

AR SCENE CONTENT GENERATION METHOD AND PRESENTATION METHOD, APPARATUSES, AND STORAGE MEDIUM

[0001] This disclosure claims priority to Chinese patent application No. 202010456842.3, filed with CNIPA on May 26, 2020 and entitled " AR Scene Content Generation Method, Presentation Method and Presentation System, and Apparatuses", and Chinese patent application No. 202010456843.8, filed with CNIPA on May 26, 2020 and entitled "AR Scene Content Generation Method and Presentation Method, Apparatuses, and Storage Medium", contents of both of which are hereby incorporated by reference in their entireties.

TECHNICAL FIELD

[0002] The disclosure relates to the technical field of Augmented Reality (AR), and particularly to an AR scene content generation method and presentation method, apparatuses, and a storage medium.

BACKGROUND

[0003] AR, as a technology of combining virtual objects and the real world skillfully, simulates a virtual object such as a text, image, three-dimensional model, music, and video generated by a computer for application to a real world, thereby presenting an AR scene.

[0004] Before the AR scene is presented, an AR content to be presented in the AR scene may be determined in advance, for example, including a virtual object and presentation information of the virtual object. However, if an internal environment of a present reality scene changes, the pre-produced virtual object is no more matched with the present reality scene. In such case, when the virtual object is overlaid to the reality scene, a presentation effect of the AR scene is relatively poor.

SUMMARY

[0005] Embodiments of the disclosure at least provide an AR scene content generation solution.

[0006] According to a first aspect, the embodiments of the disclosure provide an AR scene content generation method, which may include the following operations.

[0007] In response to a first triggering operation, an initial AR data packet associated with a target reality scene indicated by the first triggering operation is acquired.

[0008] Updating data of at least one virtual object associated with the initial AR data packet is acquired, the updating data including first position and pose data corresponding to the at least one virtual object.

[0009] The initial AR data packet is updated based on the updating data of the at least one virtual object to generate an updated AR data packet.

[0010] In the embodiments of the disclosure, when the first triggering operation is detected, the initial AR data packet associated with the target reality scene may be acquired, the updating data of the at least one virtual object associated with the initial AR data packet

may further be acquired, for example, including the first position and pose data corresponding to the at least one virtual object, and then the initial AR data packet is updated based on the updating data to obtain a virtual object matched better with the target reality scene. A realistic AR scene effect is improved.

[0011] According to a second aspect, the embodiments of the disclosure provide an AR scene content presentation method, which may include the following operations.

[0012] In response to a second triggering operation, an AR data packet associated with a target reality scene indicated by the second triggering operation is acquired, the AR data packet including first position and pose data corresponding to at least one virtual object.

[0013] Presentation special effect information of the at least one virtual object is determined based on second position and pose data of an AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet.

[0014] The at least one virtual object is presented through the AR device based on the presentation special effect information.

[0015] In the embodiments of the disclosure, the AR data packet associated with the second triggering operation may be acquired in response to the second triggering operation, and the presentation special effect information of the virtual object in the target reality scene may further be determined based on the second position and pose data corresponding to the AR device and the preset first position and pose data of the virtual object in the target reality scene in the AR data packet to eventually present a realistic AR scene effect in the AR device.

[0016] According to a third aspect, the embodiments of the disclosure provide an AR scene content generation apparatus, which may include a first acquisition module, a second acquisition module, and an updating module.

[0017] The first acquisition module may be configured to, in response to a first triggering operation, acquire an initial AR data packet associated with a target reality scene indicated by the first triggering operation.

[0018] The second acquisition module may be configured to acquire updating data of at least one virtual object associated with the initial AR data packet, the updating data including first position and pose data corresponding to the at least one virtual object.

[0019] The updating module may be configured to update the initial AR data packet based on the updating data of the at least one virtual object to generate an updated AR data packet.

[0020] According to a fourth aspect, the embodiments of the disclosure provide an AR scene content presentation apparatus, which may include an acquisition module, a determination module, and a presentation module.

[0021] The acquisition module may be configured to, in response to a second triggering operation, acquire an AR data packet associated with a target reality scene indicated by the second triggering operation, the AR data packet including first position and pose data corresponding to at least one virtual object.

[0022] The determination module may be configured to determine presentation special effect information of the at least one virtual object based on second position and pose data of an AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet.

[0023] The presentation module may be configured to present the at least one virtual object through the AR device based on the presentation special effect information.

[0024] According to a fifth aspect, the embodiments of the disclosure provide an electronic device, which may include a processor, a memory, and a bus. The memory may

store a machine-readable instruction executable for the processor. When the electronic device runs, the processor may communicate with the memory through the bus. The machine-readable instruction may be executed by the processor to execute the steps of the generation method as described in the first aspect or execute the steps of the presentation method as described in the second aspect.

[0025] According to a sixth aspect, the embodiments of the disclosure provide a computer-readable storage medium, in which a computer program may be stored. The computer program may be operated by a processor to execute the steps of the generation method as described in the first aspect or execute the steps of the presentation method as described in the second aspect.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] For describing the technical solutions of the embodiments of the disclosure more clearly, the drawings required to be used in the embodiments will be simply introduced below. The drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments consistent with the disclosure and, together with the specification, serve to explain the technical solutions of the disclosure. It is to be understood that the following drawings only illustrate some embodiments of the disclosure and thus should not be considered as limits to the scope. Those of ordinary skill in the art may also obtain other related drawings according to these drawings without creative work.

[0027] FIG. 1 is a flowchart of a first AR scene content generation method according to an embodiment of the disclosure.

[0028] FIG. 2a is a schematic diagram of an AR data packet downloading interface according to an embodiment of the disclosure.

[0029] FIG. 2b is a schematic diagram of an AR data packet downloading and uploading interface according to an embodiment of the disclosure.

[0030] FIG. 3 is a schematic diagram of a positioning prompting page according to an embodiment of the disclosure.

[0031] FIG. 4 is a schematic diagram of a position and pose data presentation page for a virtual object according to an embodiment of the disclosure.

[0032] FIG. 5 is a schematic diagram of a position and pose data editing interface for a virtual object according to an embodiment of the disclosure.

[0033] FIG. 6 is a schematic diagram of an interactive data generation interface according to an embodiment of the disclosure.

[0034] FIG. 7 is a schematic diagram of an AR data packet saving page according to an embodiment of the disclosure.

[0035] FIG. 8 is an interface flowchart of uploading an updated AR data packet according to an embodiment of the disclosure.

[0036] FIG. 9 is a flowchart of an AR scene content presentation method according to an embodiment of the disclosure.

[0037] FIG. 10 is a schematic diagram of positioning prompting at an AR device during AR scene content presentation according to an embodiment of the disclosure.

[0038] FIG. 11 is a schematic diagram of an AR scene according to an embodiment of the disclosure.

[0039] FIG. 12 is a flowchart of a second AR scene content generation method according to an embodiment of the disclosure.

[0040] FIG. 13 is a structure diagram of an AR scene content presentation system

according to an embodiment of the disclosure.

[0041] FIG. 14 is a flowchart of a third AR scene content generation method according to an embodiment of the disclosure.

[0042] FIG. 15 is a structure diagram of a first AR scene content generation apparatus according to an embodiment of the disclosure.

[0043] FIG. 16 is a structure diagram of a first AR scene content presentation apparatus according to an embodiment of the disclosure.

[0044] FIG. 17 is a structure diagram of an electronic device according to an embodiment of the disclosure.

DETAILED DESCRIPTION

[0045] In order to make the objectives, technical solutions, and advantages of the embodiments of the disclosure clearer, the technical solutions in the embodiments of the disclosure will be clearly and completely described below in combination with the drawings in the embodiments of the disclosure. It is apparent that the described embodiments are not all but only part of embodiments of the disclosure. Components, described and shown in the drawings, of the embodiments of the disclosure may usually be arranged and designed with various configurations. Therefore, the following detailed descriptions about the embodiments of the disclosure provided in the drawings are not intended to limit the claimed scope of the disclosure but only represent selected embodiments of the disclosure. All other embodiments obtained by those skilled in the art based on the embodiments of the disclosure without creative work shall fall within the scope of protection of the disclosure.

[0046] It is to be noted that similar reference signs and letters represent similar terms in the following drawings and thus a certain term, once being defined in a drawing, is not required to be further defined and explained in subsequent drawings.

[0047] In the disclosure, term "and/or" only describes an association relationship and represents that three relationships may exist. For example, A and/or B may represent three conditions: i.e., independent existence of A, existence of both A and B, and independent existence of B. In addition, term "at least one" in the disclosure represents any one of multiple or any combination of at least two of multiple. For example, including at least one of A, B and C may represent including any one or more elements selected from a set formed by A, B and C.

[0048] An AR technology may be applied to an AR device. The AR device may be any electronic device capable of supporting an AR function, including, but not limited to, AR glasses, a tablet computer, a smart phone, etc. When the AR device is operated in a reality scene, a virtual object overlaid to the reality scene may be viewed through the AR device. For example, when a user passes some buildings or scenic spots, a virtual graphic introduction overlaid to the vicinity of the building or the scenic spot may be viewed through the AR device. Here, the virtual graphic introduction may be called a virtual object, and the building or the scenic spot may be a real scene. In this scene, the virtual graphic introduction viewed through AR glasses may change with an orientation angle of the AR glasses. Here, the virtual graphic introduction is correlated with a positional relationship of the AR glasses. However, in some other scenes, a more real AR scene combining the virtuality and the reality is expected to be viewed. For example, a virtual flowerpot placed on a real desk is expected to be viewed, and a virtual tree overlaid to a real playground of a school is expected to be viewed. In this manner, how to fuse the virtual flowerpot and the virtual tree with the reality scene better to achieve a presentation effect of the virtual objects in the AR scene is required

to be considered. How to achieve the presentation effect is a content to be discussed in the embodiments of the disclosure, and will be elaborated below in combination with the following specific embodiments.

