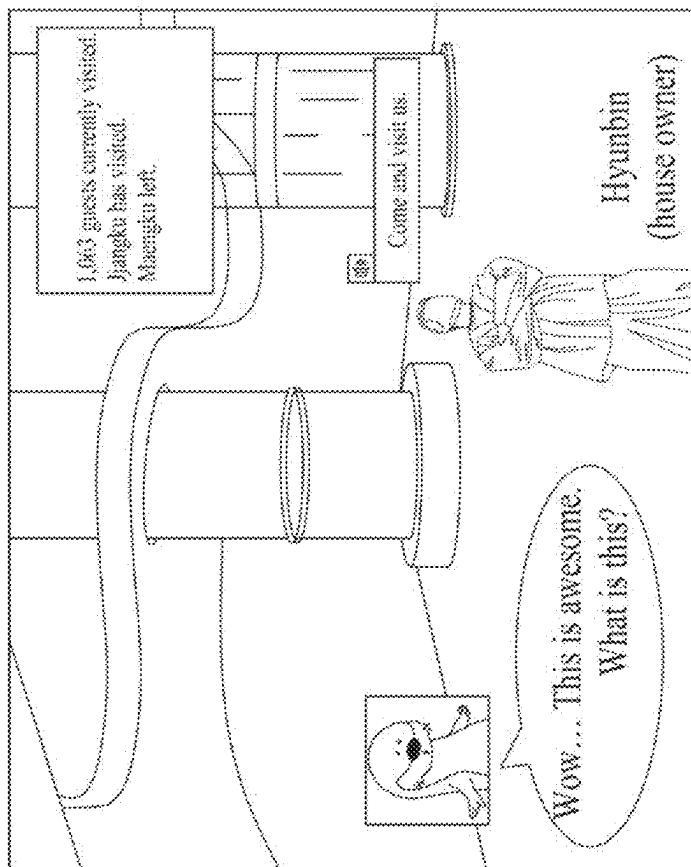
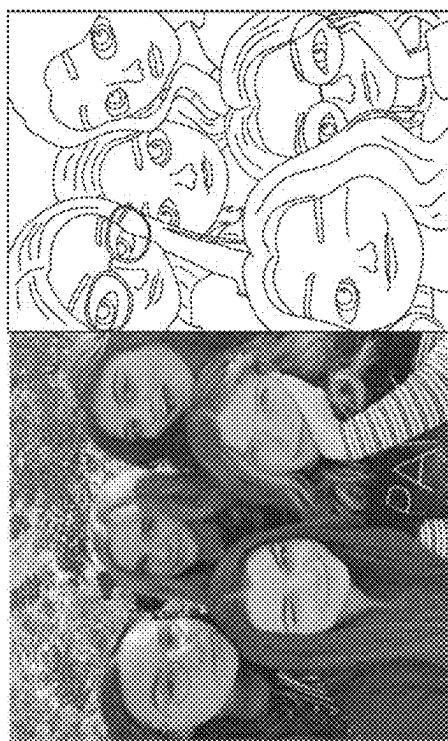


FIG. 10

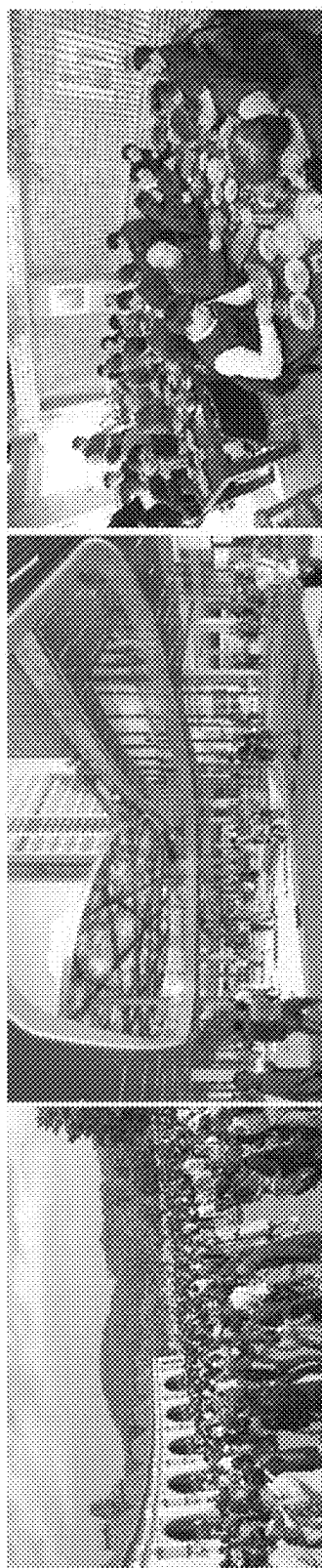


(b) Share our virtualized house and my virtualized appearance

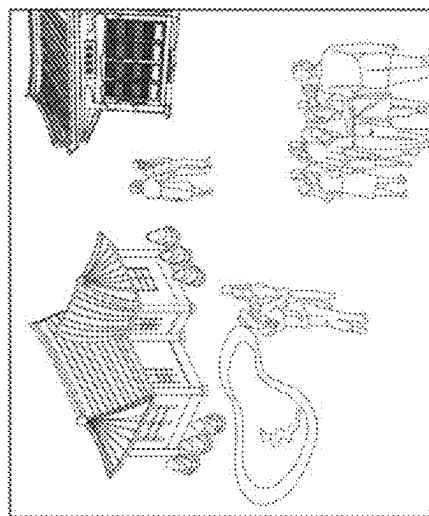
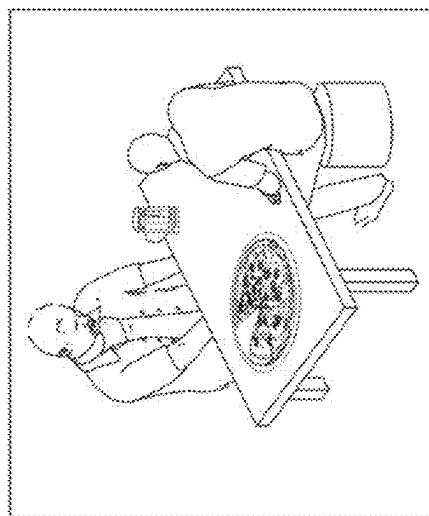


