CLAIMS

What is claimed is:

1. A virtual-environment-based object construction method, applicable to a terminal or a server, the method comprising:

displaying an environment interface, the environment interface comprising an image corresponding to a virtual environment;

receiving a three-dimensional (3D) model input operation, the 3D model input operation being used for inputting a target 3D model, the target 3D model being used for determining a style of a to-be-constructed target object;

receiving a position input operation, the position input operation being used for determining a display position of the target object in the virtual environment; and

displaying the target object at the display position in the virtual environment according to the 3D model input operation and the position input operation, the target object being obtained by filling with voxel blocks within a contour range of the target 3D model;

wherein a method of the filling with voxel blocks within the contour range of the target 3D model comprises:

stacking the voxel blocks layer by layer along a contour of the target 3D model directly, and if a stacked voxel block has no intersection with the target 3D model, discarding the stacked voxel block that has no intersection with the target 3D model.

2. The method according to claim 1, wherein ~~a~~ the method of the filling with voxel blocks within ~~a~~ the contour range of the target 3D model comprises:

determining the voxel blocks located on ~~a~~ the contour of the target 3D model; and

filling with the voxel blocks within the contour range according to the voxel blocks located on the contour of the target 3D model.

3. The method according to claim 2, wherein the determining the voxel blocks located on ~~a~~ the contour of the target 3D model comprises:

receiving a model slicing operation to obtain a slicing mode corresponding to each dimension, the model slicing operation being used for performing 3D slicing on a bounding box corresponding to the target 3D model;

determining voxel regions according to the model slicing operation, the voxel regions being regions obtained by performing the 3D slicing on the bounding box, the voxel regions being used for being filled with the voxel blocks;

determining a target voxel region located on the contour of the target 3D model; and

determining the voxel blocks filled in the target voxel region as the voxel blocks on the contour of the target 3D model.

4. The method according to claim 3, wherein the receiving a model slicing operation comprises:

receiving a slice quantity input operation, the slice quantity input operation comprising an operation of inputting respective slice quantities of three dimensions of the target 3D model; and performing the 3D slicing on the bounding box based on the slice quantities according to the slice quantity input operation; or

receiving a sliding slicing operation, and performing the 3D slicing on the bounding box according to the sliding slicing operation,

the slice quantity corresponding to each dimension being used for determining a degree of refinement of the target object generated by the target 3D model.

5. The method according to claim 3, wherein the contour of the target 3D model is formed by triangular patches; and

the determining a target voxel region located on the contour of the target 3D model comprises:

determining, in response to determining the voxel region intersects the triangular patch, that the voxel region is the target voxel region located on the contour of the target 3D model.

6. The method according to claim 5, wherein the filling with the voxel blocks within the contour range according to the voxel blocks located on the contour of the target 3D model comprises:

scanning the voxel regions in the bounding box;

determining a relationship between a normal direction of the triangular patch and a scanning direction in response to determining the scanning proceeds to the target voxel region comprising the triangular patch, the normal direction of the triangular patch correspondingly facing to outside of the target 3D model;

filling with the voxel blocks in the scanning direction in response to determining the normal

direction and the scanning direction are relatively opposite; and

stopping filling with the voxel blocks in the scanning direction in response to determining that the normal direction and the scanning direction are relatively the same.

7. The method according to any one of claims 3 to 6, wherein after the determining a target voxel region located on the contour of the target 3D model, the method further comprises:

determining pixels that are on the contour of the target 3D model and that correspond to the target voxel region; and

determining, according to the pixels, a color of the voxel blocks filled in the target voxel region.

8. A virtual-environment-based object construction apparatus, comprising:

a display module, configured to display an environment interface, the environment interface comprising an image corresponding to a virtual environment; and

a receiving module, configured to receive a three-dimensional (3D) model input operation, the 3D model input operation being used for inputting a target 3D model, the target 3D model being used for determining a style of a to-be-constructed target object;

the receiving module being further configured to receive a position input operation, the position input operation being used for determining a display position of the target object in the virtual environment; and

the display module being further configured to display the target object at the display position in the virtual environment according to the 3D model input operation and the position input operation, the target object being obtained by filling with voxel blocks within a contour range of the target 3D model;

wherein the apparatus is further configured to:

stack the voxel blocks layer by layer along a contour of the target 3D model directly, and if a stacked voxel block has no intersection with the target 3D model, discard the stacked voxel block that has no intersection with the target 3D model.

9. The apparatus according to claim 8, further comprising:

a determining module, configured to determine the voxel blocks located on ~~a~~ the contour of the target 3D model; and

a filling module, configured to fill with the voxel blocks within the contour range according to

the voxel blocks located on the contour of the target 3D model.

10. The apparatus according to claim 9, wherein the receiving module is further configured to receive a model slicing operation to obtain a slicing mode corresponding to each dimension, the model slicing operation being used for performing 3D slicing on a bounding box corresponding to the target 3D model;

the determining module is further configured to determine voxel regions according to the model slicing operation, the voxel regions being regions obtained by performing the 3D slicing on the bounding box, the voxel regions being used for being filled with the voxel blocks;

the determining module is further configured to determine a target voxel region located on the contour of the target 3D model; and

the determining module is further configured to determine the voxel blocks filled in the target voxel region as the voxel blocks on the contour of the target 3D model.

11. The apparatus according to claim 10, wherein the receiving module is further configured to receive a slice quantity input operation, the slice quantity input operation comprising an operation of inputting slice quantities of three dimensions of the target 3D model; and perform the 3D slicing on the bounding box based on the slice quantities according to the slice quantity input operation;

or

the receiving module is further configured to receive a sliding slicing operation, and perform the 3D slicing on the bounding box according to the sliding slicing operation,

the slice quantity corresponding to each dimension being used for determining a degree of refinement of the target object generated by the target 3D model.

