CLAIMS

1. A method for generating a special effect program file package, comprising:

importing a group of sub-materials, wherein the group of sub-materials comprise a plurality of sub-materials, the plurality of sub-materials having a predetermined playback time sequence;

obtaining parameter values of playback parameters of the group of sub-materials; and

generating the special effect program file package according to the group of sub-materials and the parameter values of the playback parameters, wherein the special effect program file package is executed for generating, on a video image, a special effect based on the plurality of sub-materials having the predetermined playback time sequence,

wherein the playback parameters of the group of sub-materials comprise any one or more of the following:

a display parameter, used for representing whether the plurality of sub-materials are displayed;

an interval parameter, used for representing a number of frames spaced between two adjacent sub-materials in the plurality of sub-materials for display;

a trigger action parameter, used for representing a trigger action for triggering display of the plurality of sub-materials;

a loop parameter, used for representing a number of times of loop playback of the plurality of sub-materials;

a trigger delay parameter, used for representing an amount of time for which a display of the plurality of sub-materials is delayed;

a trigger stop parameter, used for representing an action for stopping the display of the plurality of sub-materials;

a display scale parameter, used for representing a reference basis for a change in a display size of the plurality of sub-materials;

a position type parameter, used for representing a type of a relationship between each of the plurality of sub-materials and a respective position;

a position relation parameter, used for representing whether the plurality of sub-materials move with a preset reference part;

a position parameter, used for representing a position binding relationship between each of the plurality of sub-materials and a respective preset key point;

a rotation parameter, used for representing a key point around which the plurality of sub-materials rotate; or

a beautifying/make-up effect parameter, used for representing a beautifying/make-up effect displayed at a preset part when the plurality of sub-materials are displayed,

wherein the trigger action corresponding to the trigger action parameter comprises any one or more of the following: trigger without an action, an eye action, a head action, an eyebrow action, a hand action, a mouth action, or a shoulder action,

wherein the position type parameter comprises any one of the following:

a parameter used for representing a foreground;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a face;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a hand;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a head;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a shoulder;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of an arm;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a waist;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a leg;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a foot;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a human skeleton;

a playback position relationship related to the reference part; or

a parameter used for representing a background, and

wherein the playback position relationship related to the reference part comprises any one or more of the following:

the plurality of sub-materials move with the position of the reference part, and the plurality of sub-materials are scaled with a size of the reference part;

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, and the plurality of sub-materials are scaled in depth with rotation of the reference part; or

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, the plurality of sub-materials are scaled in depth with rotation of the reference part, and the plurality of sub-materials rotate with rotation of a plane of the reference part.

2. The method according to claim 1,

wherein the playback time sequence of the plurality of sub-materials is determined based on file names of the plurality of sub-materials.

3. The method according to any one of claims 1 to 2, wherein importing the group of sub-materials comprises: receiving an import instruction input through an interactive interface of an action bar, and importing, as the group of sub-materials, a plurality of sub-materials in a material folder pointed to by the import instruction.

4. The method according to claim 3, wherein receiving the import instruction input through the interactive interface of the action bar, and importing the plurality of sub-materials in the material folder pointed to by the import instruction comprise: receiving the import instruction sent via the interactive interface in a playback parameter setting interface under the action bar, and importing the plurality of sub-materials in the material folder pointed to by the import instruction; or, receiving a selection instruction sent via the interactive interface of the action bar, using a reference part selected according to the selection instruction as a target part where a special effect currently needs to be added, displaying a playback parameter setting interface for the target part in the action bar, receiving the import instruction sent via the interactive interface in the playback parameter setting interface, and importing the plurality of sub-materials in the material folder pointed to by the import instruction.

5. The method according to claim 3 or 4, wherein receiving the import instruction input through the interactive interface, and importing the plurality of sub-materials in the material folder pointed to by the import instruction comprise:

receiving the import instruction sent via the interactive interface, and obtaining and displaying the material folder pointed to by the import instruction;

in response to receipt of a selection operation on the sub-materials in the material folder, importing a plurality of sub-materials selected according to the sub-material selection operation; and/or in response to non-receipt of the selection operation on the sub-materials in the material folder, selecting all or some of the sub-materials in the material folder according to a presetting, and importing the sub-materials selected according to the presetting.