(a) Create metaverse character based on my face

FIG. 11



(a)



(b)

FIG. 12

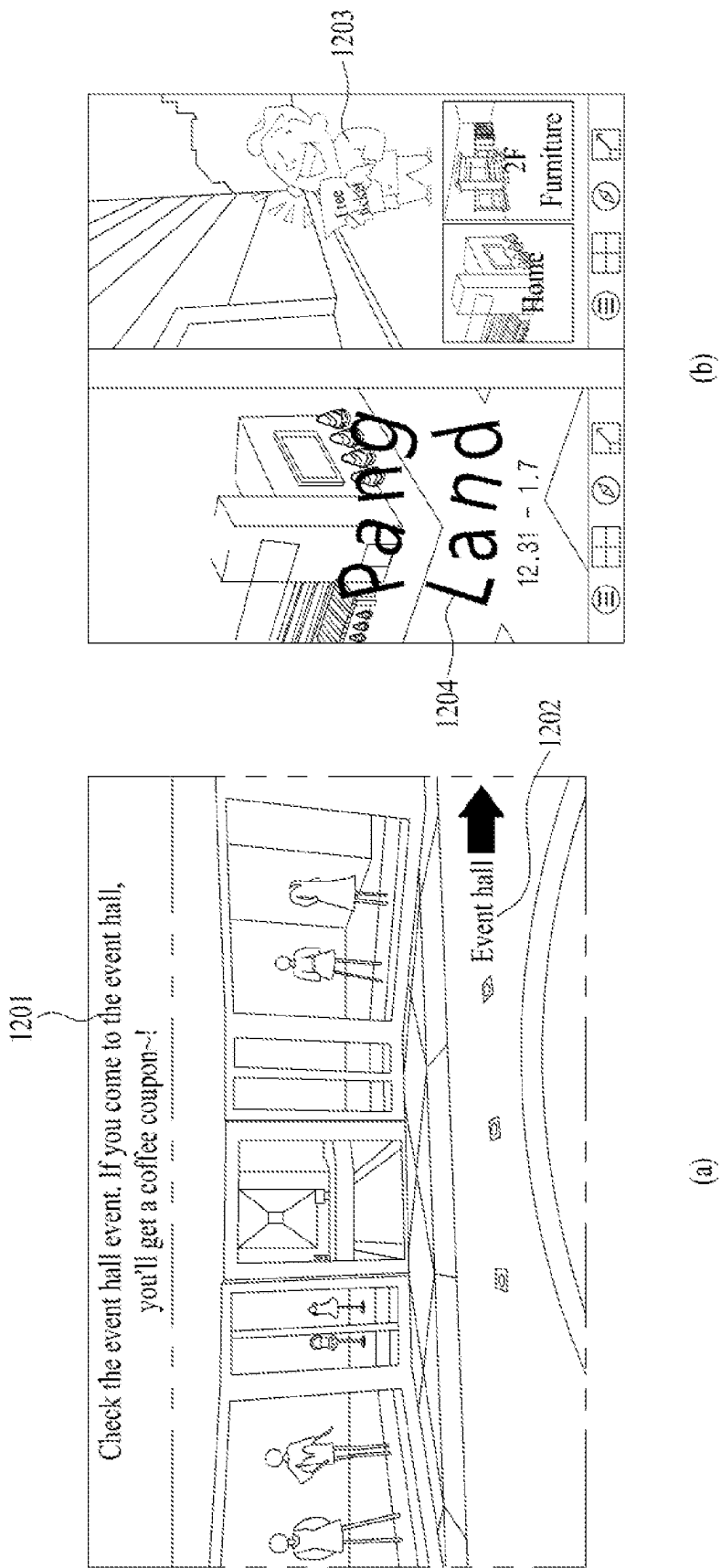
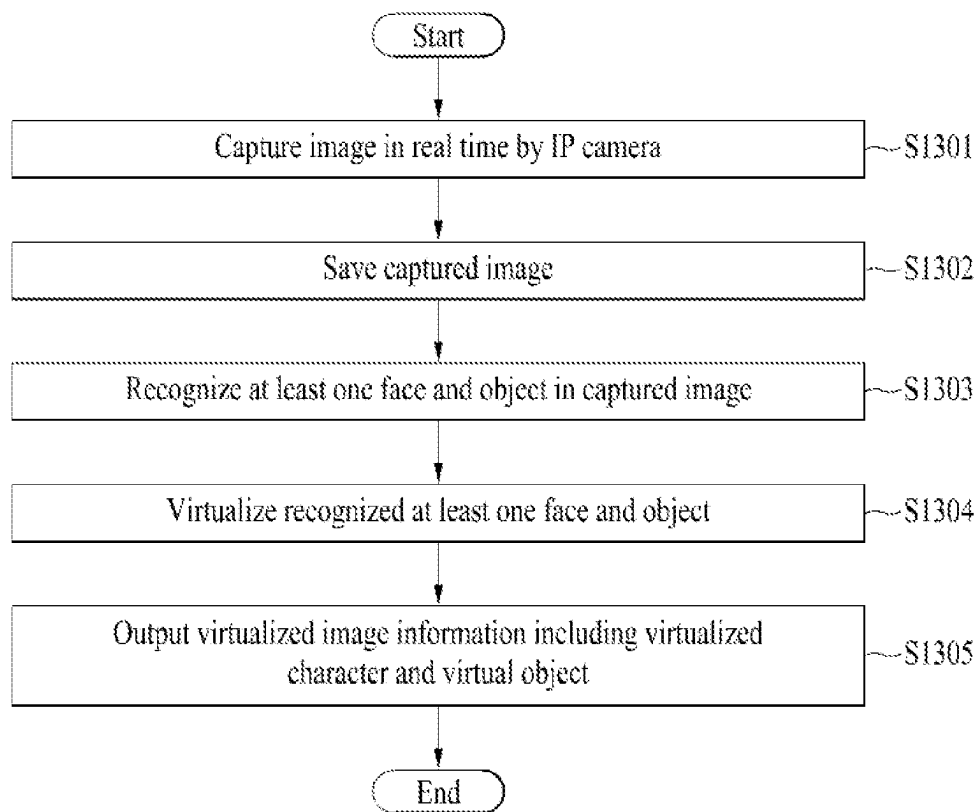