[0049] To easily understand the embodiments, an AR scene content generation method disclosed in the embodiments of the disclosure is introduced in detail at first. An execution body of the AR scene content generation method provided in the embodiments of the disclosure may be the abovementioned AR device, for example, including a device with a display function and a data processing capability like AR glasses, a tablet computer, a smart phone, and an intelligent wearable device. No limits are made in the embodiments of the disclosure. In some possible implementation modes, the AR scene content generation method may be implemented by a processor by calling a computer-readable instruction stored in a memory.

[0050] Referring to FIG. 1, a flowchart of an AR scene content generation method according to an embodiment of the disclosure is shown. The generation method includes following S101 to S103.

[0051] In S101, in response to a first triggering operation, an initial AR data packet associated with a target reality scene indicated by the first triggering operation is acquired.

[0052] Exemplarily, the first triggering operation may be a triggering operation over an editing option corresponding to any initial AR data packet associated with the target reality scene. The triggering operation may be, for example, an option of selecting the editing option, or triggering directly through a voice, a gesture, or other manners. No limits are made thereto in the disclosure.

[0053] As shown in FIG. 2a, a schematic diagram of AR data packets associated with "XXX Building-15th floor" and another reality scene respectively is shown. If it is detected that an editing option for any AR data packet corresponding to "XXX Building-15th floor" is triggered, for example, an editing option for an initial AR data packet corresponding to "[example] science fiction" is triggered, a server may further be requested for acquiring the initial AR data packet corresponding to "[example] science fiction" associated with the target reality scene "XXX Building-15th floor".

[0054] The number of the initial AR data packet associated with the target reality scene may be at least one, and different initial AR data packets may correspond to different types of AR scenes. Exemplarily, each initial AR data packet may include label information, and the label information configured to represent a type of the initial AR data packet, for example, including one or more of a "science fiction type", a "cartoon type", and a "history type", each type being configured to represent a style of a virtual object to be presented in the AR scene. Each initial AR data packet may include a preset virtual object, or may not include the virtual object.

[0055] Exemplarily, the target reality scene may be an indoor scene of a building or a street scene, or may be any target reality scene that a virtual object may be overlaid to.

[0056] In S102, updating data of at least one virtual object associated with the initial AR data packet is acquired, the updating data including first position and pose data corresponding to the at least one virtual object.

[0057] The at least one virtual object associated with the initial AR data packet may include a virtual object locally included in the initial AR data packet, or may include a virtual object downloaded through a network, or may include a virtual object acquired from a pre-created material library. The material library may be set locally, or may be set at a cloud. No limits are made thereto in the disclosure.

[0058] Exemplarily, the virtual object may be a static virtual model such as the

abovementioned virtual flowerpot and virtual tree, or may be some dynamic virtual objects such as a virtual video and a virtual animation. The first position and pose data of the virtual object includes, but not limited to, data capable of representing a position and/or pose of the virtual object when presented, for example, including a position coordinate, deflection angle, and dimension information of the virtual object under a coordinate system corresponding to the target reality scene.

[0059] In S103, the initial AR data packet is updated based on the updating data of the at least one virtual object to generate an updated AR data packet.

[0060] In some embodiments, a related content of the virtual object in the initial AR data packet may be updated based on the acquired updating data to obtain the updated AR data packet. An updating manner may be directly adding the updating data to the initial AR data packet, or replacing part of original data in the initial AR data packet, to obtain the updated AR data packet. The updated AR data packet includes the abovementioned virtual object associated with the initial AR data packet and the updating data of the at least one virtual object.

[0061] The obtained updated AR data packet may be configured to present the virtual object blended to the target reality scene according to the updated AR data packet when the AR device photographs the target reality scene.

[0062] In the embodiment of the disclosure, when the first triggering operation is detected, the initial AR data packet associated with the target reality scene may be acquired, the updating data of the at least one virtual object associated with the initial AR data packet may further be acquired, for example, including the first position and pose data corresponding to the at least one virtual object, and then the initial AR data packet is updated based on the updating data to obtain a virtual object matched better with the target reality scene. A realistic AR scene effect is improved.

[0063] S101 to S103 will be specifically described below in combination with specific embodiments.

[0064] In an implementation mode, the generation method provided in the embodiment of the disclosure may be applied to an AR generator. The generation method further includes the following operation.

[0065] A three-dimensional scene model of the target reality scene indicated by the first triggering operation is acquired.

[0066] Exemplarily, the AR generator may be a device such as a computer, a notebook, and a pad. In these devices, an application configured to generate and edit an AR scene content may be installed in these devices, or a WEB page configured to generate and edit the AR scene content may be accessed. A user may remotely edit the AR scene content in the application or the WEB page. For example, the target reality scene may be simulated through the three-dimensional scene model representing the target reality scene, and the AR scene content may be generated directly by configuring related data of the virtual object to be presented in the three-dimensional scene model without configuring in the target reality scene.

[0067] In some embodiments, editing options corresponding to multiple reality scenes may be presented in a display interface of the AR generator. After it is detected that any editing option is triggered, the reality scene corresponding to the triggered editing option may be determined as the target reality scene. When the editing option for the target reality scene is triggered, the three-dimensional scene model of the target reality scene may further be acquired for subsequently adding the virtual object to be presented to the three-dimensional scene model of the target reality scene. Alternatively, a map may be presented in the display interface of the AR generator. Multiple Points Of Interest (POIs) are set in the map. Each POI

may correspond to a reality scene. When the POI corresponding to any reality scene is clicked by a user, the AR generator may still detect that the editing option for the target reality scene is triggered and further acquire the three-dimensional scene model representing the target reality scene and the initial AR data packet associated with the target reality scene for subsequently adding the virtual object to be presented to the three-dimensional scene model of the target reality scene.

[0068] Exemplarily, the three-dimensional scene model representing the target reality scene and the target reality scene are presented according to the same scale under the same coordinate system. For example, if the target reality scene includes a street and buildings on two sides of the street, it indicates that the three-dimensional scene model of the target reality scene also includes a model of the street and the buildings on the two sides of the street, and the three-dimensional scene model and the target reality scene may be presented according to a scale of 1:1 in the same coordinate system, or may be presented according to the same scale.

[0069] As shown in FIG. 2b, an AR scene content editing interface is presented. When it is detected that option "update the test package list" in the editing interface is triggered, multiple reality scenes may be acquired, for example, including "XXX building-15th floor". When it is detected that "download the scene" in the editing interface is triggered, it may be considered that the first triggering operation on the target reality scene is detected, and the three-dimensional scene model representing the target reality scene and the initial AR data packet associated with the target reality scene may further be acquired, for example, two initial AR test packages with label information "Christmas" and "New Year's Day".

[0070] It can be seen that a type label of the initial AR test package (initial AR data packet) "Christmas" associated with the target reality scene further includes labels "science fiction" and "natural". It indicates that the created virtual object may be a virtual object belonging to the science fiction type and a virtual object belonging to a natural type. Of course, during post editing, the type of the AR data packet may be modified based on the type of the uploaded virtual object.

[0071] Furthermore, for S102, when the updating data of the at least one virtual object associated with the initial AR data packet is acquired, the following operations are included.

[0072] In S1021, the loaded three-dimensional scene model is presented.

[0073] In S1022, updating data of the at least one virtual object in the three-dimensional scene model is acquired, the updating data including first position and pose data of the at least one virtual object in the three-dimensional scene model.

[0074] Exemplarily, the first position and pose data of the virtual object in the three-dimensional scene model includes a position coordinate, deflection angle, and dimension information of the virtual object in a coordinate system of the three-dimensional scene model. The deflection angle may be represented by an included angle between a specified positive direction of the virtual object and a coordinate axis of the coordinate system of the three-dimensional scene model.

[0075] Exemplarily, the three-dimensional scene model and the target reality scene may be presented according to a scale of 1:1 in the same coordinate system and presented according to the same scale in different coordinate systems, the first position and pose data of the virtual object in the three-dimensional scene model is acquired, and the presentation special effect information of the virtual object in the target reality scene may be represented during later presentation in the AR device.

[0076] An editing operation input by the user in the editing interface presented by the AR generator may be detected to obtain a content edited by the editing operation, and the content edited by the editing operation is determined as the updating data. For example, a

schematic diagram of the three-dimensional scene model and a position and pose data editing field about the virtual object may be presented in the editing interface, the user may edit the first position and pose data of the virtual object in the three-dimensional scene model in the position and pose editing field about the virtual object, and after editing, the AR generator may acquire the first position and pose data of the virtual object in the three-dimensional scene model.

[0077] Furthermore, the first position and pose data of the virtual object when presented in the target reality scene may be determined based on the first position and pose data of the virtual object in the three-dimensional scene model, so that the virtual object may be fused better with the target reality scene when presented in the target reality scene according to the first position and pose data, and the realistic AR scene effect may be presented in the AR device.

[0078] In the embodiment of the disclosure, the three-dimensional scene model and initial AR data packet associated with the target reality scene may be provided for the user to enable the user to directly edit and update the at least one virtual object associated with the initial AR data packet through the three-dimensional scene model according to his/her own need to obtain the updated AR data packet. When an AR tester tests AR in the target reality scene, the updated AR data packet may be directly called for AR testing. Through the manner of remotely editing the AR data packet in the disclosure, an AR data packet generation manner may be simplified, and readily available AR materials are provided for subsequent presentation of the AR scene.

[0079] In addition, the three-dimensional scene model configured to edit the first position and pose data of the virtual object may be provided to enable the user to directly edit the first position and pose data of the virtual object in the three-dimensional scene model, so that the first position and pose data of the virtual object may be personalized based on the need of the user.

[0080] In another implementation mode, the generation method provided in the embodiment of the disclosure may implement generation in an AR scene testing process, for example, applied to the AR device for AR scene presentation. The method further includes the following operation.

[0081] The at least one virtual object associated with the initial AR data packet is presented based on second position and pose data of an AR device that presently photographs the target reality scene and the initial AR data packet.