6. The method according to any one of claims 3 to 5, wherein importing the plurality of sub-materials in the material folder pointed to by the import instruction comprises: in response to the import instruction comprising a display order of the plurality of sub-materials in the material folder pointed to by the import instruction, reading and importing the plurality of sub-materials in the display order, and displaying file names of a plurality of imported sub-materials in the action bar in the display order; and/or in response to the import instruction not comprising the display order of the plurality of sub-materials in the material folder pointed to by the import instruction, reading and importing the plurality of sub-materials in a preset order, and displaying the file names of the plurality of imported sub-materials in the action bar in the preset order.

7. The method according to any one of claims 4 to 6, wherein obtaining the parameter values of the playback parameters of the group of sub-materials comprises: in response to receipt of the parameter values set for the playback parameters of the group of sub-materials sent via the interactive interface in the playback parameter setting interface, using the set parameter values as the parameter values of the playback parameters of the group of sub-materials; and/or in response to non-receipt of the parameter values set for the playback parameters of the group of sub-materials sent via the interactive interface in the playback parameter setting interface, using preset parameter values as the parameter values of the playback parameters of the group of sub-materials.

8. The method according to any one of claims 1 to 7, wherein the playback parameters of the group of sub-materials comprise any one or more of the following:

a display parameter, used for representing whether the plurality of sub-materials are displayed;

an interval parameter, used for representing a number of frames spaced between two adjacent sub-materials in the plurality of sub-materials for display;

a trigger action parameter, used for representing a trigger action for triggering display of the plurality of sub-materials;

a loop parameter, used for representing a number of times of loop playback of the plurality of sub-materials;

a trigger delay parameter, used for representing an amount of time for which a display of the plurality of sub-materials is delayed;

a trigger stop parameter, used for representing an action for stopping the display of the plurality of sub-materials;

a display scale parameter, used for representing a reference basis for a change in a display size of the plurality of sub-materials;

a position type parameter, used for representing a type of a relationship between each of the plurality of sub-materials and a respective position;

a position relation parameter, used for representing whether the plurality of sub-materials move with a preset reference part;

a position parameter, used for representing a position binding relationship between each of the plurality of sub-materials and a respective preset key point;

a rotation parameter, used for representing a key point around which the plurality of sub-materials rotate; or

a beautifying/make-up effect parameter, used for representing a beautifying/make-up effect displayed at a preset part when the sub-materials are displayed,

wherein the trigger action corresponding to the trigger action parameter comprises any one or more of the following: trigger without an action, an eye action, a head action, an eyebrow action, a hand action, a mouth action, or a shoulder action,

wherein the position type parameter comprises any one of the following:

a parameter used for representing a foreground;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a face;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a hand;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a head;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a shoulder;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of an arm;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a waist;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a leg;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a foot;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a human skeleton;

a playback position relationship related to the reference part; or

a parameter used for representing a background, and

wherein the playback position relationship related to the reference part comprises any one or more of the following:

the plurality of sub-materials move with the position of the reference part, and the plurality of sub-materials are scaled with a size of the reference part;

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, and the plurality of sub-materials are scaled in depth with rotation of the reference part; or

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, the plurality of sub-materials are scaled in depth with rotation of the reference part, and the plurality of sub-materials rotate with rotation of a plane of the reference part.

~~9~~8. The method according to any one of claims 1 to ~~8~~7, wherein the playback parameters comprise a correspondence between a display position of the group of sub-materials and at least one predetermined key point; and

the key point comprises any one or more of the following: a head key point, a face key point, a shoulder key point, an arm key point, a gesture key point, a waist key point, a leg key point, a foot key point, or a human skeleton key point.

~~10~~9. The method according to claim ~~9~~8, further comprising: establishing the correspondence between the display position of the group of sub-materials and the at least one predetermined key point; and/or establishing a correspondence between the display position of the group of sub-materials and a center key point of a bounding box.