FIG. 13



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SYSTEM FOR PROVIDING A METAVERSE-BASED VIRTUALIZED IMAGE AND METHOD THEREFOR

CROSS REFERENCE TO RELATED APPLICATIONS

Pursuant to 35 U.S.C. § 119(a), this application claims the benefit of an earlier filing date and right of priority to International Application No. PCT/KR2021/019460, filed on Dec. 21, 2021, the contents of which are hereby incorporated by reference herein in its entirety.

BACKGROUND OF THE DISCLOSURE

Field of the Disclosure

The present disclosure relates to a system for providing a metaverse-based virtualized image and method therefor.

Discussion of the Related Art

Recently, virtual reality, augmented reality, and mixed reality technologies that apply computer graphics technology have been developed. At this time, virtual reality technology refers to a technology that uses a computer to build a virtual space that does not exist in the real world and makes it feel real, and augmented reality or mixed reality technology refers to a technology that expresses information generated by a computer over the real world, i.e., a technology that combines the real world and the virtual world together to enable interaction with a user in real time.

Among them, augmented reality and mixed reality technologies are used in combination with technologies in various fields (e.g., broadcasting technology, medical technology, and game technology). Typical examples of the use of augmented reality technology in the field of broadcasting technology includes a case that a weather map in front of a weather forecaster on TV changes naturally and a case that an advertisement image that does not exist in the stadium is inserted on the screen and broadcasted as if existing in the stadium actually. In particular, these augmented reality and mixed reality technologies have been implemented and provided as various application services with the advent of smartphones.

Metaverse is a representative service that provides augmented reality or mixed reality to users. Metaverse is a combination of 'meta', which means virtual, and 'universe', which means real world, and refers to a three-dimensional virtual world where social/economic/cultural activities take place like the real world. In metaverse, users create their own avatars, communicate with other users, and engage in economic activities, and thus everyday life can be implemented in the virtual world.

In addition, an Internet Protocol (IP) camera is a sort of a digital camera that is generally disposed for surveillance in general, and unlike analog Closed-Circuit Television (CCTV) cameras, corresponds to a camera that can receive data through computer networks and Internet. Most cameras that do such a job are web-cams, but the IP camera generally corresponds to only surveillance purposes, which can be accessed directly over a network connection.

However, when using an IP camera, data is transmitted and received through Internet, so there is always a problem of privacy invasion that when and how images taken by the IP camera will be released to the outside.

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In the real situation where the number of single-person households, double-income households, and elderly households is increasing, it is expected that measures to solve the problem of privacy invasion and use IP cameras will be needed.

SUMMARY OF THE DISCLOSURE

Accordingly, embodiments of the present disclosure are directed to a system for providing a metaverse-based virtualized image and method therefor that substantially obviate one or more problems due to limitations and disadvantages of the related art.

One object of the present disclosure is to provide a system for providing a metaverse-based virtualized image and method therefor.

Objects obtainable from the present disclosure are non-limited by the above-mentioned object. And, other unmentioned technical objects can be clearly understood from the following description by those having ordinary skill in the technical field to which the present disclosure pertains.

Additional advantages, objects, and features of the disclosure will be set forth in the disclosure herein as well as the accompanying drawings. Such aspects may also be appreciated by those skilled in the art based on the disclosure herein.

To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a method of providing a metaverse-based virtualized image may include capturing an image in real time via an IP camera, storing the captured image, recognizing at least one face and object from the captured image, virtualizing the recognized at least one face and object, and outputting a virtualized image information including a virtualized character and a virtual object.

The recognizing the at least one face and object from the captured image may include requesting an analysis of the image by transmitting frame and sound information of the captured image to a cloud server based on a preset period and detecting a change of the recognized face and object.

The cloud server may recognize a face and object of the captured image based on an AI algorithm, and the AI algorithm may include at least one of object detection, color detection, face identification, object tracking, action detection, or sound analysis.

The virtualizing the recognized at least one face and object may further include 3D-modeling the recognized face into a character and 3D-modeling the object into a virtual object.

The method may include generating a virtualized image information including the character and the virtual object, and locations of the character and the virtual object in the virtualized image information are equal to locations of the recognized face and object in the captured image.

The method may further include saving a first virtualized image information including a first character and a first virtual object to the cloud server and sharing by the cloud server the first virtualized image information with a terminal.

The terminal may generate and output a metaverse image based on the virtualized image information and a virtualized image in the terminal.

The method may include detecting a preset situation and providing a notification if the preset situation is detected.

Based on detecting the preset situation, an original copy of the captured image may be saved to the cloud server.

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The preset situation may include a case that at least one of an unregistered character or a virtual object is recognized from the virtualized image information, a case that a registered character is recognized from the virtualized image information, and a case that the registered character does not move over a preset time in the virtualized image information.

The method may further include receiving a second virtualized image information including a second virtual object from the cloud server, outputting the second virtualized image information, receiving a signal of selecting the second virtual object, searching for an object related to the second virtual object or an object similar to the second virtual object, and outputting the found object related to the second virtual object or the similar object.

The captured image may be stored in a memory within the IP camera.

The preset period may be determined based on at least one of the recognized face or the recognized object.