[0082] Exemplarily, an application configured to present and edit the AR scene content may be installed in the AR device. The user may open the application in the AR device to edit the AR scene content in the AR scene. After the application is opened, an editing option corresponding to at least one reality scene may be presented in a display interface of the AR device. Each reality scene is associated with multiple initial AR data packets, and each initial AR data packet corresponds to an editing option. These initial AR data packets may be edited online.

[0083] In some embodiments, initial AR data packets corresponding to multiple reality scenes respectively may be presented in the display interface of the AR device. After it is detected that an editing option for any initial AR data packet is triggered, the initial AR data packet corresponding to the triggered editing option may be determined as the AR data packet associated with the target reality scene.

[0084] Before the virtual object is presented, the second position and pose data of the AR device that presently photographs the target reality scene may be acquired. Then, the virtual object that should be presented in the AR device is determined based on the second

position and pose data of the AR device that presently photographs the target reality scene. It can be seen that the embodiment of the disclosure provides a solution to AR scene content editing in the AR scene testing process.

[0085] Exemplarily, the second position and pose data of the AR device that presently photographs the target reality scene may include a position and/or display angle of a display unit configured to display the virtual object. For conveniently explaining the second position and pose data corresponding to the AR device, the concept of coordinate system is introduced here. Taking a world coordinate system where the target reality scene is located as an example, exemplarily, the second position and pose data corresponding to the AR device may include, but not limited to, at least one of a coordinate position of the display unit of the AR device in the world coordinate system, an included angle between the display unit of the AR device and each coordinate axis in the world coordinate system, or the coordinate position of the display unit of the AR device in the world coordinate system and the included angle with each coordinate axis in the world coordinate system.

[0086] The display unit of the AR device specifically refers to a unit configured to display the virtual object in the AR device. Exemplarily, when the AR device is a mobile phone or a pad, the corresponding display unit may be a display screen. When the AR device is AR glasses, the corresponding display unit may be a lens configured to display the virtual object.

[0087] The second position and pose data corresponding to the AR device may be acquired in multiple manners. For example, when the AR device is provided with a position and pose sensor, the second position and pose data of the AR device may be determined through the position and pose sensor on the AR device. When the AR device is provided with an image collection unit such as a camera, the second position and pose data may be determined through a target reality scene image collected by the camera.

[0088] Exemplarily, the position and pose sensor may include an angular velocity sensor configured to determine a shooting angle of the AR device, such as a gyroscope and an Inertial Measurement Unit (IMU), may include a positioning part configured to determine a shooting position of the AR device, such as a positioning part based on a Global Positioning System (GPS), a Global Navigation Satellite System (GNSS), and a Wireless Fidelity (WiFi) positioning technology, and may also include both the angular velocity sensor configured to determine the shooting angle of the AR device and the positioning part configured to determine the shooting position.

[0089] Specifically, when the second position and pose data corresponding to the AR device is determined through the target reality scene image shot by the AR device, the second position and pose data corresponding to the AR device may be determined through the target reality scene image and a prestored first neural network for positioning.

[0090] Exemplarily, the first neural network may be obtained by training based on multiple sample images obtained by pre-photographing the target reality scene and corresponding second position and pose data during shooting of each sample image.

[0091] When the second position and pose data corresponding to the AR device is determined through the target reality scene image shot by the AR device, as shown in FIG. 3, information configured to give a prompt that the user has entered an editing state and positioning is started is presented in the AR device. For example, information configured to prompt the user to photograph the target reality scene image for positioning is presented.

[0092] When the second position and pose data of the AR device that presently photographs the target reality scene is acquired, the at least one virtual object may be presented based on the second position and pose data corresponding to the AR device and the

initial first position and pose data of the at least one virtual object associated with the initial AR data packet in the target reality scene. A position and pose data presentation interface for the at least one virtual object may also be presented at the same time when the virtual object is presented. As shown in FIG. 4, a schematic diagram of presenting a virtual object Tang tricolored pottery horse and a position and pose presentation interface for the virtual object in a presentation region are shown. Initial first position and pose data of the virtual object Tang tricolored pottery horse in the target reality scene is presented on the position and pose data presentation interface, mainly including coordinate information of the Tang tricolored pottery horse in the target reality scene.

[0093] Exemplarily, the position and pose data presentation interface shown on left in FIG. 4 includes "my map coordinate" capable of representing coordinate information of the display unit of the AR device in the coordinate system where the target reality scene is located. A model list includes coordinate information of multiple virtual objects in the target reality scene, for example, including coordinate information of virtual objects "Tang tricolored pottery horse" and "stone lion" in the target reality scene respectively. Furthermore, another virtual object and coordinate information of the other virtual object in the target reality scene may be added.

[0094] Furthermore, for S102, when the updating data of the at least one virtual object associated with the initial AR data packet is acquired, the following operation is included.

[0095] The updating data of the at least one virtual object that is presented is acquired, the updating data including the first position and pose data of the at least one virtual object in the target reality scene.

[0096] An editing operation input by the user in a position and pose data editing interface presented by the AR device may be detected to obtain a content edited by the editing operation, and the content edited by the editing operation is determined as the updating data. For example, a position and pose data editing field about the virtual object may be presented in the position and pose data editing interface in the AR device. As shown in FIG. 5, the user may edit the first position and pose data of the virtual object in the target reality scene in the position and pose editing field about the virtual object. Exemplarily, editing for the position and pose data of the virtual object is completed in the world coordinate system where the target reality scene is located. Therefore, after editing, the AR device may acquire the first position and pose data of the virtual object in the target reality scene.

[0097] Exemplarily, the coordinate information of the presently presented virtual object "Tang tricolored pottery horse" in the target reality scene and interactive data of the virtual object in the target reality scene are presented on the left in FIG. 5. The interactive data will be explained later. An interface for editing the first position and pose data of the presently presented virtual object in the target reality scene is presented on the right in FIG. 5. In the interface, the coordinate information of the virtual object in the coordinate system where the target reality scene is located may be edited, a dimension scale of the virtual object may be edited, and included angles between the virtual object and three coordinate axes in the coordinate system respectively may be edited.

[0098] In the embodiment of the disclosure, after the second position and pose data corresponding to the AR device is acquired, the at least one virtual object associated with the initial AR data packet may be presented based on the second position and pose data corresponding to the AR device to enable the user to directly edit and regulate the first position and pose data of the virtual object in the target reality scene as needed in the AR device, so that an AR scene content generation process may be simplified. Since the AR data packet may be directly regulated in the AR scene testing process through the process, the

accuracy of the regulated AR data packet may be higher.

[0099] In an implementation mode, for the abovementioned operation that the updating data of the at least one virtual object that is presented is acquired, the following operation is included.

[00100] A position and pose data editing interface is presented, and the first position and pose data, received through the position and pose data editing interface, of the at least one virtual object is acquired.

[00101] The first position and pose data includes at least one of a position coordinate, deflection angle, or dimension information in a coordinate system where the target reality scene is located.

[00102] Exemplarily, an editing operation over the position coordinate, deflection angle, and dimension information of the at least one virtual object that is presented in the target reality scene may be acquired through the position and pose data editing interface presented in the AR device, thereby obtaining the first position and pose data of the at least one virtual object in the target reality scene.

[00103] Exemplarily, referring to FIG. 5, a position and pose data editing interface for the virtual object "Tang tricolored pottery horse" is shown. Specifically, the position and pose data editing interface may include editing for a position coordinate of the "Tang tricolored pottery horse" in the target reality scene, may include editing for dimension information of the "Tang tricolored pottery horse" in the target reality scene, and may include editing for a deflection angle of the "Tang tricolored pottery horse" along the coordinate axis in the world coordinate system where the target reality scene is located.

[00104] In the embodiment of the disclosure, the presentation position and pose data editing interface configured to edit the first position and pose data of the virtual object may be provided in the AR scene to enable the user to directly regulate the first position and pose data of the virtual object in the target reality scene, so that the first position and pose data of the virtual object may be personalized based on the need of the user.

[00105] In another implementation mode, besides the first position and pose data of the at least one virtual object in the target reality scene, the abovementioned updating data may further include interactive data of the at least one virtual object in the target reality scene or interactive data of the at least one virtual object in the three-dimensional scene model representing the target reality scene. The updating data provided in the embodiment of the disclosure further includes interactive data corresponding to the at least one virtual object. For S102, when the updating data of the at least one virtual object associated with the initial AR data packet is acquired, the following operation is included.

[00106] An interactive data editing interface is presented, and the interactive data, received through the interactive data editing interface, of each virtual object is acquired.

[00107] The interactive data includes at least one of at least one state triggering condition, a presentation state corresponding to each state triggering condition, or a cyclic presentation count of the virtual object that is triggered to be presented.

[00108] Exemplarily, an editing operation on the interactive data of the at least one virtual object may be acquired through the interactive data editing interface presented by the AR device or the interactive data editing interface presented by the AR generator. Then, the interactive data may be edited on the spot in the target reality scene, or the interactive data may be remotely edited in the three-dimensional scene model representing the target reality scene, to obtain at least one of the at least one state triggering condition for the at least one virtual object, the presentation state corresponding to each state triggering condition, or the cyclic presentation count of the virtual object that is triggered to be presented.

[00109] Exemplarily, based on the acquired interactive data for any virtual object, the virtual object may subsequently be triggered based on a state triggering condition of the virtual object to be presented according to a presentation state corresponding to the state triggering condition and/or presented according to a cyclic presentation count after presentation is triggered by the state triggering condition.

[00110] As shown in FIG. 6, after a creation triggering condition button shown by (a) in FIG. 6 is triggered, the interactive data editing interface shown by (b) in FIG. 6, specifically an interface for editing interactive data of a virtual animation, is presented. The interactive data editing interface may include editing regions corresponding to a state triggering condition for the at least one virtual object, a presentation state corresponding to the state triggering condition, and a cyclic presentation count of the virtual object that is triggered to be presented.

