

PICTURE OPERATION AND CONTROL METHOD AND DEVICE FOR MOBILE TERMINAL, MOBILE TERMINAL, AND MEDIUM

This application claims priority for Chinese Patent Application submitted to the National
5 Intellectual Property Administration, PRC on July 24, 2017, Application No. 201710605615.0, and
titled “Picture Operation and Control Method and Device for Mobile Terminal, Mobile Terminal, and
Medium”, with all its contents hereby incorporated by reference.

TECHNICAL FIELD

This application belongs to the technical field of mobile terminals, and particularly relates to a
10 picture operation and control method and device for a mobile terminal, a mobile terminal, and a
medium.

BACKGROUND

With the development of display screen manufacturing processes, large screens are becoming
the development trend of mobile terminals, so that more contents can be displayed on the screens of
15 the mobile terminals, and the visual experience of users is improved.

In actual scenes, operation and control of pictures, such as zooming in or out the pictures, are
generally completed by touch with at least two fingers. In the case where users carry heavy objects
with one hand, if the users still want to implement operation and control on pictures by means of a
mobile phone, the users have to perform single-handed operation and control with the other hand. In
20 the scene of single-handed operation and control, the users need to hold the mobile phone with one
hand and have to keep two fingers of this hand free, and operation and control on the pictures become
more difficult. In addition, if the users want to zoom in a position at the top of the picture, this
position will be inaccessible due to a large screen and cannot be zoomed in.

From the above description, it is difficult for users to implement single-handed operation and
25 control on a picture in a large-screen mobile terminal in the prior art, thus making the efficiency of
operating and controlling the picture low.

SUMMARY

In view of this, this application provides a picture operation and control method and device for a mobile terminal, a mobile terminal, and a medium to solve the problem that in the prior art, it is difficult for users to implement single-handed operation and control on a picture in a large-screen mobile terminal, thus resulting in low picture operation and control efficiency.

5 In the first aspect, this application provides a picture operation and control method for a mobile terminal. The picture operation and control method comprises:

Dividing a picture displayed in an interface of a mobile terminal into multiple image areas;

Detecting an inclination direction and an inclination angle of the mobile terminal;

10 Performing focus switching among the multiple image areas according to the inclination direction and the inclination angle;

If it is detected that the inclination direction is the same as a preset direction, triggering an image area selecting operation so as to select, in the interface, an image area where a focus stays, wherein the preset direction is a direction which is preset corresponding to the image area selecting operation;

15 Acquiring a picture scaling factor that simultaneously corresponds to the inclination direction and the inclination angle; and

Scaling the selected image area based on the picture scaling factor.

In the second aspect, this application provides a picture operation and control device for a mobile terminal. The picture operation and control device comprises:

20 A division module used for dividing a picture displayed in an interface of a mobile terminal into multiple image areas;

A first detection module used for detecting an inclination direction and an inclination angle of the mobile terminal;

A switching module used for performing focus switching among the multiple image areas according to the inclination direction and the inclination angle;

25 A selection module used for triggering an image area selecting operation so as to select, in the interface, an image area where a focus stays if it is detected that the inclination direction is the same as a preset direction, wherein the preset direction is a direction which is preset corresponding to the image area selecting operation;

An acquisition module used for acquiring a picture scaling factor that simultaneously corresponds to the inclination direction and the inclination angle; and

Scaling module used for scaling the selected image area based on the picture scaling factor.

In the third aspect, this application provides a mobile terminal comprising a memory and a processor, wherein a computer-readable instruction which is able to run on the processor is stored in the memory, and the processor executes the computer-readable instruction to implement the steps of the picture operation and control method for a mobile terminal mentioned in the first aspect.

In the fourth aspect, this application provides a computer-readable storage medium having a computer-readable instruction stored therein, wherein the computer-readable instruction is executed by at least one processor to implement the steps of the picture operation and control method for a mobile terminal mentioned in the first aspect.