In another aspect of the present invention, as embodied and broadly described herein, a system for providing a metaverse-based virtualized image may include an IP camera capturing an image in real time, a cloud server configured to receive frame and sound information of the captured image, recognize at least one face and object from the captured image, virtualize the recognized at least one face and object, and generate a virtualized image information including the virtualized face and object, and a terminal configured to receive the virtualized image information from the cloud server and output the received virtualized image information, wherein the cloud server may recognize the at least one face and object based on an AI algorithm.

The effects of a metaverse-based virtualized image providing method and system according to the present disclosure are described below.

According to at least one of embodiments of the present disclosure, there is an advantage in that privacy invasion anxiety may be eliminated when using a home CCTV.

According to at least one of embodiments of the present disclosure, there is an advantage in that emotional and fun elements may be extended through new virtual space creation and enjoyable interaction between family members.

According to at least one of embodiments of the present disclosure, new home appliances, furniture, and interior accessories are applied to a virtual space, thereby providing convenience of interior-related shopping.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter.

However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the disclosure and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the disclosure and together with the description serve to explain the principle of the disclosure. The above and other aspects, features, and advantages of the present disclosure will become more apparent upon consideration of the following description of preferred

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embodiments, taken in conjunction with the accompanying drawing figures. In the drawings:

FIG. 1 is a diagram illustrating an embodiment of outputting an image captured by an IP camera of the related art;

FIG. 2 is a diagram illustrating an example of outputting an image captured by an IP camera according to one embodiment of the present disclosure;

FIG. 3 is a diagram illustrating operations of an IP camera and a cloud server according to one embodiment of the present disclosure;

FIG. 4 is a diagram illustrating a result from analyzing an image through an AI algorithm of a cloud server according to one embodiment of the present disclosure;

FIG. 5 is a diagram illustrating an example of virtualizing an image in a cloud server according to one embodiment of the present disclosure;

FIG. 6 is a diagram illustrating an example of detecting a preset situation and providing a notification to a terminal by a cloud server according to one embodiment of the present disclosure;

FIG. 7 is a diagram illustrating an example of performing object tracking in a cloud server according to one embodiment of the present disclosure;

FIGS. 8 to 12 are diagrams illustrating schemes of utilizing virtualized image information according to one embodiment of the present disclosure; and

FIG. 13 is a flowchart illustrating a method of providing a metaverse-based virtualized image according to one embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE DISCLOSURE

Description will now be given in detail according to exemplary embodiments disclosed herein, with reference to the accompanying drawings. For the sake of brief description with reference to the drawings, the same or equivalent components may be provided with the same reference numbers, and description thereof will not be repeated. In general, a suffix such as “module” and “unit” may be used to refer to elements or components. Use of such a suffix herein is merely intended to facilitate description of the specification, and the suffix itself is not intended to give any special meaning or function. In the present disclosure, that which is well-known to one of ordinary skill in the relevant art has generally been omitted for the sake of brevity. The accompanying drawings are used to help easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying drawings. As such, the present disclosure should be construed to extend to any alterations, equivalents and substitutes in addition to those which are particularly set out in the accompanying drawings.

It will be understood that although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are generally only used to distinguish one element from another.

It will be understood that when an element is referred to as being “connected with” another element, the element can be directly connected with the other element or intervening elements may also be present. In contrast, when an element is referred to as being “directly connected with” another element, there are no intervening elements present.

A singular representation may include a plural representation unless it represents a definitely different meaning from the context.

In the present application, terms such as “include” or “has” are used herein and should be understood that they are intended to indicate an existence of several components, functions or steps, disclosed in the specification, and it is also understood that greater or fewer components, functions, or steps may likewise be utilized.

With the increase in double-income families, needs for the use of CCTVs to monitor the conditions of children, pets, or elderly parents are steadily increasing. Regarding an IP camera mainly used for a CCTV, an image is taken with an IP camera, the taken image is stored in a cloud server, etc., and both real-time and stored images of the IP camera can be checked with applications. However, there is still a risk of use due to privacy invasion between family members and IP camera hacking issue.

In addition, by analyzing an images from an IP camera, it is difficult to alarm with good performance. If sound or motion is detected, an alarm is given, but there is also a problem that alarms are generated too frequently but an important alarm is not given.

In particular, what a user wants to know through CCTV is whether a child went to kindergarten or academy on time, whether a stranger came home, whether parents are active enough, or what a pet is doing, which is the purposes of the CCCTV, but the user doesn't have to see a real house and real family members' faces.

Accordingly, the present disclosure intends to provide a method of virtualizing and displaying a CCTV image instead of an actual image. That is, an image may be captured through an IP camera and an original image may be stored in a memory of the IP camera. More specifically, in an embodiment of the present disclosure, an indoor meta-verse environment may be constructed using face, motion, and object recognition technology, and a family member may be 3D modeled as a character. This will be described in detail with reference to the accompanying drawings.

FIG. 1 is a diagram illustrating an embodiment of outputting an image captured by an IP camera of the related art.

Referring to FIG. 1, an IP camera **101** may capture an image **102** in real time. In doing so, the image **102** captured by the IP camera **101** may be externally transmitted via a network. For example, a terminal **200** may receive the image **102** captured by the IP camera **101** and output it through a display.

In this case, when the image **102** captured by the IP camera **101** is directly transmitted to the terminal from the IP camera **101** via the network, there may be a risk that the captured image **102** may remain in the network. Namely, That is, in the case of the IP camera **101**, it is common to be installed in the home for monitoring purposes, but since an image in the home is transmitted through the network to be transmitted to the terminal **200**, there is a risk of hacking, which may lead to privacy invasion. In order to compensate for this point, an embodiment of the present disclosure proposes a method of virtualizing a face and an object recognized from the image **102** captured by the IP camera **101** and providing the same to the terminal **200**.

FIG. 2 is a diagram illustrating an example of outputting an image captured by an IP camera according to one embodiment of the present disclosure.

Referring to FIG. 2, an IP camera **101** may capture an image **102** in real time. In this case, the captured image **102** may be stored in a memory **103** of the IP camera **101**. Here, the memory **103** may include an SD card and the like.