[00111] Exemplarily, an editing operation over the state triggering condition for the virtual object may be acquired through the editing region corresponding to the state triggering condition, thereby obtaining the state triggering condition corresponding to the virtual object. Subsequently, the AR device may trigger the virtual object to be presented in the target reality scene after acquiring the state triggering condition.

[00112] Exemplarily, whether to display the virtual object that is triggered may be edited through the editing region for the presentation state. As shown by (b) in FIG. 6, when a button corresponding to "model display" is in a selected state, it indicates that the present virtual animation is displayed after triggered by triggering condition 1 corresponding to the present virtual animation. If the button corresponding to "model display" is in an unselected state, it indicates that the present virtual animation is not displayed after triggered by triggering condition 1 corresponding to the present virtual animation.

[00113] Exemplarily, an editing operation over the cyclic presentation count of the virtual object that is presented may be acquired through the editing region corresponding to the cyclic presentation count. For example, if the acquired presentation count is n , it may indicate that the present virtual animation is cyclically presented for n times after triggered by triggering condition 1.

[00114] Particularly, in a case where the interactive data includes multiple state triggering conditions, the interactive data further includes a priority of each state triggering condition.

[00115] Exemplarily, in a case where the interactive data is edited in the interactive data editing interface presented by the AR device, presentation may be implemented in the interface shown in FIG. 5. For example, the coordinate information of the presently presented virtual object "Tang tricolored pottery horse" in the coordinate system where the target reality scene is located and interactive data (not shown in FIG. 5) corresponding to the virtual object "Tang tricolored pottery horse", including a triggering condition, a display state, whether to cyclically present, a priority, etc., may be presented on the left in FIG. 5.

[00116] Exemplarily, that the interactive data includes multiple state triggering conditions specifically refers to a condition that the initial AR data packet is associated with multiple virtual objects and each virtual object corresponds to a state triggering condition. A priority may be set for the state triggering condition corresponding to each virtual object. When the AR device subsequently acquires the multiple state triggering conditions at the same time, the virtual object corresponding to the state triggering condition with the highest triggering priority is presented according to a presentation state corresponding to the state triggering condition corresponding to the virtual object and/or a cyclic presentation count of the virtual object that is triggered to be presented.

[00117] The state triggering condition mentioned here may include, but not limited to, at least one of:

[00118] a model clicking triggering condition, a model sliding triggering condition, a distance identification triggering condition, a specified region triggering condition, a gesture identification triggering condition, a triggering condition of orienting to a present model, or a triggering condition of orienting to a specified model.

[00119] Meanings of these state triggering conditions will be described below for virtual object A.

[00120] (1) The model clicking triggering condition refers to a state triggering condition of clicking a three-dimensional model of virtual object A presented in the AR device to trigger virtual object A to be presented in the AR device. Exemplarily, the AR device may present the three-dimensional model of the virtual object to be presented, and after detecting a clicking operation on the three-dimensional model, present the virtual object corresponding to the three-dimensional model.

[00121] (2) The model sliding triggering condition refers to a state triggering condition of sliding the three-dimensional model of virtual object A in the AR device in a set manner to trigger virtual object A. Exemplarily, it may be set that a slide-to-the-right operation is performed on the three-dimensional model of virtual object A to trigger virtual object A to be presented in the AR device and a slide-to-the-left operation is performed on the three-dimensional model of virtual object A to trigger virtual object A to disappear in the AR device.

[00122] (3) The distance triggering condition refers to a state triggering condition of triggering virtual object A in a case where a distance between a position coordinate of the AR device and a set position meets a set distance.

[00123] (4) The specified region triggering condition refers to a state triggering condition of triggering virtual object A after the AR device enters a specified region.

[00124] (5) The gesture identification triggering condition refers to a state triggering condition of triggering virtual object A through a set gesture.

[00125] (6) The triggering condition of orienting to the present model refers to a state triggering condition of triggering virtual object A when the shooting angle of the AR device points to a position of virtual object A.

[00126] (7) The triggering condition of orienting to the specified model refers to a state triggering condition of triggering virtual object A when the AR device is oriented to a position of a specific virtual object.

[00127] When the AR data packet includes multiple virtual objects, and each virtual object corresponds to a state triggering condition, a triggering logic chain may be formed for these state triggering conditions. For example, the AR data packet includes three virtual objects, and if state triggering conditions corresponding to virtual object 1, virtual object 2, and virtual object 3 respectively are recorded as state triggering condition 1, state triggering condition 2, and state triggering condition 3, after state triggering condition 1, state triggering condition 2, and state triggering condition 3 form a triggering logic chain, for example, a sequence of the formed triggering logic chain is state triggering condition 1, state triggering condition 2, and state triggering condition 3, virtual object 1, virtual object 2, and virtual object 3 may be sequentially presented when the user sequentially triggers state triggering condition 1, state triggering condition 2, and state triggering condition 3.

[00128] In the embodiment of the disclosure, the interactive data editing interface for editing the interactive data of the virtual object may be provided to support editing of a triggering manner and presentation form of the virtual object.

[00129] In an implementation mode, the generation method provided in the embodiment of the disclosure further includes the following operation.

[00130] Third position and pose data corresponding to at least one virtual object model associated with the initial AR data packet is acquired, the at least one virtual object model representing a target object in the target reality scene.

[00131] The operation that the initial AR data packet is updated based on the updating data of the at least one virtual object to generate the updated AR data packet includes the following operation.

[00132] The initial AR data packet is updated based on the updating data of the at least one virtual object and the third position and pose data corresponding to the virtual object model to generate the updated AR data packet.

[00133] Exemplarily, the third position and pose data corresponding to the virtual object model may include, but not limited to, data capable of representing a position and/or pose of the virtual object model when presented in the target reality scene, or may include, but not limited to data capable of representing a position and/or pose of the virtual object model in the three-dimensional scene model, for example, including a position coordinate, deflection angle, and dimension information of the virtual object model in the coordinate system where the target reality scene or the three-dimensional scene model is located.

[00134] Specifically, the third position and pose data of the virtual object model in the target reality scene or the three-dimensional scene model may represent third position and pose data of the real target object corresponding to the virtual object model in the target reality scene. In addition, a presentation form of the virtual object model that is presented in the AR device may be edited. For example, the presentation form of the virtual object model in the AR device is edited to an occlusion form, and transparency processing is performed during presentation in the AR device. The virtual object model may be configured to occlude a virtual object required to be occluded. For example, when the virtual object is presented, a partial region, required to be occluded, of the virtual object is not rendered, and transparency processing may be performed on the occluded partial region through the virtual object model, thereby achieving an occlusion effect.

[00135] In the embodiment of the disclosure, the virtual object model configured to present the occlusion effect may be edited. The third position and pose data corresponding to the virtual object model may be edited to recover the real third position and pose data of the virtual object model in the target reality scene to provide a more realistic presentation effect when the AR device subsequently presents the virtual object.

[00136] In an implementation mode, the at least one virtual object includes at least one first virtual object. For S102, when the updating data of the at least one virtual object associated with the initial AR data packet is acquired includes the following operation.

[00137] Updating data of the at least one first virtual object in the initial AR data packet is acquired.

[00138] Here, when the initial AR data packet includes the virtual object, acquiring the updating data of the at least one virtual object associated with the initial AR data packet may be acquiring the updating data of the at least one first virtual object in the initial AR data packet.

[00139] In another implementation mode, the at least one virtual object includes at least one second virtual object. For S102, when the updating data of the at least one virtual object associated with the initial AR data packet is acquired includes the following operation.

[00140] The at least one second virtual object associated with the initial AR data packet is acquired from a pre-created material library, and updating data of the at least one second

virtual object is acquired.

[00141] When the initial AR data packet includes the virtual object or does not include the virtual object, acquiring the updating data of the at least one virtual object associated with the initial AR data packet may be acquiring the at least one second virtual object associated with the initial AR data packet from the pre-created material library and acquiring the updating data of the at least one second virtual object.

[00142] In another implementation mode, when the updating data of the at least one virtual object associated with the initial AR data packet is acquired, the updating data of the at least one first virtual object in the initial AR data packet is acquired, and the updating data of the at least one second virtual object associated with the initial AR data packet is simultaneously acquired from the pre-created material library.

[00143] Exemplarily, the pre-created material library may include multiple virtual objects such as a virtual static model, an animation, and a video, and the user may select a virtual object to be uploaded to the initial AR data packet from the pre-created material library.

[00144] Exemplarily, the second virtual object may be the same as or different from the first virtual object, and the initial AR data packet may be updated through the updating data of the first virtual object and/or the second virtual object.

[00145] In the embodiment of the disclosure, the virtual object associated with the initial AR data packet and the updating data of the virtual object may be acquired in multiple manners, so that the updating data of the virtual object may be acquired flexibly.

[00146] Correspondingly, when the at least one virtual object associated with the initial AR data packet is presented, the following operation may be included.

[00147] The at least one first virtual object in the initial AR data packet is presented, and/or, the at least one second virtual object acquired from the pre-created material library and associated with the initial AR data packet is presented.

[00148] As mentioned above, the initial AR data packet may include the virtual object, or may not include the virtual object. When the initial AR data packet includes the virtual object, presenting the at least one virtual object associated with the initial AR data packet may be presenting the at least one first virtual object in the initial AR data packet, or may be acquiring the at least one second virtual object associated with the initial AR data packet from the pre-created material library for presentation, or may be simultaneously presenting the at least one first virtual object in the initial AR data packet and the at least one second virtual object acquired from the pre-created material library and associated with the initial AR data packet.

[00149] Furthermore, after the updated AR data packet is generated, the generation method provided in the embodiment of the disclosure further includes the following operation.

[00150] The updated AR data packet is sent to a server, or, the updated AR data packet and state information that indicates whether the updated AR data packet is activated are sent to the server.

[00151] Exemplarily, as shown in FIG. 7, after the initial AR data packet is edited to obtain the updated AR data packet, SAVE may be clicked. For example, after detecting a saving triggering operation triggered by the user and succeeding in saving, the AR device may send the updated AR data packet to the server.