In this application, after a picture is divided into multiple image areas, a focus in an interface of a mobile terminal is controlled to switch among multiple image areas the according to an inclination direction and an inclination angle which are detected in real time, so that a user can still select an image area at any position of the interface by inclining the mobile terminal in the case of single-handed operation and control. After the image area is selected, the mobile terminal is inclined again to scale the selected image area by a scaling factor required by the user, so that operation and control of the picture are completed without multiple fingers. Therefore, by means of this application, the difficulty in implementing single-handed operation and control on a picture in a large-screen mobile terminal is reduced, and the efficiency of operating and controlling the picture is improved.

BRIEF DESCRIPTION OF DRAWINGS

For the sake of a clearer explanation of the technical solutions of the embodiments of this application, a brief description of the accompanying drawings required for describing the embodiments of this application or the prior art is given below. Clearly, the drawings in the following description are only illustrative ones of this application, and those ordinarily skilled in the art can obtain other drawings according to these illustrative ones without creative labor.

FIG. 1 is an implementation flow diagram of a picture operation and control method for a mobile terminal provided by one embodiment of this application;

FIG. 2 is a schematic diagram of a three-dimensional coordinate system suitable for a direction sensor provided by the embodiment of this application;

FIG. 3 is a schematic diagram of a focus switching direction provided by the embodiment of this application;

5 FIG. 4 is a specific implementation flow diagram of S101 of the picture operation and control method for a mobile terminal provided by the embodiment of this application;

FIG. 5 is an implantation flow diagram of the picture operation and control method for a mobile terminal provided by another embodiment of this application;

10 FIG. 6 is a specific implementation flow diagram of S101 of the picture operation and control method for a mobile terminal provided by the embodiment of this application;

FIG. 7 is a specific implementation flow diagram of S103 of the picture operation and control method for a mobile terminal provided by the embodiment of this application;

FIG. 8 is an implementation flow diagram of the picture operation and control method for a mobile terminal provided by another embodiment of this application;

15 FIG. 9 is a structural block diagram of a picture operation and control device for a mobile terminal provided by one embodiment of this application;

FIG. 10 is a structural block diagram of the picture operation and control device for a mobile terminal provided by another embodiment of this application;

20 FIG. 11 is a structural blow diagram of the picture operation and control device for a mobile terminal provided by another embodiment of this application;

FIG. 12 is a schematic diagram of a mobile terminal provided by one embodiment of this application.

DESCRIPTION OF EMBODIMENTS

For the sake of a thorough understanding of the embodiments of this application, concrete
25 details such as specific system structures and techniques are provided in the following description for the purpose of explanation instead of limitation. However, those skilled in the art would appreciate that this application can still be implemented without these concrete details in other embodiments. In other cases, a detailed description of known systems, devices, circuits and methods is omitted to

avoid interference of other unnecessary details on the description of this application.

In the embodiments of this application, a mobile terminal includes, but is not limited to, terminal devices such as mobile phones, tablet computers, personal digital assistants (PDAs), and smartwatches.

5 The technical solutions of this application are explained below in combination with embodiments.

FIG. 1 shows an implementation process of a picture operation and control method for a mobile terminal provided by one embodiment of this application. The picture operation and control method specifically comprises the following steps:

10 S101: a picture displayed in an interface of a mobile terminal is divided into multiple image areas.

A picture corresponding to an image thumbnail or picture link in a local photo file or a mobile application is displayed in the interface of the mobile terminal according to a selecting instruction sent in the mobile terminal by a user.

15 The picture is divided into multiple image areas when displayed, and a control to be selected is added in each image area. Preferably, division lines between the image areas are not shown in the interface to avoid visual influences when the user views the picture.

S102: an inclination direction and an inclination angle of the mobile terminal are detected.

20 In this embodiment of the application, an acceleration sensor is an electronic device which is able to measure accelerations of the mobile terminal in all directions. If the acceleration sensor is a triaxial accelerometer, accelerations in an x-axis direction, a y-axis direction and a z-axis direction can be measured. The inclination direction of the mobile terminal is determined based on the accelerations in all the directions.

For example, when it is detected that the acceleration of the mobile terminal in the x-axis
25 direction is a positive value, it is determined that the inclination direction of the mobile terminal at the current moment is leftward; when it is detected that the acceleration of the mobile terminal in the x-axis direction is a negative value, it is determined that the inclination direction of the mobile terminal at the current moment is rightward; when it is detected that the acceleration of the mobile

terminal in the y-axis direction is a negative value, it is determined that the inclination direction of the mobile terminal at the current moment is upward; and when it is detected that the acceleration of the mobile terminal in the y-axis direction is a positive value, it is determined that the inclination direction of the mobile terminal at the current moment is downward.