~~11~~10. The method according to any one of claims ~~9 to 10~~8 to 9, further comprising: displaying a reference image through a content display bar, and displaying key points on the reference image, wherein the reference image comprises at least one reference part,

wherein the reference image comprises at least one part of an image of a reference person,

wherein the at least one part of the image of the reference person comprises any one or more of the following images of the reference person: a complete image, a head image, a face image, a shoulder image, an arm image, a gesture image, a waist image, a leg image, or a foot image.

~~12~~11. The method according to claim ~~11~~10, after importing the plurality of sub-materials, further comprising: displaying each sub-material in the group of imported sub-materials in sequence according to the parameter values of the playback parameters of the group of sub-materials, or displaying a plurality of sub-materials in the group of imported sub-materials simultaneously in the content display bar in accordance with a preset display policy; or receiving a selection operation on the sub-materials in the group of sub-materials, and displaying sub-materials selected according to the selection operation in the content display bar.

~~13~~12. The method according to claim ~~12~~11, further comprising: updating the display position of

the group of sub-materials in the content display bar according to a position movement operation on the group of sub-materials or one sub-material therein received through the content display bar, and updating corresponding parameter values in the playback parameters of the group of sub-materials.

~~14~~13. The method according to claim ~~12 or 13~~11 or 12, further comprising: updating the display size of the group of sub-materials in the content display bar according a size adjustment operation on the group of sub-materials or one sub-material therein received through the content display bar, and updating the corresponding parameter values in the playback parameters of the group of sub-materials.

~~15~~14. The method according to any one of claims 1 to ~~14~~13, further comprising: adjusting an occlusion relationship between two or more groups of sub-materials according to a layer parameter adjustment instruction sent for the two or more groups of sub-materials and received through the interactive interface of the action bar, and displaying the two or more groups of sub-materials according to the adjusted occlusion relationship and the parameter values of the playback parameters.

~~16~~15. The method according to any one of claims 1 to ~~15~~14, before generating the special effect program file package, further comprising: generating a special effect program file of the group of sub-materials according to a preset special effect program file and the parameter values of the playback parameters of the group of sub-materials, and displaying the special effect program file of the group of sub-materials through a program file bar.

~~17~~16. A method for generating a special effect, comprising:

obtaining reference values of playback parameters of at least one group of sub-materials in a special effect program file package, wherein the group of sub-materials comprise a plurality of sub-materials, the plurality of sub-materials having a predetermined playback time sequence;

performing key-point detection on a video image; and

generating a special effect based on the at least one group of sub-materials on the video image according to detected key points and the reference values of the playback parameters of

the at least one group of sub-materials,

wherein the special effect program file package is a special effect program file package generated using the method according to any one of claims 1 to ~~16~~15.

~~18~~17. The method according to claim ~~17~~16, further comprising: importing the special effect program file package,

wherein the special effect program file package comprises the at least one group of sub-materials and the parameter values of the playback parameters of the at least one group of sub-materials, and the parameter values of the playback parameters of the group of sub-materials comprise a correspondence between a display position of the group of sub-materials and at least one predetermined key point.

~~19~~18. The method according to claim ~~17 or 18~~16 or 17,

wherein the playback parameters comprise: a trigger event parameter, used for representing a trigger event for triggering display of the plurality of sub-materials;

the method further comprises: detecting whether a trigger action corresponding to a parameter value of the trigger action parameter occurs in the video image,

wherein generating the special effect based on the at least one group of sub-materials on the video image according to detected key points and the reference values of the playback parameters of the at least one group of sub-materials comprises: in response to detecting that the trigger action corresponding to the parameter value of the trigger action parameter occurs in the video image, generating the special effect of the at least one group of sub-materials on the video according to the detected key points and the parameter values of the playback parameters of the at least one group of sub-materials.

~~20~~19. The method according to claim ~~19~~18, wherein the playback parameters further comprise: a trigger stop parameter, used for representing an action for stopping the display of the plurality of sub-materials; and

the method further comprises: detecting whether a trigger action corresponding to a parameter value of the trigger stop parameter occurs in the video image; and in response to detecting that the trigger action corresponding to the parameter value of the trigger stop

parameter occurs in the video image, stopping the special effect of the at least one group of sub-materials generated on the video that is currently being played.