In one embodiment of the present disclosure, the captured image **102** may be transmitted and virtualized via a cloud server. Thereafter, having received the virtualized image **201**

via the cloud server, a terminal **200** may output the virtualized image **201**. In this case, the terminal **200** may correspond to a metaverse client terminal configured to provide metaverse based information. The terminal **200** may include one of a mobile phone, a projector, a smartphone, a notebook computer (e.g., a laptop computer), a digital broadcast terminal, Personal Digital Assistants (PDA), Portable Multimedia Player (PMP), a navigation device, a slate PC, a tablet PC, an ultrabook, a wearable device (e.g., a watch-type terminal (smartwatch), a glasses-type terminal (smart glasses), a head mounted display (HMD)), etc.

Hereinafter, how the cloud server stores the captured image **102** and how the terminal **200** outputs the virtualized image **201** will be described in detail. This will be described in detail with reference to FIG. 3 and FIG. 4.

Accordingly, since an original copy of the captured image **102** is stored in the memory **103** of the IP camera **101** and the image **201** virtualized via the cloud server is outputted from the terminal **200**, privacy can be protected.

FIG. 3 is a diagram illustrating operations of an IP camera and a cloud server according to one embodiment of the present disclosure.

Referring to FIG. 3, an IP camera **101** may include a scene change detection **104**, a sound extractor **105** and a server interface **106**. In addition, a cloud server **300** may include an API gateway **301**, an AI algorithm **302** and a cloud server memory **303**. Since the components shown in FIG. 3 are not essential for implementation of the IP Camera **101** and the cloud server **300**, the IP camera **101** and the cloud server **300** described in the present specification may have components more or less than the above-listed components. In addition, all of the aforementioned components are not shown in detail in the accompanying drawings, and only some important components may be shown in the accompanying drawings. However, although not all of them are shown, it is understandable to those skilled in the art that at least the components of FIG. 3 may be included in the IP camera **101** and the cloud server **300** to implement functions.

The IP camera **101** may capture an image in real time.

The memory **103** may store the image captured in real time by the IP camera **101**. In this case, the memory **103** may be built in the IP camera **103** and may include an SD card. A user may then check the image stored in the memory **103**.

The scene change detection **104** may extract frame information of the image captured by the IP camera **101**. The scene change detection **104** may transmit the extracted frame information to the cloud server **300** via the server interface **106**. The scene change detection **104** may detect a scene change of the image captured in real time by the IP camera **101**. In doing so, the scene change detection **104** may directly detect a scene change or set up an alarm period of a scene change based on information (including period information for example) received from the cloud server **300** described later.

The sound extractor **105** may extract sound information of the image captured by the IP camera **101**. The sound extractor **105** may transmit the extracted sound information to the cloud server **300** via the server interface **106**.

The server interface **106** may transmit frame (e.g., 1 frame per 5 seconds) and sound information of the image captured by the IP camera **101** to the cloud server **300** and make a request for an analysis of the image.

The APIR gateway **301** may forward the request for the analysis of the frame information and the sound information received via the server interface **106** of the IP camera **101** to the AI algorithm **302** of the cloud server **300**.

The AI algorithm 302 may perform at least one of object detection, color detection, face identification, object tracking, action detection and sound analysis on the received frame information and the received sound information. In this case, the above-described operation performed by the AI algorithm 302 is for a currently constructed algorithm, and more accurate information expression may be possible when other algorithms such as facial expression analysis and the like are added.

The AI algorithm 302 may store the results of object detection, color detection, face identification, object tracking, action detection, and sound analysis performed on the received frame information and sound information in the cloud server memory 303.

In addition, the cloud server 300 may save the frame information and sound information received from the IP camera 101 to the cloud server memory 303.

FIG. 4 is a diagram illustrating a result from analyzing an image through an AI algorithm of a cloud server according to one embodiment of the present disclosure.

An image 102 captured via the aforementioned IP camera (not shown) may be analyzed as shown in FIG. 4.

Specifically, an AI algorithm in a cloud server may recognize at least one object in the image 102. In addition, if the recognized object is a person, the AI algorithm may recognize a face 107 of the person. In this case, if the face 107 corresponds to a registered user, the AI algorithm may identify the face 107 of the image 102. For example, the AI algorithm may identify that the face 107 of the image 102 is 'our daughter'.

In addition, the AI algorithm may specifically recognize at least one object in the image 102. For example, the AI algorithm may identify a sofa, a table, a flowerpot, an air purifier, a curtain, and the like in the image 102.

In addition, the AI algorithm may recognize the color and arrangement of the recognized at least one object. For example, the AI algorithm may recognize the recognized object as ivory for the sofa, beige for the table, gray for the flowerpot, white for the air purifier, and khaki for the curtain. In addition, the AI algorithm may recognize a location, size, ratio and the like occupied by the recognized object in space.

The recognized image information may be virtualized as shown in FIG. 5.

FIG. 5 is a diagram illustrating an example of virtualizing an image in a cloud server according to one embodiment of the present disclosure.

Referring to FIG. 5, a cloud server 300 may virtualize a captured image. Specifically, the cloud server 300 may perform virtualization to match a location and a color tone of an object based on image information analyzed like FIG. 4.

In one embodiment of the present disclosure, the cloud server 300 may 3D-model a recognized face as a character 304 and also 3D-model a recognized object as a virtual object. In this case, the character 304 may be a preconfigured metaverse character 304 or may correspond to a metaverse character 304 similar to the recognized face in case of absence of the preconfigured metaverse character 304.

In addition, the virtual object may correspond to a virtual object similar to the recognized object in size and color. The character 304 and the virtual object used herein may be extracted from the database stored in the cloud server 300.

As another embodiment, the character 304 and virtual object used herein may be extracted from another external resource usable in the cloud server 300.

In addition, when the cloud server 300 3D-models the recognized face as the character 304, it may precisely

represent the character 304 using information such as action or face expression information and the like.