5 A direction sensor is used for measuring the inclination angle of the mobile terminal in the inclination direction. Three parameters, namely the azimuth angle, the inclination angle and the rolling angle, returned by the internal direction sensor can be acquired in real time and respectively reflect the rotation angles of the mobile terminal around the z-axis, the x-axis and the y-axis.

10 For example, as shown in FIG. 2, if the mobile terminal is erected on the horizontal plane, the direction from bottom to top of the mobile terminal is a positive direction of the y-axis; the direction from back to front of the mobile terminal is a positive direction of the z-axis; and towards a display screen of the mobile terminal, the direction from left to right is a positive direction of the x-axis. When the mobile terminal rotates around the x-axis, the value of the inclination angle varies from -180° to 180° . If the mobile terminal is lifted from the top to rotate around the x-axis by 180° , the value of the inclination angle gradually varies from 0° to -180° in the rotation process. If the mobile terminal is lifted from the bottom to rotate around the x-axis by 180° , the value of the inclination angle gradually varies from 0° to 180° in the rotation process. Therefore, the user can acquire the inclination angle of the mobile terminal around the x-axis according to the inclination angle parameter returned by the direction sensor when inclining the mobile terminal.

20 The inclination direction of the mobile terminal not only can be measured by the acceleration sensor, but also can be determined according to the inclination angle measured by direction sensor, so that single-handed operation and control can still be conducted on a picture in a large-screen mobile terminal in the case of a failure of the acceleration sensor, thus improving the reliability of single-handed operation and control on the mobile terminal.

25 For example, if the rolling angle measured by the direction sensor is 0° - 90° , it is determined that the mobile terminal rotates around the y-axis rightwards, that is to say, the left side of the mobile terminal is lifted, and thus, the inclination direction of the mobile terminal is rightward.

S103: focus switching is performed among the multiple image areas according to the inclination

direction and the inclination angle.

In this embodiment of the application, the focus indicates the position where a cursor in the interface of the mobile terminal is activated. The position of the focus in the interface of the mobile terminal can be adjusted according to the inclination direction and the inclination angle of the mobile terminal. When the user wants to select an inaccessible image area, the user can incline the mobile terminal as actually needed to adjust the focus to a position of the image area to be selected.

In one illustrative embodiment of this application, the switching direction of the focus in the interface is determined according to the inclination direction of the mobile terminal. For instance, as shown in FIG. 3, if the focus is located at point B at the current moment, the focus is switched toward the position of the next image area C when the inclination direction of the mobile terminal is downward; and the focus is switched to the position of the previous image area A when the inclination direction of the mobile terminal is upward.

If the inclination direction of the mobile terminal remains unchanged within a preset time, the focus is continuously and rapidly switched in one direction. That is to say, it takes a seconds to complete one time of focus switching in a normal mode, while it takes $1/N \times a$ seconds to complete one time of focus switching in the continuous and rapid switching process, wherein N is an integer greater than zero. By adoption of such switching manner, when the user wants to select an image area at the top of the interface of the mobile terminal in the case where the focus is located at the bottom of the interface of the mobile terminal, the user does not need to incline the mobile terminal repeatedly and can rapidly switch the focus to the top of the interface by keeping the inclination direction of the mobile terminal unchanged, thus realizing rapid selection of the image area.

In another illustrative embodiment of this application, the switching direction of the focus in the interface is determined according to the inclination angle of the mobile terminal. For instance, if the inclination angle of the mobile terminal around the x-axis is 0° - 180° , the focus is switched towards the position of the next image area; and if the inclination angle of the mobile terminal around the x-axis is -180° - 0° , the focus is switched towards the position of the previous image area.

Preferably, in order the decrease the error rate of focus switching, when the inclination direction and the inclination angle of the mobile terminal are acquired, a focus switching event is triggered only

if the inclination direction remains unchanged or the inclination angle is within a certain range within a preset time such as 0.5s, and then the switching direction of the focus in the interface is determined according to the inclination direction and the inclination angle within the preset time.

