

CLAIMS

1. A gesture recognition method, comprising:

detecting states of fingers comprised in a hand in an image;

determining a state vector of the hand according to the states of the fingers; and

determining the gesture of the hand according to the state vector of the hand,

wherein, the method further comprises:

detecting position information of the fingers comprised in the hand in the image, the position information only including position information of key points of fingers comprised in the hand, which are not in a non-outstretched state; and

determining a position vector of the hand according to the position information of the fingers,

wherein determining the gesture of the hand according to the state vector of the hand comprises:

determining the gesture of the hand according to the state vector of the hand and the position vector of the hand.

2. The method according to claim 1, wherein the states of the fingers represent the states of whether the fingers are outstretched with respect to the base of a palm of the hand and/or an extent of outstretching.

3. The method according to claim 1 or 2, wherein determining the state vector of the hand according to the states of the fingers comprises:

determining state values of the fingers according to the states of the fingers, wherein the state values of fingers corresponding to different states are different; and

determining the state vector of the hand according to the state values of the fingers.

4. The method according to any one of claims 1 to 3, wherein the states of the fingers comprise one or more of the following: an outstretched state, a non-outstretched state, a half-outstretched state, or a bent state.

~~5. The method according to any one of claims 1 to 4, further comprising:~~

~~detecting position information of the fingers comprised in the hand in the image; and~~

~~determining a position vector of the hand according to the position information of the fingers,~~

~~wherein determining the gesture of the hand according to the state vector of the hand comprises:~~

~~determining the gesture of the hand according to the state vector of the hand and the position vector of the hand.~~

56. The method according to claim 15, wherein detecting the position information of the fingers comprised in the hand in the image comprises:

detecting key points of the fingers comprised in the hand in the image to obtain position information of the key points of the fingers; and

the determining the position vector of the hand according to the position information of the fingers comprises:

determining the position vector of the hand according to the position information of the key points of the fingers.

67. The method according to claim 56, wherein detecting the key points of the fingers comprised in the hand in the image to obtain the position information of the key points of the fingers comprises:

only detecting the key points of fingers, which are not in a non-outstretched state, comprised in the hand in the image, to obtain the position information of the key points.

78. The method according to claim 67, wherein the key points comprise fingertips and/or phalangeal joints.

89. The method according to any one of claims 1 to 78, wherein detecting the states of fingers comprised in the hand in the image comprises:

inputting the image into a neural network, and detecting the states of the fingers comprised in the hand in the image via the neural network.

940. The method according to claim 89, wherein the neural network comprises multiple state branch networks, and the detecting the states of the fingers comprised in the hand in the image via the neural network comprises:

detecting the states of different fingers comprised in the hand in the image respectively via different state branch networks of the neural network.

1044. The method according to claim 89 or 940, wherein the neural network further comprises a position branch network, the method further comprises detecting a position information of the fingers comprised in the hand in the image, and the detecting the position information of the fingers comprised in the hand in the image comprises:

detecting the position information of the fingers comprised in the hand in the image via the position branch network of the neural network.

1112. The method according to any one of claims 89 to 1011, wherein the neural network is obtained in advance by means of training by using a sample image with annotation information, the annotation information comprising first annotation information representing the states of the fingers, and/or second annotation information representing the position information of the fingers or the position information of the key points.

1123. The method according to claim 112, wherein in the sample image, the second annotation information of the fingers in the non-outstretched state is not annotated.

1134. The method according to claim 112 or 1123, wherein the first annotation information comprises the state vector composed of a first identification value representing the state of each finger; and

the second annotation information comprises the position vector composed by a second identification value identifying the position information of each finger or the position information of the key points.

1145. The method according to any one of claims 89 to 1134, wherein the neural network is obtained in advance by means of training, and the training steps of the neural network comprises:

inputting the sample image of a hand into the neural network to obtain the states of fingers in the hand;

determining position weights of the fingers according to the states of the fingers;

determining the loss of the gesture prediction result of the neural network according to the states and the position weights of the fingers; and

back-propagating the loss to the neural network, so as to adjust network parameters of the neural network.

1156. The method according to claim 1145, wherein inputting the sample image of the hand into the neural network to obtain the states of the fingers in the hand comprises:

inputting the sample image of the hand into the neural network to obtain the states and the position information of fingers in the hand; and

the determining the loss of the gesture prediction result of the neural network according to the states and the position weights of the fingers comprises:

determining the loss of the gesture prediction result of the neural network according to the states, the position information, and the position weights of the fingers.

167. The method according to claim 145 or 156, wherein determining the position weights of the fingers according to the states of the fingers comprises:

when the states of the fingers are the non-outstretched state, determining that the position weights of the fingers are zero weight.

178. The method according to claim 1, further comprising:

acquiring, according to a predetermined mapping relationship between the gesture and a control instruction, a control instruction corresponding to a determined result of the gesture, and controlling, according to the control instruction, an electronic device to execute a corresponding operation;

or,

determining a special effect corresponding to the determined result of the gesture according to the predetermined mapping relationship between the gesture and a special effect, and drawing the special effect on the image by means of computer drawing.

189. An electronic device, comprising:

a processor; and

a memory configured to store processor-executable instructions,

wherein the processor executes the method according to any one of claims 1 to 178 by invoking the executable instructions.

1920. A computer-readable storage medium, having computer program instructions stored thereon, wherein when the computer program instructions are executed by a processor, the method according to any one of claims 1 to 178 is implemented.