[00152] Exemplarily, the state information that indicates whether the updated AR data packet is activated may be set in the interface shown in FIG. 2a. An "on" button (not shown in FIG. 2a) may be set below each AR data packet. If the "on" button below the AR data packet is triggered, it indicates that the updated AR data packet corresponding to the AR data packet may be downloaded by the AR device for testing after uploaded to the server.

[00153] In the embodiment of the disclosure, the generated updated AR data packet may be published to the server for another user to download and use. Exemplarily, the AR data packet may be downloaded and edited by another AR device, and meanwhile, may be downloaded by the AR device for testing.

[00154] In another implementation mode, after the updated AR data packet is generated, the generation method provided in the embodiment of the disclosure further includes the following operation.

[00155] In response to an uploading triggering operation on the updated AR data packet, label information of the updated AR data packet is acquired, and the updated AR data packet and the label information are sent to the server.

[00156] Exemplarily, after the initial AR data packet is edited to obtain the updated AR data packet, the updated AR data packet may be sent to the server. As shown in FIG. 8, multiple AR data packets associated with the target reality scene may be obtained. After the user triggers a test package uploading operation in a page shown by (a) in FIG. 8, for determining a target updated AR data packet to be uploaded by the user, a page shown by (b) in FIG. 8, and the user may fill in the page with label information corresponding to the target updated AR data packet to be uploaded.

[00157] Exemplarily, the label information may include information of the name of the target reality scene, the floor name, the name of the test package, the subject, notes, etc. The label information is filled in to determine the updated AR data packet to be loaded on one hand, and on the other hand, enable the server to save the uploaded updated AR data packet based on the label information to make it convenient for the user of the AR device to download the AR data packet through the AR device for testing.

[00158] In the embodiment of the disclosure, the generated updated AR data packet may be published to the server for another user to download and use. Exemplarily, the AR data packet may be downloaded and edited by another AR generator, and meanwhile, may be downloaded by the AR device for testing.

[00159] Exemplarily, the operation that the updated AR data packet and the label information are sent to the server includes the following operation.

[00160] The updated AR data packet, the label information, and the state information that indicates whether the updated AR data packet is activated are sent to the server.

[00161] An AR data packet in an on state is available.

[00162] Exemplarily, the state information that indicates whether the updated AR data packet is activated may be set in (a) in FIG. 8. An "on" button is set below each AR data packet. If the "on" button below the AR data packet is triggered, it indicates that the updated AR data packet corresponding to the AR data packet may be downloaded by the AR device for testing after uploaded to the server.

[00163] An AR scene content presentation process will be introduced below. The presentation process may be applied to an AR device. The AR device may be the same as or different from the abovementioned AR device configured to generate an AR data packet, and no limits are made herein. As shown in FIG. 9, following S201 to S203 are included.

[00164] In S201, in response to a second triggering operation, an AR data packet associated with a target reality scene indicated by the second triggering operation is acquired, the AR data packet including first position and pose data corresponding to at least one virtual object.

[00165] Exemplarily, the AR device may include, but not limited to, a device with a display function and a data processing capability like AR glasses, a tablet computer, a smart phone, and an intelligent wearable device. An application configured to present an AR scene

content may be installed in these AR devices, and a user may test the AR scene content in the application.

[00166] After the AR device opens the application configured to present the AR scene content, the AR device may present at least one reality scene and an AR data packet associated with each reality scene. Exemplarily, the second triggering operation may be a triggering operation on the AR data packet associated with the target reality scene. In an embodiment, as shown in FIG. 2a, the user may click an AR data packet associated with a target reality scene "XXX building-15th floor" in the AR data packet associated with the reality scene presented by the AR device, for example, clicking an AR data packet "[Example] science fiction", and the AR device may detect existence of the second triggering operation on the AR data packet and further request a server for acquiring the AR data packet associated with the target reality scene "XXX building-15th floor".

[00167] The first position and pose data corresponding to the at least one virtual object in the AR data packet may be first position and pose data in the target reality scene. Alternatively, the first position and pose data corresponding to the at least one virtual object in the AR data packet may be first position and pose data in a three-dimensional scene model of the target reality scene. Specific details refer to the above descriptions, and elaborations are omitted herein.

[00168] In S202, presentation special effect information of the at least one virtual object is determined based on second position and pose data of an AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet.

[00169] Details about the second position and pose data of the AR device that presently photographs the target reality scene and a manner for acquiring the second position and pose data corresponding to the AR device refer to the above descriptions, and elaborations are omitted herein.

[00170] Before the second position and pose data of the AR device that presently photographs the target reality scene is acquired, as shown in FIG. 10, information configured to prompt the user to use the AR device for shooting may be presented on the AR device.

[00171] In a case where the first position and pose data corresponding to the virtual object is the first position and pose data in the target reality scene, since both the second position and pose data corresponding to the AR device and the first position and pose data corresponding to the virtual object are position and pose data under the same coordinate system, the presentation special effect information of the virtual object in the AR device may be determined based on the second position and pose data corresponding to the AR device and the first position and pose data corresponding to the at least one virtual object.

[00172] In a case where the first position and pose data corresponding to the virtual object is the first position and pose data in the three-dimensional scene model of the target reality scene, since the three-dimensional scene model and the reality scene are presented in the same coordinate system according to a scale of 1:1 and presented in different coordinate systems according to the same scale, the presentation special effect information of the virtual object in the AR device may be determined based on the preset first position and pose data of the virtual object that is presented in the three-dimensional scene model and the second position and pose data corresponding to the AR device.

[00173] In S203, the at least one virtual object is presented through the AR device based on the presentation special effect information.

[00174] After the presentation special effect information of the virtual object in the target reality scene is obtained, the at least one virtual object may be presented in the AR

device according to the presentation special effect information. FIG. 11 is a schematic diagram of presenting a virtual object "Tang tricolored pottery horse" in the target reality scene.

[00175] In the embodiment of the disclosure, the AR data packet associated with the second triggering operation may be acquired in response to the second triggering operation, and the presentation special effect information of the virtual object in the target reality scene may further be determined based on the second position and pose data corresponding to the AR device and the preset first position and pose data corresponding to the virtual object in the AR data packet to eventually present a realistic AR scene effect in the AR device.

[00176] Furthermore, the AR data packet further includes third position and pose data corresponding to at least one virtual object model. The virtual object model represents a target object in the target reality scene.

[00177] When the presentation special effect information of the at least one virtual object is determined based on the second position and pose data of the AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet, the following operation is included.

[00178] The presentation special effect information of the at least one virtual object is determined based on the second position and pose data of the AR device that presently photographs the target reality scene, the first position and pose data corresponding to the at least one virtual object in the AR data packet, and the third position and pose data corresponding to the virtual object model.

[00179] Exemplarily, whether the virtual object is occluded by a real object corresponding to the virtual object model may be determined according to the third position and pose data of the virtual object model in the target reality scene, the second position and pose data corresponding to the AR device, and the first position and pose data corresponding to the virtual object. When it is determined that a partial region or complete region of the virtual object is occluded by the real object corresponding to the virtual object model, the occluded partial region may not be rendered, the virtual object model may be processed to an occlusion form, and transparency processing is performed on the virtual object model in the occlusion form. In this manner, the virtual object model subjected to transparency processing in the AR device is invisible for to the user, and an presentation effect that the virtual object is occluded by the real object in the target reality scene may be presented.

[00180] In the embodiment of the disclosure, real third position and pose data of the virtual object model in the target reality scene may also be recovered through the third position and pose data of the virtual object model. When it is determined that the virtual object is occluded by the real object corresponding to the virtual object model, an effect of occluding the virtual object may be achieved through the virtual object model, thereby presenting a more realistic AR scene effect in the AR device.

[00181] In an implementation mode, the AR data packet further includes interactive data corresponding to the at least one virtual object, and the interactive data includes at least one of at least one state triggering condition, a presentation state corresponding to each state triggering condition, or a cyclic presentation count of the virtual object that is triggered to be presented.

[00182] Exemplarily, detailed explanations about the state triggering condition, presentation state corresponding to each state triggering condition, and cyclic presentation count of the virtual object that is triggered to be presented in the interactive data refer to the above, and elaborations are omitted herein.

[00183] As mentioned above, multiple state triggering conditions may be included. For example, one or more of a model clicking triggering condition, a model sliding triggering condition, a distance identification triggering condition, a specified region triggering condition, a gesture identification triggering condition, a triggering condition of orienting to a present model, and a triggering condition of orienting to a specified model are included. Detailed explanations about each triggering condition refer to the above, and elaborations are omitted herein. Based on this, it can be seen that two types of state triggering conditions may be included. One type is a state triggering condition related to the second position and pose data corresponding to the AR device, such as one or more of the distance identification triggering condition, the specified region triggering condition, the triggering condition of orienting to the present model, and the triggering condition of orienting to the specified model. The other type is a state triggering condition unrelated to the second position and pose data corresponding to the AR device, such as one or more of the model clicking triggering condition, the model sliding triggering condition, and the gesture identification triggering condition. Interaction with the virtual object will be considered below for the two types respectively.

[00184] In a possible implementation mode, the presentation method provided in the embodiment of the disclosure further includes the following operations.

[00185] In (1), an interactive operation acting on the at least one virtual object is detected.

[00186] In (2), in a case where the interactive operation acting on the at least one virtual object satisfies a first-type state triggering condition, the presentation special effect information of the at least one virtual object is updated based on a presentation state corresponding to the at least one virtual object under the first-type state triggering condition and/or a cyclic presentation count of the at least one virtual object that is triggered by the first-type state triggering condition to be presented to obtain updated presentation special effect information.

[00187] Furthermore, the operation that the at least one virtual object is presented through the AR device based on the presentation special effect information includes the following operation.

[00188] The at least one virtual object is presented through the AR device based on the updated presentation special effect information.