The cloud server 300 may generate virtualized image information 305 including the character 304 and the virtual object. In doing so, the cloud server 300 may generate the virtualized image information 305 in a manner of disposing locations and sizes of the 3D-modeled character 304 and the 3D-modeled virtual object to match the locations and sizes of an original image (i.e., raw data). Thereafter, the cloud server 300 may save the generated virtualized image information 305 to a cloud server memory 303.

In one embodiment of the present disclosure, a terminal 200 may receive (or read) the virtualized image information 305 and sound information from the cloud server 300. In addition, the sound information may be transmitted/received and stored in a manner of being included in or separated from the virtualized image information 305.

In one embodiment of the present disclosure, the terminal 200 may receive the virtualized image information 305 and sound information from the cloud server 300 via a server interface 201 of the terminal 200.

The terminal 200 may generate a metaverse image 203 using the received virtualized image information 305 and sound information and a virtualized image 202 in the terminal 200. In this case, the virtualized image 202 may include an image brought from an external server of the terminal 200 or correspond to an image stored in a resource within the terminal 200. Namely, the terminal 200 may receive only the virtualized image information 304 and sound information from the cloud server 300 and may render the virtualized image 202 stored in the resource. Thereafter, the terminal may output a metaverse image 203 through a display.

Accordingly, as the virtualization-processed character 304 and virtual object are stored in the cloud server 300, the problem of privacy invasion can be solved despite using the IP camera 101.

FIG. 6 is a diagram illustrating an example of detecting a preset situation and providing a notification to a terminal by a cloud server according to one embodiment of the present disclosure;

Referring to FIG. 6, a cloud server 300 may detect a preset situation based on virtualized image information 305 stored in a cloud server memory 303.

In one embodiment of the present disclosure, the cloud server 300 may provide a notification to a terminal 200 via an alert manager 306 in case of detecting a preset situation. Here, the preset situation may include a case that at least one of an unregistered character 307 or a virtual object is recognized from a virtualized image information 305, a case that a registered character 304 is recognized from the virtualized image information 305, or a case that the registered character 304 does not move over a preset time in the virtualized image information 305. For one example, the cloud server 300 may detect the case that the unregistered character 307 is recognized from the virtualized image information 305. For another example, the cloud server 300 may detect the case that the registered character 304 does not move over a preset time in the virtualized image information 305. For further example, the preset situation may include an abnormal sound information (e.g., child crying sound), a fall (activity detection), etc.

In case of detecting the preset situation, the cloud server 300 may save an original copy of a captured image to a cloud server memory 303. In addition, in case of detecting the preset situation, the cloud server 300 may save the virtual-

ized image information **305** and an original image (i.e., raw data) of the unregistered character **306** to the cloud server memory **303**.

The terminal **200** may receive a notification from the cloud server **300** via a server interface **201**. The terminal **200** may output the notification to a user via an alert manager **204** of the terminal **200**. For example, the terminal **200** may output an original image (i.e., raw data) of the unregistered character **307** to a popup window **205** via a display. In doing so, the server interface **201**, the alert manager **204**, the popup window **205** and the like may operate in a metaverse related application **206** installed on the terminal **200**.

In addition, the cloud server **300** may determine a preset situation in various ways if more AI algorithms are present in the cloud server **300**. Namely, since the cloud server **300** determines a preset situation using an AI algorithm based on the captured image **102** and the virtualized image information **305**, the cloud server **300** may determine a preset situation in more various ways if more AI algorithms are provided.

Through the above-described embodiment, a user normally checks the virtualized image information **305** via the terminal **200** only. If a preset situation occurs, the user may check an original image (raw data) of the unregistered character **307** via the terminal **200**.

Through this, the user can usually be safe from the risk of privacy invasion or hacking, and can check the original image (raw data) in an emergency situation.

FIG. 7 is a diagram illustrating an example of performing object tracking in a cloud server according to one embodiment of the present disclosure;

An IP camera **101** may make a request for an analysis of frame information of a captured image **102** via an API gateway **301** of a cloud server **300**. In addition, the IP camera **101** may transmit the frame information of the captured image **102** to a cloud server memory **303**.

The cloud server **300** may perform an object tracking **308** that is one of AI algorithms **302**. Namely, the cloud server **300** may perform tracking on an object recognized from a virtualized image information **305** generated from virtualizing the captured image **102**.

In one embodiment of the present disclosure, a preset period may be determined based on at least one of a recognized face and an object.

Specifically, if there is a moving object such as a person or an animal in the captured image **102**, the IP camera **101** may set up a short analysis request period (e.g., 1 frame per second). If there is no moving object, the IP camera **101** may set up a long analysis request period (e.g., 1 frame per minute). Namely, the IP camera **101** may perform recognition of a simple object. If there are many motions of an object, the IP camera **101** may transmit frame information to the cloud server **300** more frequently and make a request for an image analysis.

The cloud server **300** may save the virtualized image information **305** on a moving object to the cloud server memory **303**. Thereafter, the cloud server **303** may transmit the virtualized image information **305** to a terminal (not shown). Accordingly, the terminal may receive the virtualized image information **305** on which the object tracking has been performed. The terminal may output the virtualized image information **305** in which a character moves naturally.

FIGS. 8 to 12 are diagrams illustrating schemes of utilizing virtualized image information according to one embodiment of the present disclosure.

Through the above-described method, the image **102** captured via the IP camera **101** may be virtualized via the

cloud server **300**. The virtualized image information **305** is shared externally and may be outputted through the terminal **200**. The virtualized image information **305** does not show an actual face or household objects as they are, and uses characters and virtual objects, so there is no concern about invasion of privacy even if they are disclosed externally. Accordingly, various embodiments in which the virtualized image information **305** may be used will be described with reference to FIGS. 8 to 12.

Referring to FIG. 8, in case of using a metaverse-based virtualized image providing system and method, a virtual door to another virtual space is included in the virtualized image information **305**, whereby connection to another virtual space is available.