~~21~~20. The method according to claim ~~19 or 20~~18 or 19, wherein the playback parameters comprise~~: a~~ the beautifying/make-up effect parameter~~, used for representing a beautifying/make-up effect displayed at a preset part when the sub-materials are displayed~~; and

the method further comprises: displaying the beautifying/make-up effect at the preset part in the video image according to the beautifying/make-up effect parameter when generating the special effect of the at least one group of sub-materials on the video image according to the detected key points and the parameter values of the playback parameters of the at least one group of sub-materials.

~~22~~21. The method according to any one of claims ~~17 to 21~~16 to 20, wherein importing the special effect program file package comprises: reading the special effect program file package to a memory by invoking a first interface function for reading a sticker material; and parsing the special effect program file package to obtain the at least one group of sub-materials and a special effect program file, wherein the special effect program file comprises the parameter values of the playback parameters of the at least one group of sub-materials.

~~23~~22. The method according to claim ~~22~~21, wherein obtaining the parameter values of the playback parameters of the at least one group of sub-materials in the special effect program file package comprises: creating a sticker handle through a second interface function for creating a sticker handle; and reading the at least one group of sub-materials and the parameter values of the playback parameters of the at least one group of sub-materials in the special effect program file package, and storing the at least one group of sub-materials and the parameter values of the playback parameters into the sticker handle,

wherein the method further comprises: determining a playback time sequence of the plurality of sub-materials according to file names of the plurality of sub-materials; obtaining a display position of each sub-material in the at least one group of sub-materials in the video and the number of video frames according to the parameter values of the playback parameters of the at least one group of sub-materials in the special effect program file in the sticker handle and the

playback time sequence of the plurality of sub-materials, and pre-reading video images corresponding to the number of video frames from the video.

~~24~~23. The method according to claim ~~23~~22, wherein generating the special effect based on the at least one group of sub-materials on the video image according to detected key points and the reference values of the playback parameters of the at least one group of sub-materials comprises: reading, from the sticker handle, the sub-materials that need to be displayed on a current video image of the video by invoking a third interface function for rendering the sticker material; determining, according to the detected key points and the parameter values of the playback parameters, a display position of to-be-displayed sub-materials on the current video image; and displaying, on the display position of the current video image, the sub-materials that need to be displayed on the current video image.

~~25~~24. The method according to any one of claims ~~18 to 24~~17 to 23, wherein performing the key-point detection on the video image comprises: detecting, through a neural network, key points involved in the correspondence on the video image, and outputting a key point detection result,

wherein the key point detection result comprises any one or more of the following: positions of the key points involved in the correspondence in the video image; or preset serial numbers of the key points involved in the correspondence.

~~26~~25. An apparatus for generating a special effect program file package, comprising:

a first import module, configured to import a group of sub-materials, wherein the group of sub-materials comprise a plurality of sub-materials, the plurality of sub-materials having a predetermined playback time sequence;

a first acquisition module, configured to obtain parameter values of playback parameters of the group of sub-materials; and

a first generation module, configured to generate the special effect program file package according to the group of sub-materials and the parameter values of the playback parameters, wherein the special effect program file package is executed for generating, on a video image, a special effect based on the plurality of sub-materials having the predetermined playback time

sequence,

wherein the playback parameters of the group of sub-materials comprise any one or more of the following:

a display parameter, used for representing whether the plurality of sub-materials are displayed;

an interval parameter, used for representing a number of frames spaced between two adjacent sub-materials in the plurality of sub-materials for display;

a trigger action parameter, used for representing a trigger action for triggering display of the plurality of sub-materials;

a loop parameter, used for representing a number of times of loop playback of the plurality of sub-materials;

a trigger delay parameter, used for representing an amount of time for which a display of the plurality of sub-materials is delayed;

a trigger stop parameter, used for representing an action for stopping the display of the plurality of sub-materials;

a display scale parameter, used for representing a reference basis for a change in a display size of the plurality of sub-materials;

a position type parameter, used for representing a type of a relationship between each of the plurality of sub-materials and a respective position;

a position relation parameter, used for representing whether the plurality of sub-materials move with a preset reference part;

a position parameter, used for representing a position binding relationship between each of the plurality of sub-materials and a respective preset key point;

a rotation parameter, used for representing a key point around which the plurality of sub-materials rotate; or