[00189] Exemplarily, the interactive operation may be an operation configured to trigger the presentation special effect information of the virtual object to be updated. The first-type state triggering condition may be the abovementioned state triggering condition unrelated to the second position and pose data corresponding to the AR device, such as at least one or more of the model clicking triggering condition, the model sliding triggering condition, and the gesture identification triggering condition.

[00190] Exemplarily, when the AR device detects existence of the interactive operation, for example, if a sliding operation of the user for triggering virtual object A in the AR device, a presentation state corresponding to virtual object A under the sliding operation and/or a cyclic presentation count of virtual object A that is triggered by the sliding operation to be presented may be acquired, and then presentation special effect information of virtual object A is updated based on this.

[00191] Exemplarily, there are three cases for a manner for updating the presentation special effect information of the virtual object. In case 1, the presentation special effect information of the at least one virtual object may be updated independently based on the presentation state of the at least one virtual object under the first-type state triggering

condition. In case 2, the presentation special effect information of the at least one virtual object may be updated independently based on the cyclic presentation count of the at least one virtual object that is triggered by the first-type state triggering condition to be presented. In case 3, the presentation state corresponding to the at least one virtual object under the first-type state triggering condition and the cyclic presentation count of the at least one virtual object that is triggered by the first-type state triggering condition to be presented may be combined to update the presentation special effect information of the at least one virtual object.

[00192] The three cases will be introduced below in combination with specific embodiments respectively.

[00193] For case 1, exemplarily, the presentation special effect information of virtual object A is a virtual flowerpot displayed on a desk, an interactive operation is a sliding operation acting on the virtual object, and a presentation state corresponding to virtual object A under the sliding operation is non-displayed. After existence of the sliding operation acting on the virtual flowerpot is detected, the presentation special effect information of the virtual flowerpot may be changed from original displayed to disappeared.

[00194] For case 2, exemplarily, virtual object A is a virtual colorful cat walking on a wall from position A to position B, the interactive operation is a clicking operation acting on a three-dimensional model corresponding to the virtual colorful cat, and a cyclic presentation count of the virtual object that is triggered by the clicking operation to be presented is 5. When the clicking operation of the user over the virtual colorful cat is detected, the virtual colorful cat may be triggered to be cyclically presented for five times according to a presentation manner of walking from position A to position B.

[00195] For case 3, exemplarily, virtual object A is virtual light flickered once in a festive lantern, the interactive operation is a gesture identification operation, a presentation state corresponding to the virtual light under the gesture identification operation is displayed, and a cyclic presentation count of the virtual object that is triggered by the gesture identification operation to be presented is 5. When the gesture identification operation is detected, the presentation special effect information of the virtual light may be updated to be flickered for five times.

[00196] In the embodiment of the disclosure, when existence of the interactive operation on the virtual object is detected, the virtual object may be presented according to a presentation manner of the virtual object under a set state triggering condition in case of determining that the interactive operation satisfies the set state triggering condition. Exemplarily, an AR tester may make a set gesture to the AR device, thereby triggering the virtual object to be presented according to a presentation special effect corresponding to the gesture. In this manner, the interactivity between the AR tester and the virtual object in the target reality scene is improved, and user experiences are improved.

[00197] In another possible implementation mode, the presentation method provided in the embodiment of the disclosure further includes the following operation.

[00198] In a case where the second position and pose data satisfies a second-type state triggering condition, the presentation special effect information of the at least one virtual object is updated based on a presentation state corresponding to the at least one virtual object under the second-type state triggering condition and/or a cyclic presentation count of the at least one virtual object that is triggered by the second-type state triggering condition to be presented to obtain updated presentation special effect information.

[00199] The operation that the at least one virtual object is presented through the AR device based on the presentation special effect information includes the following operation.

[00200] The at least one virtual object is presented through the AR device based on the updated presentation special effect information.

[00201] Exemplarily, the second-type state triggering condition may be the abovementioned state triggering condition related to the second position and pose data corresponding to the AR device, such as one or more of the distance identification triggering condition, the specified region triggering condition, the triggering condition of orienting to the present model, and the triggering condition of orienting to the specified model.

[00202] Exemplarily, there are multiple cases that the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition. Specifically, whether the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition may be determined through a position and/or display angle of a display unit of the AR device. Whether the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition may be determined independently through the position of the display unit of the AR device. Alternatively, whether the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition may be determined independently through the display angle of the AR device. Alternatively, the position and display angle of the display unit of the AR device are combined to determine whether the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition.

[00203] Exemplarily, when a distance between a position coordinate of the display unit of the AR device and a set position meets a set distance, it may be determined that the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition. Alternatively, when it is determined that the display angle of the AR device points to the position of virtual object A, it may still be determined that the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition. Alternatively, when the distance between the position coordinate of the display unit of the AR device and the set position meets the set distance, and the display angle of the AR device points to the position where virtual object A is presented, it may be determined that the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition. This case happens a lot. Elaborations are omitted herein.

[00204] Furthermore, in a case where the second position and pose data corresponding to the AR device satisfies the second-type state triggering condition, the presentation special effect information of the at least one virtual object may be updated according to the presentation state corresponding to the at least one virtual object under the second-type state triggering condition and/or the cyclic presentation count of the at least one virtual object that is triggered by the second-type state triggering condition to be presented. A specific updating manner is similar to the above updating manner based on the interactive operation, and will not be elaborated herein.

[00205] In the embodiment of the disclosure, in case of detecting that the second position and pose data corresponding to the AR device satisfies the set state triggering condition, the virtual object is presented according to the presentation manner of the virtual object under the set state triggering condition. Exemplarily, when the AR device is close to the set position, and the display angle of the AR device points to the position of virtual object A, virtual object A is triggered to be presented according to the presentation special effect corresponding to the second position and pose data of the AR device. Through this process, a more realistic AR scene effect may be achieved, so that user experiences are improved.

[00206] A process of generating an AR scene content remotely based on an AR

generator will be described below. As shown in FIG. 12, the following operations are included.

[00207] In S301, in response to a first triggering operation, a three-dimensional scene model of a target reality scene indicated by the first triggering operation and an initial AR data packet associated with the target reality scene are acquired.

[00208] In S302, updating data of at least one virtual object associated with the initial AR data packet is acquired, the updating data including first position and pose data of the at least one virtual object in the three-dimensional scene model.

[00209] In S303, the initial AR data packet is updated based on the updating data of the at least one virtual object to generate an updated AR data packet.

[00210] In the embodiment of the disclosure, the three-dimensional scene model and initial AR data packet associated with the target reality scene may be provided for a user in response to the first triggering operation to enable the user to directly edit and update the at least one virtual object associated with the initial AR data packet through the three-dimensional scene model according to his/her own need to obtain the updated AR data packet. When an AR tester tests AR in the target reality scene, the updated AR data packet may be directly called for AR testing. Through the manner of remotely editing the AR data packet in the disclosure, an AR data packet generation manner may be simplified, and readily available AR materials are provided for subsequent presentation of the AR scene.

[00211] Referring to FIG. 13, the embodiments of the disclosure also provide an AR scene content presentation system 400, which includes an AR generator 401, a server 402, and an AR device 403. The AR generator 401 is in communication connection with the server 402, and the AR device 403 is in communication connection with the server 402.

[00212] The AR generator 401 is configured to, in response to a first triggering operation, acquire a three-dimensional scene model of a target reality scene indicated by the first triggering operation and an initial AR data packet associated with the target reality scene, and acquire updating data of at least one virtual object associated with the initial AR data packet, the updating data including first position and pose data of the at least one virtual object in the three-dimensional scene model, and is configured to update the initial AR data packet based on the updating data of the at least one virtual object, and send an updated AR data packet to the server.

[00213] The server 402 is configured to receive the updated AR data packet, and forward the updated AR data packet to the AR device.

[00214] The AR device 403 is configured to, in response to a second triggering operation, acquire an updated AR data packet saved in the server and associated with a target reality scene indicated by the second triggering operation, determine presentation special effect information of at least one virtual object based on second position and pose data of the AR device that presently photographs the target reality scene and first position and pose data of the at least one virtual object in a three-dimensional scene model in the updated AR data packet, and present the at least one virtual object through the AR device based on the presentation special effect information.

[00215] The presentation system provided in the embodiments of the disclosure may edit and generate the AR data packet remotely and publish the generated AR data packet to the server for AR testing through the AR device. Specifically, a convenient AR data packet generation manner may be provided for the AR generator to bring conveniences to editing of a user. The server may save the AR data packet such that the AR device may download the AR data packet for testing.

[00216] A process of generating an AR scene content on the spot in an AR scene based

on an AR device will be described below, which is applied to the AR device. As shown in FIG. 14, the following operations are included.

[00217] In S501, in response to a first triggering operation, an initial AR data packet associated with a target reality scene indicated by the first triggering operation is acquired.

[00218] In S502, at least one virtual object associated with the initial AR data packet is presented based on second position and pose data of the AR device that presently photographs the target reality scene and the initial AR data packet.

[00219] In S503, updating data of the at least one virtual object that is presented is acquired, the updating data including first position and pose data of the at least one virtual object in the target reality scene.

[00220] In S505, the initial AR data packet is updated based on the updating data to generate an updated AR data packet.

[00221] In the embodiment of the disclosure, an AR data packet editing state may be entered in response to the first triggering operation, and after the second position and pose data corresponding to the AR device is acquired, the at least one virtual object associated with the initial AR data packet is presented based on the second position and pose data corresponding to the AR device to enable the user to directly edit and regulate the first position and pose data of the virtual object in the target reality scene as needed in the AR device, so that an AR scene content generation process may be simplified, and the accuracy of the regulated AR data packet may be higher.

[00222] Based on the same inventive concept, the embodiments of the disclosure also provide a generation apparatus corresponding to the AR scene content generation method shown in FIG. 1. The principle of the apparatus in the embodiments of the disclosure for solving the problem is similar to the generation method of the embodiments of the disclosure, and thus implementation of the apparatus may refer to implementation of the method. Repeated parts will not be elaborated.