S104: if it is detected that the inclination direction is the same as a preset direction, an image area selecting operation is triggered so as to select, in the interface, an image area where the focus stays, wherein the preset direction is a direction which is preset corresponding to the image area selecting operation.

The focus in the interface is switched towards the position of the previous image area or the position of the next image area. However, in an actual scene, the mobile terminal may incline in various other directions. In view of this, in addition to determining the switching direction of the focus in the interface according to the inclination direction of the mobile terminal, any one of the remaining inclination directions is preset as an inclination direction corresponding to the image area selecting operation.

For instance, when the inclination direction of the mobile terminal is rightward, it is determined that the user is about to implement the image area selecting operation at the current moment. In this case, the user inclines the mobile terminal upwards, downwards, leftwards or rightwards to adjust the position of the focus and then implements a rightward inclination operation when the focus reaches the position of the image area to be selected by the user, and thus, the required image area is selected.

S105: a picture scaling factor that simultaneously corresponds to the inclination direction and the inclination angle is acquired.

In this embodiment of the application, after one image area in the interface is selected, the inclination direction and the inclination angle of the mobile terminal continue to be detected. The picture scaling factor at each moment can be acquired by means of a preset computation formula or a preset corresponding relation table according to the inclination direction and the inclination angle of the mobile terminal at each moment.

For example, a_{xt} and a_{yt} respectively represent the accelerations of the mobile terminal in the x-axis direction and in the y-axis direction at moment t , θ_{xt} and θ_{yt} respectively represent the inclination angles (unit: radian (rad)) of the mobile terminal around the x-axis and the y-axis at

moment t , and the picture scaling factor A is obtained by calculation according to the following formula:

$$A = \frac{a_{xt}}{|a_{xt}|} \times \frac{15}{2\pi} \times |\theta_{yt}| + \frac{a_{yt}}{|a_{yt}|} \times \frac{15}{2\pi} \times |\theta_{xt}|$$

For example, if the mobile terminal is inclined upwards, it is detected that the acceleration in the

5 y-axis direction is smaller than zero, and $\frac{a_{yt}}{|a_{yt}|} = -1$; if the mobile terminal rotates around the x-axis by 36° at the same time, $\theta_{xt} = 36 \times \frac{\pi}{180}$ (rad); if the mobile terminal is not inclined in other directions at this moment, $|\theta_{yt}|=0$; and the picture scaling factor A obtained by calculation is 1.5 after the parameters are substituted to the formula. 1.5 is a positive value, and thus, the picture needs to be zoomed in by 1.5 times.

10 S106: the selected image area is scaled based on the picture scaling factor.

For example, if it is detected at moment t_1 that the inclination direction is leftward and the inclination angle is 30° , the image scaling operation corresponding to the leftward inclination is to zoom in the image area, the scaling factor corresponding to the inclination angle of 30° is 120%, and the image area selected by the user is zoomed in by 1.2 times at moment t_1 . If it is detected at moment 15 t_2 that the inclination direction is rightward and the inclination angle is 10° , an image scaling operation corresponding to the leftward inclination is to zoom out the picture, the scaling factor corresponding to the inclination angle of 10° is 100%, and the image area selected by the user is zoomed out by 1 time at moment t_2 . Clearly, after the image area is selected, the user can change the inclination degree of the mobile terminal in real time as actually needed so as to implement scaling 20 control on the selected image area.

Preferably, in addition to scaling the picture by means of the inclination operation, the picture can also be scaled according to a multi-touch event sent out by the user on the mobile terminal, so that multi-approach control of the image area is realized. The user can still scale the picture by means of finger touch, so that the flexibility of operating and controlling the picture is improved.

25 In this embodiment of the application, after a picture is divided into multiple image areas, a focus in an interface of a mobile terminal is controlled to switch among multiple image areas the according to an inclination direction and an inclination angle which are detected in real time, so that a user can still select an image area at any position of the interface by inclining the mobile terminal in

the case of single-handed operation and control. After the image area is selected, the mobile terminal is inclined again to scale the selected image area by a scaling factor required by the user, so that operation and control of the picture are completed without multiple fingers. Therefore, by means of this application, the difficulty in implementing single-handed operation and control on a picture in a large-screen mobile terminal is reduced, and the efficiency of operating and controlling the picture is improved.