a beautifying/make-up effect parameter, used for representing a beautifying/make-up effect displayed at a preset part when the plurality of sub-materials are displayed,

wherein the trigger action corresponding to the trigger action parameter comprises any one or more of the following: trigger without an action, an eye action, a head action, an eyebrow action, a hand action, a mouth action, or a shoulder action,

wherein the position type parameter comprises any one of the following:

a parameter used for representing a foreground;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a face;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a hand;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a head;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a shoulder;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of an arm;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a waist;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a leg;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a foot;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a human skeleton;

a playback position relationship related to the reference part; or

a parameter used for representing a background, and

wherein the playback position relationship related to the reference part comprises any one or more of the following:

the plurality of sub-materials move with the position of the reference part, and the plurality of sub-materials are scaled with a size of the reference part;

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, and the plurality of sub-materials are scaled in depth with rotation of the reference part; or

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, the plurality of sub-materials are scaled in depth with rotation of the reference part, and the plurality of sub-materials rotate with

rotation of a plane of the reference part.

~~27~~26. An apparatus for generating a special effect, comprising:

a second acquisition module, configured to obtain reference values of playback parameters of at least one group of sub-materials in a special effect program file package, wherein the group of sub-materials comprise a plurality of sub-materials, the plurality of sub-materials having a predetermined playback time sequence;

a first detection module, configured to perform key-point detection on a video image; and

a second generation module, configured to generate a special effect based on the at least one group of sub-materials on the video image according to detected key points and the reference values of the playback parameters of the at least one group of sub-materials,

wherein the special effect program file package is executed for generating, on a video image, a special effect based on the plurality of sub-materials having the predetermined playback time sequence,

wherein the playback parameters of at least one group of sub-materials comprise any one or more of the following:

a display parameter, used for representing whether the plurality of sub-materials are displayed;

an interval parameter, used for representing a number of frames spaced between two adjacent sub-materials in the plurality of sub-materials for display;

a trigger action parameter, used for representing a trigger action for triggering display of the plurality of sub-materials;

a loop parameter, used for representing a number of times of loop playback of the plurality of sub-materials;

a trigger delay parameter, used for representing an amount of time for which a display of the plurality of sub-materials is delayed;

a trigger stop parameter, used for representing an action for stopping the display of the plurality of sub-materials;

a display scale parameter, used for representing a reference basis for a change in a display size of the plurality of sub-materials;

a position type parameter, used for representing a type of a relationship between each of the

plurality of sub-materials and a respective position;

a position relation parameter, used for representing whether the plurality of sub-materials move with a preset reference part;

a position parameter, used for representing a position binding relationship between each of the plurality of sub-materials and a respective preset key point;

a rotation parameter, used for representing a key point around which the plurality of sub-materials rotate; or

a beautifying/make-up effect parameter, used for representing a beautifying/make-up effect displayed at a preset part when the plurality of sub-materials are displayed,

wherein the trigger action corresponding to the trigger action parameter comprises any one or more of the following: trigger without an action, an eye action, a head action, an eyebrow action, a hand action, a mouth action, or a shoulder action,

wherein the position type parameter comprises any one of the following:

a parameter used for representing a foreground;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a face;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a hand;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a head;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a shoulder;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of an arm;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a waist;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a leg;

a parameter used for representing that the plurality of sub-materials are positioned and/or move with a position of a foot;

a parameter used for representing that the plurality of sub-materials are positioned and/or

move with a position of a human skeleton;

a playback position relationship related to the reference part; or

a parameter used for representing a background, and

wherein the playback position relationship related to the reference part comprises any one or more of the following:

the plurality of sub-materials move with the position of the reference part, and the plurality of sub-materials are scaled with a size of the reference part;

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, and the plurality of sub-materials are scaled in depth with rotation of the reference part; or

the plurality of sub-materials move with the position of the reference part, the plurality of sub-materials are scaled with the size of the reference part, the plurality of sub-materials are scaled in depth with rotation of the reference part, and the plurality of sub-materials rotate with rotation of a plane of the reference part.

~~28~~27. A computer-readable storage medium, having a computer program stored thereon, wherein when the computer program is executed by a processor, the method according to any one of claims 1 to ~~25~~ 24 is implemented.