[00223] Referring to FIG. 15, an AR scene content generation apparatus 600 is shown, which includes a first acquisition module 601, a second acquisition module 602, and an updating module 603.

[00224] The first acquisition module 601 is configured to, in response to a first triggering operation, acquire an initial AR data packet associated with a target reality scene indicated by the first triggering operation.

[00225] The second acquisition module 602 is configured to acquire updating data of at least one virtual object associated with the initial AR data packet, the updating data including first position and pose data corresponding to the at least one virtual object.

[00226] The updating module 603 is configured to update the initial AR data packet based on the updating data of the at least one virtual object to generate an updated AR data packet.

[00227] In a possible implementation mode, the first acquisition module 601 is further configured to:

[00228] acquire a three-dimensional scene model of the target reality scene indicated by the first triggering operation.

[00229] The second acquisition module 602, when configured to acquire the updating data of the at least one virtual object associated with the initial AR data packet includes:

[00230] presenting the loaded three-dimensional scene model; and

[00231] acquiring updating data of the at least one virtual object in the three-dimensional scene model, the updating data including first position and pose data of the at least one virtual object in the three-dimensional scene model.

[00232] In a possible implementation mode, the generation apparatus further includes a presentation module 604. The presentation module 604 is configured to:

[00233] present the at least one virtual object associated with the initial AR data packet based on second position and pose data of an AR device that presently photographs the target reality scene and the initial AR data packet.

[00234] The second acquisition module 602, when configured to acquire the updating data of the at least one virtual object associated with the initial AR data packet, includes:

[00235] acquire the updating data of the at least one virtual object that is presented, the updating data including the first position and pose data of the at least one virtual object in the target reality scene.

[00236] In a possible implementation mode, the second acquisition module, when configured to acquire the updating data of the at least one virtual object that is presented, includes:

[00237] presenting a position and pose data editing interface, and acquiring the first position and pose data, received through the position and pose data editing interface, of the at least one virtual object.

[00238] The first position and pose data includes at least one of a position coordinate, deflection angle, or dimension information in a coordinate system where the target reality scene is located.

[00239] In a possible implementation mode, the updating data further includes interactive data corresponding to the at least one virtual object.

[00240] The second acquisition module, when configured to acquire the updating data of the at least one virtual object associated with the initial AR data packet, includes:

[00241] presenting an interactive data editing interface, and acquiring the interactive data, received through the interactive data editing interface, of each virtual object.

[00242] The interactive data includes at least one of at least one state triggering condition, a presentation state corresponding to each state triggering condition, or a cyclic presentation count of the virtual object that is triggered to be presented.

[00243] In a possible implementation mode, in a case where the interactive data includes multiple state triggering conditions, the interactive data further includes a priority of each state triggering condition.

[00244] In a possible implementation mode, the second acquisition module 602 is further configured to:

[00245] acquire third position and pose data corresponding to at least one virtual object model associated with the initial AR data packet, the at least one virtual object model representing a target object in the target reality scene.

[00246] The updating module 603, when configured to update the initial AR data packet based on the updating data of the at least one virtual object to generate the updated AR data packet, includes:

[00247] updating the initial AR data packet based on the updating data of the at least one virtual object and the third position and pose data corresponding to the virtual object model to generate the updated AR data packet.

[00248] In a possible implementation mode, the at least one virtual object includes at least one first virtual object. The second acquisition module 602, when configured to acquire the updating data of the at least one virtual object associated with the initial AR data packet, includes:

[00249] acquiring updating data of the at least one first virtual object in the initial AR data packet.

[00250] In a possible implementation mode, the at least one virtual object includes at least one second virtual object. The second acquisition module, when configured to acquire the updating data of the at least one virtual object associated with the initial AR data packet, includes:

[00251] acquiring the at least one second virtual object associated with the initial AR data packet from a pre-created material library, and acquiring updating data of the at least one second virtual object.

[00252] In a possible implementation mode, the generation apparatus further includes a sending module 605. After the updated AR data packet is generated, the sending module 605 is configured to:

[00253] send the updated AR data packet to a server, or, send the updated AR data packet and state information that indicates whether the updated AR data packet is activated to the server.

[00254] In a possible implementation mode, after the updated AR data packet is generated, the sending module 605 is further configured to:

[00255] in response to an uploading triggering operation on the updated AR data packet, acquire label information of the updated AR data packet, and send the label information to the server.

[00256] Based on the same inventive concept, the embodiments of the disclosure also provide a presentation apparatus corresponding to the AR scene content presentation method shown in FIG. 9. The principle of the apparatus in the embodiments of the disclosure for solving the problem is similar to the presentation method of the embodiments of the disclosure, and thus implementation of the apparatus may refer to implementation of the method. Repeated parts will not be elaborated.

[00257] Referring to FIG. 16, a schematic diagram of an AR scene content presentation apparatus 700 is shown, which includes an acquisition module 701, a determination module 702, and a presentation module 703.

[00258] The acquisition module 701 is configured to, in response to a second triggering operation, acquire an AR data packet associated with a target reality scene indicated by the second triggering operation, the AR data packet including first position and pose data corresponding to at least one virtual object.

[00259] The determination module 702 is configured to determine presentation special effect information of the at least one virtual object based on second position and pose data of an AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet.

[00260] The presentation module 703 is configured to present the at least one virtual object through the AR device based on the presentation special effect information.

[00261] In a possible implementation mode, the AR data packet further includes third position and pose data corresponding to at least one virtual object model, and the virtual object model represents a target object in the target reality scene.

[00262] The determination module 702, when configured to determine the presentation special effect information of the at least one virtual object based on the second position and pose data of the AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet, includes:

[00263] determining the presentation special effect information of the at least one virtual object based on the second position and pose data of the AR device that presently photographs the target reality scene, the first position and pose data corresponding to the at

least one virtual object in the AR data packet, and the third position and pose data corresponding to the virtual object model.

[00264] In a possible implementation mode, the AR data packet further includes interactive data corresponding to the at least one virtual object, and the interactive data includes at least one of at least one state triggering condition, a presentation state corresponding to each state triggering condition, or a cyclic presentation count of the virtual object that is triggered to be presented.

[00265] In a possible implementation mode, the presentation apparatus further includes an interaction module 704. The interaction module 704 is configured to:

[00266] detect an interactive operation acting on the at least one virtual object; and

[00267] in a case where the interactive operation acting on the at least one virtual object satisfies a first-type state triggering condition, update the presentation special effect information of the at least one virtual object based on a presentation state corresponding to the at least one virtual object under the first-type state triggering condition and/or a cyclic presentation count of the at least one virtual object that is triggered by the first-type state triggering condition to be presented to obtain updated presentation special effect information.

[00268] The presentation module 704, when configured to present the at least one virtual object through the AR device based on the presentation special effect information, includes:

[00269] presenting the at least one virtual object through the AR device based on the updated presentation special effect information.

[00270] In a possible implementation mode, the presentation apparatus further includes the interaction module 704. The interaction module 704 is configured to:

[00271] in a case where the second position and pose data satisfies a second-type state triggering condition, update the presentation special effect information of the at least one virtual object based on a presentation state corresponding to the at least one virtual object under the second-type state triggering condition and/or a cyclic presentation count of the at least one virtual object that is triggered by the second-type state triggering condition to be presented to obtain updated presentation special effect information.

[00272] The presentation module, when configured to present the at least one virtual object through the AR device based on the presentation special effect information, includes:

[00273] presenting the at least one virtual object through the AR device based on the updated presentation special effect information.

[00274] The descriptions about the processing flow of each module in the apparatus and interaction flows between each module may refer to the related descriptions in the method embodiment, and elaborations are omitted herein.

[00275] Corresponding to the AR scene content generation method in FIG. 1, the embodiments of the disclosure also provide an electronic device 800. FIG. 17 is a structure diagram of an electronic device 800 according to an embodiment of the disclosure. The electronic device includes a processor 81, a memory 82, and a bus 83.

[00276] The memory 82 is configured to store an executable instruction, and includes an internal storage 821 and an external memory 822. Here, the internal storage 821, also called an internal memory, is configured to temporarily store arithmetic data in the processor 81 and data exchanged with the external memory 822 such as a hard disk. The processor 81 performs data exchange with the external memory 822 through the internal storage 821. When the electronic device 800 runs, the processor 81 communicates with the memory 82 through the bus 83 such that the processor 81 executes the following instructions: in response to a first triggering operation, acquiring an initial AR data packet associated with a target reality scene

indicated by the first triggering operation; acquiring updating data of at least one virtual object associated with the initial AR data packet, the updating data including first position and pose data corresponding to the at least one virtual object; and updating the initial AR data packet based on the updating data of the at least one virtual object to generate an updated AR data packet.

[00277] Alternatively, the processor 81 may be enabled to execute the following instructions: in response to a second triggering operation, acquiring an AR data packet associated with a target reality scene indicated by the second triggering operation, the AR data packet including first position and pose data corresponding to at least one virtual object; determining presentation special effect information of the at least one virtual object based on second position and pose data of an AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet; and presenting the at least one virtual object through the AR device based on the presentation special effect information.

[00278] The embodiments of the disclosure also provide a computer-readable storage medium, in which a computer program is stored. The computer program is run by a processor to execute the steps of the generation method or presentation method in the method embodiments. The storage medium may be a volatile or non-volatile computer-readable storage medium.

[00279] The embodiments of the disclosure also provide a computer program product, which contains a computer code. An instruction in the program code may be configured to execute the steps of the generation method or presentation method as described in the method embodiments. References may specifically be made to the method embodiments. Elaborations are omitted herein.

[00280] The computer program product may specifically be implemented by hardware, software, or a combination thereof. In an optional embodiment, the computer program product is specifically embodied as a computer storage medium. In another optional embodiment, the computer program product is specifically embodied as a software product, for example, a Software Development Kit (SDK).