In this embodiment of the invention, after the

In one embodiment of this application, as shown in FIG. 4, S101 particularly comprises:

S401: the accelerations of the mobile terminal in all directions are detected.

10 S402: if it is detected, within a first preset time, that the acceleration in any one direction continuous changes between positive values and negative values, a picture division event is triggered.

In this embodiment of the application, the accelerations of the mobile terminal in the x-axis direction, the y-axis direction and the z-axis direction are detected. If it is detected, within a short first preset time, that the accelerations in the x-axis direction, the y-axis direction and the z-axis direction are continuously switched between positive values and negative values and the switching frequency is greater than a preset threshold such as 3, it is determined that the user needs to divide the picture at the current moment, and the picture division event is triggered. Wherein, every time the accelerations are switched from positive values to negative values or from negative values to positive values, the switching frequency is increased by one.

20 For example, if the first preset time is 3s and the acceleration in the x-axis direction within 3s is sequentially switched to a negative value, a positive value, a negative value and a positive value, the switching frequency within 3s is 3. Because the switching frequency reaches the preset threshold, the picture division event is triggered.

S403: the number of continuous changes between positive values and negative values of the acceleration within the first preset time is counted, and an area division number of the picture is determined according to the number of continuous changes.

If the switching frequency reaches the preset threshold before the end of the first preset time, the picture division event is triggered, and the total number of continuous changes of the acceleration

between the positive values and the negative values within the first preset time continues to be detected.

For example, the step of determining the area division number of the picture according to the detected switching frequency can be implemented as follows: if the switching frequency is b , the area division number is $b \times b$; or, if the switching frequency is b , the area division number is b , that is to say, the picture is randomly divided into b image areas.

S404: the picture displayed in the interface of the mobile terminal is divided into multiple image areas based on the area division number of the picture.

In this embodiment of the application, whether the acceleration in any one direction changes frequently between positive values and negative values is detected, so that the user can determine whether the picture division event needs to be triggered, and accordingly, whether it is necessary for the user to scale the image area by means of single-handed operation and control is determined. The number of changes between positive values and negative values of the acceleration is detected, so that the user can accurately control the area division number of the picture only by repeatedly turning the mobile terminal in one direction, thus reducing the difficulty of operating and controlling the picture.

As shown in FIG. 5, in another embodiment of this application, S401 is implemented again after S106, namely, the accelerations of the mobile terminal in all the directions are detected. The subsequent steps are sequentially implemented after S401.

Particularly, after the selected image area is scaled, whether it is detected, within the first preset time, that the acceleration in any one direction continuously changes between positive values and negative values is determined again in S402 according to the real-time accelerations of the mobile terminal. If it is detected, within the first preset time, that the acceleration in any one direction continuously changes between positive values and negative values, the area division number of the picture is determined according to a detected switching frequency. The scaled image area in the interface of the mobile terminal at the current moment is divided again based on the area division number, so that multiple image areas which are further scaled are obtained, namely multiple sub-areas of the previously-selected image area are obtained.

Wherein, the division principle of the sub-areas of the selected image area is the same as that of

the original picture and will not be detailed anymore herein.

After the multiple sub-areas in the scaled image area are obtained, the focus in the interface is switched again according to the inclination direction and the inclination angle of the mobile terminal to select one sub-area, and then the sub-area selected by the focus is scaled.

5 As shown in FIG. 6, the following step is implemented after S401:

S405: if it is not detected, with the first preset time, that the acceleration in any one direction continuously changes between positive values and negative values, the scaled image area is horizontally moved according to the current inclination direction and the current inclination angle of the mobile terminal.

10 After one image area in the interface is selected, if the acceleration in the x-axis direction, the y-axis direction or the z-axis direction remains unchanged or is kept at a positive or negative value, or the switching frequency is smaller than the preset threshold within the short first preset time, it is determined that continuous changes between positive values and negative values of the acceleration in any one direction are not detected. In this case, the horizontal-movement direction and distance of
15 the image area are determined according to the inclination direction and the inclination angle, detected in real time, of the mobile terminal.