Specifically, FIG. 8(a) shows a first virtualized image information **801**, FIG. 8(b) shows a second virtualized image information **802**, and FIG. 8(c) shows a third virtualized image information **803**. FIGS. 8(a) to 8(c) show embodiments of outputting virtualized image informations from first to third terminals, respectively. Here, the first to third terminals may correspond to terminals registered as friends with each other via the cloud server **300** or a metaverse related application. Alternatively, the first to third terminals may correspond to terminals having authentication keys capable of visiting virtualized image informations **801** to **803** to each other, respectively.

In this case, the first virtualized image information **801** may include a virtual door **801a** connecting to a virtual space. Here, the virtual space may include a virtual space in which on-line meeting is available by inviting friends or family members, a game space capable of enjoying a game with friends or family members, and a virtual space capable of enjoying activities with friends or family members.

Accordingly, users may have meetings and games through virtual spaces without meeting each other actually. In addition, the users may use a virtual object virtualized based on an object actually captured via the IP camera **101**. In addition, the virtual door **801a/802a/803a** included in the virtualized image information **801/802/803** may correspond to an object connectible to another virtual space despite being a virtual object that does not exist actually. Users may have or enjoy a meeting, a game and the like in a new virtual space by being connected to the cloud server **300** via the virtual doors **801a**, **802a** and **803a**.

Referring to FIG. 9, the terminal **200** may output a virtualized image information **901**. In this case, the virtualized image information **901** may correspond to a virtualized image information **901** on an image captured by a user of the terminal **200** or another user's virtualized image information **901** received via the cloud server **300**.

In doing so, a signal **903** of selecting a virtual object **902** included in the virtualized image information **901** may be received. The terminal **200** may search for an actual object corresponding to the virtual object **902** or an actual object similar to the virtual object **902** via the cloud server **300**. Thereafter, the terminal **200** may output a search result **904**. Here, the search result **904** may include information on the actual object corresponding to the virtual object **902** or the actual object similar to the virtual object **902**.

The terminal **200** may receive a signal **906** of selecting a first object **905** from the search result **904**. Hence, the terminal **200** may place the first object **905** in the virtualized image information **901**.

In addition, although FIG. 9 illustrates the embodiment of placing the first object **905** in the virtualized image information **901**, an embodiment of purchasing the first object **905** according to the search result **904** may be taken into

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consideration as well. Likewise, as the terminal **200** receives the signal **906** of selecting the first object **905** from the search result **904**, it may output a site at which the first object **905** can be purchased.

FIG. **10(a)** illustrates an embodiment of creating a metaverse character based on an actual face, and FIG. **10(b)** illustrates an embodiment of sharing a virtualized space and character.

As shown in FIG. **10(a)**, a metaverse character **1002** may be created based on an actually captured image **1001**. A method of creating the metaverse character **1002** is as described above.

As shown in FIG. **10(b)**, a virtualized character and a virtual object may be shared with other persons. Namely, as described above, users may share the virtualized image information **305** including the virtual character and the virtual object via the cloud server **300**. Through this, each user may place the virtual object in a virtualized space of its own, include sound information therein, and visit a virtualized space of another user. In addition, the cloud server **300** may provide the virtualized space with user information on a user visiting the virtualized space and output the user information through the terminal **200**.

Namely, in case of using the metaverse-based virtualized image providing system and method, a platform of making a new influencer can be provided.

Through this, many influencers can share their own homes, which can create new advertising effects. For example, various types of advertising effects may occur, including virtualized home appliances, furniture, interior accessories, character clothes, and accessories. A method of purchasing such a virtual object is as described above with reference to FIG. **9**.

When the metaverse-based virtualized image providing method according to one embodiment of the present disclosure is used, it is applicable not only to an indoor environment but also to an outdoor environment.

FIG. **11(a)** is a diagram illustrating a general amusement park entrance line, a department store entrance line, and an interior of a restaurant, and FIG. **11(b)** is a diagram illustrating them as the virtualization image information **305**.

Namely, a user is unable to know an internal situation until the user actually goes to an amusement park, a department store, a restaurant, etc. Only after arriving, the user is able to know how many people are in the amusement park, the department store, or the restaurant. On the other hand, when the metaverse-based virtualized image providing method according to one embodiment of the present disclosure is used, the user may be informed of the situation in advance through the virtualized image information **305**. More specifically, the IP cameras **101** are also recently used in amusement parks, department stores, and restaurants. In this case, the cloud server **300** may change the image **102** captured by the IP camera **101** installed in a public facility such as an amusement park, a department store, a restaurant, or the like into the virtualized image information **305**. Since the faces of real people included in the captured image **102** have portrait rights, the amusement park, department store, restaurant, etc. cannot directly use the image **102**. On the other hand, when the captured image **102** is changed into the virtualized image information **305** via the cloud server **300**, the public facility may share the virtualized image information **305** externally.

Accordingly, if the IP camera **101** is installed in a desired place, a user may immediately determine the situation in the desired place through the virtualized image information **305**

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corresponding to the image **102** captured by the IP camera **101** without infringing on other people's portrait rights.

In addition, using the metaverse-based virtualized image providing method according to one embodiment of the present disclosure, it is able to provide a platform capable of providing event information and promotion or to link with various AR/VR games. In FIG. **12**, a case of providing department store virtualized image information based on a department store in which an IP camera **101** is installed will be described as an example. Yet, this is only an example, and of course, it can be applied to every place where the IP camera **101** is installed.

FIG. **12(a)** is a diagram of providing event information in department store virtualized image information, and FIG. **12(b)** is a diagram of providing promotion information in department store virtualized image information. A user may output department store virtualized image information through the terminal **200**.

As shown in FIG. **12(a)**, a department store virtualization image information may include an event information **1201**. In addition, the department store virtualized image information may include a place indicator **1202** for guiding the event information **1201**.