[00281] It can be clearly learned by those skilled in the art that specific working processes of the system and apparatuses described above may refer to the corresponding processes in the method embodiments and will not be elaborated herein for easy and brief description. In some embodiments provided by the disclosure, it is to be understood that the disclosed system, apparatus, and method may be implemented in another manner. The apparatus embodiment described above is only schematic. For example, division of the units is only logic function division, and other division manners may be adopted during practical implementation. For another example, multiple units or components may be combined or integrated into another system, or some characteristics may be neglected or not executed. In addition, coupling or direct coupling or communication connection between each displayed or discussed component may be indirect coupling or communication connection, implemented through some communication interfaces, of the apparatus or the units, and may be electrical and mechanical or adopt other forms.

[00282] The units described as separate parts may or may not be physically separated, and parts displayed as units may or may not be physical units, and namely may be located in the same place, or may also be distributed to multiple network units. Part or all of the units may be selected to achieve the purposes of the solutions of the embodiments according to a practical requirement.

[00283] In addition, each function unit in each embodiment of the disclosure may be

integrated into a processing unit, each unit may also physically exist independently, and two or more than two units may also be integrated into a unit.

[00284] When realized in form of software function unit and sold or used as an independent product, the function may also be stored in a non-volatile computer-readable storage medium executable for the processor. Based on such an understanding, the technical solutions of the disclosure substantially or parts making contributions to the conventional art or part of the technical solutions may be embodied in form of software product, and the computer software product is stored in a storage medium, including a plurality of instructions configured to enable a computer device (which may be a personal computer, a server, a network device, etc.) to execute all or part of the steps of the method in each embodiment of the disclosure. The storage medium includes various media capable of storing program codes such as a U disk, a mobile hard disk, a ROM, a RAM, a magnetic disk, or an optical disk.

[00285] It is finally to be noted that the above embodiments are only the specific implementation modes of the disclosure and are adopted not to limit the disclosure but to describe the technical solutions of the disclosure. The scope of protection of the disclosure is not limited thereto. Although the disclosure is described with reference to the embodiments in detail, those of ordinary skill in the art should know that those skilled in the art may still make modifications or apparent variations to the technical solutions recorded in the embodiments or make equivalent replacements to part of technical features within the technical scope disclosed in the disclosure, and these modifications, variations, or replacements do not make the essence of the corresponding technical solutions depart from the spirit and scope of the technical solutions of the embodiments of the disclosure and shall fall within the scope of protection of the disclosure. Therefore, the scope of protection of the disclosure shall be subject to the scope of protection of the claims.

CLAIMS

1. An Augmented Reality (AR) scene content generation method, comprising:

in response to a first triggering operation, acquiring an initial AR data packet associated with a target reality scene indicated by the first triggering operation;

acquiring updating data of at least one virtual object associated with the initial AR data packet, the updating data comprising first position and pose data corresponding to the at least one virtual object; and

updating the initial AR data packet based on the updating data of the at least one virtual object to generate an updated AR data packet.

2. The generation method of claim 1, further comprising:

acquiring a three-dimensional scene model of the target reality scene indicated by the first triggering operation,

wherein acquiring the updating data of the at least one virtual object associated with the initial AR data packet comprises:

presenting the loaded three-dimensional scene model; and

acquiring updating data of the at least one virtual object in the three-dimensional scene model, the updating data comprising first position and pose data of the at least one virtual object in the three-dimensional scene model.

3. The generation method of claim 1, further comprising:

presenting the at least one virtual object associated with the initial AR data packet based on second position and pose data of an AR device that presently photographs the target

reality scene and the initial AR data packet,

wherein acquiring the updating data of the at least one virtual object associated with the initial AR data packet comprises:

acquiring the updating data of the at least one virtual object that is presented, the updating data comprising the first position and pose data of the at least one virtual object in the target reality scene.

4. The generation method of claim 3, wherein acquiring the updating data of the at least one virtual object that is presented comprises:

presenting a position and pose data editing interface, and acquiring the first position and pose data, received through the position and pose data editing interface, of the at least one virtual object,

the first position and pose data comprising at least one of a position coordinate, deflection angle, or dimension information in a coordinate system where the target reality scene is located.

5. The generation method of any one of claims 1 to 4, wherein the updating data further comprises interactive data corresponding to the at least one virtual object;

wherein acquiring the updating data of the at least one virtual object associated with the initial AR data packet comprises:

presenting an interactive data editing interface, and acquiring the interactive data, received through the interactive data editing interface, of each virtual object,

the interactive data comprising at least one of at least one state triggering condition, a presentation state corresponding to each state triggering condition, or a cyclic presentation count of the virtual object that is triggered to be presented.

6. The generation method of claim 5, wherein, in a case where the interactive data comprises a plurality of state triggering conditions, the interactive data further comprises a priority of each state triggering condition.

7. The generation method of any one of claims 1 to 6, further comprising:

acquiring third position and pose data corresponding to at least one virtual object model associated with the initial AR data packet, the at least one virtual object model representing a target object in the target reality scene,

wherein updating the initial AR data packet based on the updating data of the at least one virtual object to generate the updated AR data packet comprises:

updating the initial AR data packet based on the updating data of the at least one virtual object and the third position and pose data corresponding to the virtual object model to generate the updated AR data packet.

8. The generation method of any one of claims 1 to 7, wherein the at least one virtual object comprises at least one first virtual object; wherein acquiring the updating data of the at least one virtual object associated with the initial AR data packet comprises:

acquiring updating data of the at least one first virtual object in the initial AR data packet.

9. The generation method of any one of claims 1 to 8, wherein the at least one virtual object comprises at least one second virtual object; wherein acquiring the updating data of the at least one virtual object associated with the initial AR data packet comprises:

acquiring the at least one second virtual object associated with the initial AR data

packet from a pre-created material library, and acquiring updating data of the at least one second virtual object.

10. The generation method of any one of claims 1 to 9, after generating the updated AR data packet, further comprising:

 sending the updated AR data packet to a server, or, sending the updated AR data packet and state information that indicates whether the updated AR data packet is activated to the server.

11. The generation method of claim 10, after generating the updated AR data packet, further comprising:

 in response to an uploading triggering operation on the updated AR data packet, acquiring label information of the updated AR data packet, and sending the label information to the server.

12. An Augmented Reality (AR) scene content presentation method, comprising:

 in response to a second triggering operation, acquiring an AR data packet associated with a target reality scene indicated by the second triggering operation, the AR data packet comprising first position and pose data corresponding to at least one virtual object;

 determining presentation special effect information of the at least one virtual object based on second position and pose data of an AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet; and

 presenting the at least one virtual object through the AR device based on the presentation special effect information.

13. The presentation method of claim 12, wherein the AR data packet further comprises third position and pose data corresponding to at least one virtual object model, and the virtual object model represents a target object in the target reality scene;

wherein determining the presentation special effect information of the at least one virtual object based on the second position and pose data of the AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet comprises:

determining the presentation special effect information of the at least one virtual object based on the second position and pose data of the AR device that presently photographs the target reality scene, the first position and pose data corresponding to the at least one virtual object in the AR data packet, and the third position and pose data corresponding to the virtual object model.

14. The presentation method of claim 12 or 13, wherein the AR data packet further comprises interactive data corresponding to the at least one virtual object, and the interactive data comprises at least one of at least one state triggering condition, a presentation state corresponding to each state triggering condition, or a cyclic presentation count of the virtual object that is triggered to be presented.

15. The presentation method of claim 14, further comprising:

detecting an interactive operation acting on the at least one virtual object; and

in a case where the interactive operation acting on the at least one virtual object satisfies a first-type state triggering condition, updating the presentation special effect information of the at least one virtual object based on a presentation state corresponding to the at least one virtual object under the first-type state triggering condition and/or a cyclic presentation count of the at least one virtual object that is triggered by the first-type state

triggering condition to be presented to obtain updated presentation special effect information,

wherein presenting the at least one virtual object through the AR device based on the presentation special effect information comprises:

presenting the at least one virtual object through the AR device based on the updated presentation special effect information.

16. The presentation method of claim 14 or 15, further comprising:

in a case where the second position and pose data satisfies a second-type state triggering condition, updating the presentation special effect information of the at least one virtual object based on a presentation state corresponding to the at least one virtual object under the second-type state triggering condition and/or a cyclic presentation count of the at least one virtual object that is triggered by the second-type state triggering condition to be presented to obtain updated presentation special effect information,

wherein presenting the at least one virtual object through the AR device based on the presentation special effect information comprises:

presenting the at least one virtual object through the AR device based on the updated presentation special effect information.

17. An Augmented Reality (AR) scene content generation apparatus, comprising:

a first acquisition module, configured to, in response to a first triggering operation, acquire an initial AR data packet associated with a target reality scene indicated by the first triggering operation;

a second acquisition module, configured to acquire updating data of at least one virtual object associated with the initial AR data packet, the updating data comprising first position and pose data corresponding to the at least one virtual object; and

an updating module, configured to update the initial AR data packet based on the updating data of the at least one virtual object to generate an updated AR data packet.

18. An Augmented Reality (AR) scene content presentation apparatus, comprising:

an acquisition module, configured to, in response to a second triggering operation, acquire an AR data packet associated with a target reality scene indicated by the second triggering operation, the AR data packet comprising first position and pose data corresponding to at least one virtual object;

a determination module, configured to determine presentation special effect information of the at least one virtual object based on second position and pose data of an AR device that presently photographs the target reality scene and the first position and pose data corresponding to the at least one virtual object in the AR data packet; and

a presentation module, configured to present the at least one virtual object through the AR device based on the presentation special effect information.

19. An electronic device, comprising a processor, a memory, and a bus, wherein the memory stores a machine-readable instruction executable for the processor; when the electronic device runs, the processor communicates with the memory through the bus; and the machine-readable instruction is executed by the processor to execute the steps of the generation method of any one of claims 1 to 11, or, execute the steps of the presentation method of any one of claims 12 to 16.

20. A computer-readable storage medium, having a computer program stored thereon, wherein the computer program, is run by a processor to execute the steps of the generation method of any one of claims 1 to 11, or, execute the steps of the presentation method of any one of claims 12 to 16.