12. The apparatus according to claim 10, wherein the contour of the target 3D model is formed by triangular patches; and

the determining module is further configured to determine that the voxel region is the target voxel region located on the contour of the target 3D model in a case that the voxel region intersects the triangular patch.

13. The apparatus according to claim 12, wherein the filling module is further configured to scan the voxel regions in the bounding box, and determine a relationship between a normal direction and a scanning direction of the triangular patch in a case that the scanning proceeds to the target voxel region comprising the triangular patch, the normal direction of the triangular patch correspondingly facing to outside of the target 3D model;

the filling module is further configured to fill with the voxel blocks in the scanning direction in a case that the normal direction and the scanning direction are relatively opposite; and

the filling module is further configured to stop filling with the voxel blocks in the scanning direction in a case that the normal direction and the scanning direction are relatively the same.

14. A computer device, comprising a processor and a memory, the memory storing at least one instruction, at least one program, a code set or an instruction set, the at least one instruction, the at least one program, the code set or the instruction set being loaded and executed by the processor to perform the method as claimed in any of claims 1 to 7. ~~following operations:~~

~~displaying an environment interface, the environment interface comprising an image corresponding to a virtual environment;~~

~~receiving a three-dimensional (3D) model input operation, the 3D model input operation being used for inputting a target 3D model, the target 3D model being used for determining a style of a to-be-constructed target object;~~

~~receiving a position input operation, the position input operation being used for determining a display position of the target object in the virtual environment; and~~

~~displaying the target object at the display position in the virtual environment according to the 3D model input operation and the position input operation, the target object being obtained by filling with voxel blocks within a contour range of the target 3D model.~~

~~15. The computer device according to claim 14, wherein the at least one instruction, the at least one program, the code set or the instruction set, when being loaded by the processor to perform the operation of filling with voxel blocks within a contour range of the target 3D model, causes the processor to perform the following operations:~~

~~determining the voxel blocks located on a contour of the target 3D model; and~~

~~filling with the voxel blocks within the contour range according to the voxel blocks located on the contour of the target 3D model.~~

~~16. The computer device according to claim 15, wherein the at least one instruction, the at least one program, the code set or the instruction set, when being loaded by the processor to perform the operation of determining the voxel blocks located on a contour of the target 3D model, causes the processor to perform the following operations:~~

~~receiving a model slicing operation to obtain a slicing mode corresponding to each dimension, the model slicing operation being used for performing 3D slicing on a bounding box corresponding~~

~~to the target 3D model;~~

~~determining voxel regions according to the model slicing operation, the voxel regions being regions obtained by performing the 3D slicing on the bounding box, the voxel regions being used for being filled with the voxel blocks;~~

~~determining a target voxel region located on the contour of the target 3D model; and~~

~~determining the voxel blocks filled in the target voxel region as the voxel blocks on the contour of the target 3D model.~~

~~17. The computer device according to claim 16, wherein the at least one instruction, the at least one program, the code set or the instruction set, when being loaded by the processor to perform the operation of receiving a model slicing operation, causes the processor to perform the following operations:~~

~~receiving a slice quantity input operation, the slice quantity input operation comprising an operation of inputting slice quantities of three dimensions of the target 3D model; and performing the 3D slicing on the bounding box based on the slice quantities according to the slice quantity input operation;~~

~~or~~

~~receiving a sliding slicing operation, and performing the 3D slicing on the bounding box according to the sliding slicing operation,~~

~~the slice quantity corresponding to each dimension being used for determining a degree of refinement of the target object generated by the target 3D model.~~

1~~8~~5. A computer-readable storage medium, storing at least one instruction, at least one program, a code set or an instruction set, the at least one instruction, the at least one program, the code set or the instruction set, when being loaded and executed by a processor, causes the processor to perform the ~~following~~ method as claimed in any of claims 1 to 7.~~operations:~~

~~displaying an environment interface, the environment interface comprising an image corresponding to a virtual environment;~~

~~receiving a three-dimensional (3D) model input operation, the 3D model input operation being used for inputting a target 3D model, the target 3D model being used for determining a style of a to-be-constructed target object;~~

~~receiving a position input operation, the position input operation being used for determining a~~

display position of the target object in the virtual environment; and

displaying the target object at the display position in the virtual environment according to the 3D model input operation and the position input operation, the target object being obtained by filling with voxel blocks within a contour range of the target 3D model.

19. The computer-readable storage medium according to claim 18, wherein the at least one instruction, the at least one program, the code set or the instruction set, when being loaded by the processor to perform the operation of filling with voxel blocks within a contour range of the target 3D model, causes the processor to further perform:

determining the voxel blocks located on a contour of the target 3D model; and

filling with the voxel blocks within the contour range according to the voxel blocks located on the contour of the target 3D model.

20. The computer-readable storage medium according to claim 19, wherein the at least one instruction, the at least one program, the code set or the instruction set, when being loaded by the processor to perform the operation of determining the voxel blocks located on a contour of the target 3D model, causes the processor to further perform:

receiving a model slicing operation to obtain a slicing mode corresponding to each dimension, the model slicing operation being used for performing 3D slicing on a bounding box corresponding to the target 3D model;

determining voxel regions according to the model slicing operation, the voxel regions being regions obtained by performing the 3D slicing on the bounding box, the voxel regions being used for being filled with the voxel blocks;

determining a target voxel region located on the contour of the target 3D model; and

determining the voxel blocks filled in the target voxel region as the voxel blocks on the contour of the target 3D model.