As shown in FIG. **12(b)**, a department store virtualized image information may include a promotion information **1203**. When receiving a signal (not shown) of selecting the promotion information **1203**, the terminal **200** may make a request for a subsequent operation to the cloud server **300**. The terminal **200** may output a location information of the promotion information **1203** or a specific schedule information **1204** of the promotion information **1203** based on the instruction of the cloud server **300**.

FIG. **13** is a flowchart illustrating a method of providing a metaverse-based virtualized image according to one embodiment of the present disclosure.

Referring to FIG. **13**, in a step **S1301**, an image may be captured in real time via an IP camera.

In a step **S1302**, the captured image may be saved. In this case, the captured image may be saved to a memory in the IP camera.

In a step **S1303**, at least one face and object may be recognized from the captured image. In this case, after at least one object has been detected, if the detected object is a person or animal, a face may be detected.

In addition, in the step **S1303**, the IP camera may make a request for an analysis of an image by transmitting frame and sound information of the captured image to a cloud server based on a preset period. In this case, the preset period may be determined based on at least one of the recognized face and the recognized object.

The cloud server may detect a change of the recognized face and object in the captured image. In doing so, the cloud server may recognize a face and object of the captured image using an AI algorithm. Here, the AI algorithm may include at least one of object detection, color detection, face identification, object tracking, action detection and sound analysis.

In a step **S1304**, the recognized at least one face and object may be virtualized. In the step **S1304**, the recognized face can be 3D-modeled into a character. In addition, the recognized object may be 3D-modeled into a virtual object.

In the step **S1304**, a virtualized image information including the character and the virtual object may be generated. In this case, locations of the character and virtual object in the virtualized image information may be equal to those of the recognized face and object in the captured image. The cloud server may save the generated virtualized image information

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to a cloud server memory. Thereafter, the cloud server may share the saved virtualized image information with the terminal.

In a step S1305, the virtualized image information including the virtualized character and the virtual object may be outputted. Specifically, the terminal may generate and output a metaverse image using the virtualized image information received from the cloud server and the virtualized image in the terminal.

In addition, it is a matter of course that the embodiments through FIGS. 2 to 12 may be implemented by the method as shown in FIG. 13.

The present disclosure mentioned in the foregoing description can be implemented in a program recorded medium as computer-readable codes. The computer-readable media may include all kinds of recording devices in which data readable by a computer system are stored. The computer-readable media may include HDD (Hard Disk Drive), SSD (Solid State Disk), SDD (Silicon Disk Drive), ROM, RAM, CD-ROM, magnetic tapes, floppy discs, optical data storage devices, and the like for example and also include carrier-wave type implementations (e.g., transmission via Internet). Further, the computer may include the controller 180 of the image editing device. The foregoing embodiments are merely exemplary and are not to be considered as limiting the present disclosure. The present teachings can be readily applied to other types of methods and apparatuses. Thus, it is intended that the present disclosure covers the modifications and variations of this invention that come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A method of providing a metaverse-based virtualized image, the method comprising:

capturing an image in real time via an internet protocol (IP) camera;

storing the captured image;

recognizing a face and an object from the captured image;

generating a virtual character and a virtual object corresponding to a virtualization of the recognized face and the object, respectively, based on the captured image; and

outputting a virtualized image information including the virtualized character and the virtual object,

wherein recognizing the face and the object from the captured image comprises:

requesting an analysis of the captured image by transmitting frame and sound information of the captured image to a cloud server at a preset interval period; and

detecting a change of the recognized face and object, wherein a length of the preset interval period is set to be shorter in a case in which motion of at least one of the recognized face or the recognized object is detected compared to a longer length in a case in which no motion is detected.

2. The method of claim 1, wherein the face and the object of the captured image are recognized by the cloud server based on an artificial intelligence (AI) algorithm, and wherein the AI algorithm includes at least one of object detection, color detection, face identification, object tracking, action detection, or sound analysis.

3. The method of claim 2, wherein the virtual character and virtual object are generated by 3D-modeling the recognized face and 3D-modeling the recognized object.

4. The method of claim 3, wherein locations of the virtual character and the virtual object in the virtualized image

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information respectively correspond to locations of the recognized face and recognized object in the captured image.

5. The method of claim 4, further comprising saving the virtualized image information to the cloud server, wherein the virtualized image information is shared with a terminal by the cloud server.

6. The method of claim 5, wherein a metaverse image is generated and output by the terminal based on the virtualized image information and a virtualized image stored in the terminal.

7. The method of claim 6, further comprising:

detecting a preset situation; and

providing a notification based on detection of the preset situation.

8. The method of claim 7, wherein based on detection of the preset situation, an original copy of the captured image is saved to the cloud server.

9. The method of claim 8, wherein the preset situation includes:

wherein at least one of an unregistered character or a virtual object is recognized from the virtualized image information,

wherein a registered character is recognized from the virtualized image information, or

wherein the registered character does not move during a preset time based on the virtualized image information.

10. The method of claim 9, further comprising:

receiving a second virtualized image information including a second virtual object from the cloud server;

outputting the second virtualized image information;

receiving a signal of selecting the second virtual object;

searching for an object related or similar to the second virtual object; and

outputting the object resulting from the search.

11. The method of claim 1, wherein the captured image is stored in a memory of the IP camera.

12. A system for providing a metaverse-based virtualized image, the system comprising:

an IP camera configured to capture an image;

a cloud server configured to: receive frame and sound information of the captured image, recognize a face and an object from the captured image based on an AI algorithm, generate a virtual character and a virtual object corresponding to a virtualization of the recognized face and the object, respectively, based on the captured image; and

a terminal configured to receive virtualized image information from the cloud server and output the received virtualized image information,

wherein the terminal is further configured to:

request an analysis of the captured image by transmitting frame and sound information of the captured image to a cloud server at a preset interval period; and

detect a change of the recognized face and object,

wherein a length of the preset interval period is set to be shorter in a case in which motion of at least one of the recognized face or the recognized object is detected compared to a longer length in a case in which no motion is detected.

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