The scaled image area is moved based on the determined horizontal-movement direction and distance, so that the user can view the image area which is not displayed in the interface of the mobile terminal currently.

20 In this embodiment of the application, different responsive operations, such as scaling, horizontal movement operation and area division, are implemented on the mobile terminal at different moments according to the inclination direction and the inclination angle of the mobile terminal, so that the flexibility of operating and controlling the picture is improved. Multi-level area division is conducted on the selected image area, so that the selection range of the image areas is
25 further narrowed, the image area to be zoomed in for the user can be positioned more accurately, and thus, the accuracy of picture operation and control is improved.

FIG. 7 shows a specific implementation flow diagram of S103 of the picture operation and control method for a mobile terminal in one embodiment of this application. As shown in FIG. 7,

S103 is specifically implemented as follows:

S103: a detection box is generated, wherein the detection box is initially located in one image area of the picture.

In this embodiment of the application, the detection box is generated in the interface of the mobile terminal to indicate a focus used for selecting an operation control in the interface of the mobile terminal. The detection box is able to move upwards, downwards, leftwards or rightwards in the interface of the mobile terminal according to a received control instruction.

Preferably, because the detection box is used for selecting any one of the image areas in the picture, the edges of the detection box are made to overlap with the edges of the corresponding image area when the detection box is located at any position of the interface, so that the image area corresponding to the detection box at the current moment can be accurately displayed. The size of the detection box should be the same as that of each image area.

S1032: the detection box is controlled to move among the multiple image areas according to the inclination direction and the inclination angle.

The moving direction of the detection box in the interface is determined according to the inclination direction of the mobile terminal. For instance, when the inclination direction is downward, the detection box is controlled to move toward the position of the next image area; and when the inclination direction is upward, the detection box is controlled to move towards the position of the previous image area. If it is detected, within a preset time, that the mobile terminal is inclined, the detection box is moved once. Every time the detection box is moved, the detection box is moved to the position of another image area not located at the current position of the detection box.

Every time the detection box is moved, the edges of the detection box overlap with the edges of the image area at the corresponding position, and are highlighted.

In one embodiment of this application, the moving distance of the detection box can be determined according to the inclination angle of the mobile terminal. For instance, if the mobile terminal is inclined leftwards and the inclination angle is greater than 90° , the moving distance is 10 image areas. In this case, the detection box is moved to the position of the 10th image area previous to the current position.

When it is detected that the inclination direction of the mobile terminal at the current moment is the inclination direction corresponding to the image area selecting operation, vertex coordinates of the detection box are obtained.

The image area defined by the vortex coordinates is determined in the picture and is identified as
5 an image area selected at the current moment.

When the detection box overlaps with one image area to be selected by the user, the user inclines the mobile terminal to a direction corresponding to image area selecting operation. At this moment, the vortex coordinates of the detection box at the current moment are acquired, and pixel points corresponding to the vertex coordinates are determined in the preset picture according to the vortex
10 coordinates. An area defined by the pixel points is recognized through a preset image processing algorithm, and the recognized area is extracted and is identified as an image area selected by the user so as to be scaled.

In this embodiment of the application, the detection box capable of moving in the interface is generated and is made to overlap with the image area at the position where the detection box is
15 located in real time, so that it is guaranteed that the user can know the size of the image area selected at the current moment, and the user can accurately determine whether or not the area obtained by division includes an image element required, thus improving the selection accuracy of the image area. The area in the picture is determined based on the vertex coordinates of the detection box, so that recognition and extraction of an image corresponding to the selected area are realized.

20 As shown in FIG. 8, in another embodiment of this application, the following steps are implemented before S101:

S107: when a calibration event is triggered, a prompt message is sent out, wherein the prompt message is used for reminding the user to maintain the mobile terminal at a common inclination angle within a second preset time, and the common inclination angle is an inclination angle at which the
25 mobile terminal is used by the user most frequently; and

S108: an inclination angle of the mobile terminal within the second preset time is detected and is identified as a reference angle used for detecting the inclination direction and the inclination angle of the mobile terminal.

When an operation and control calibration instruction sent by the user is detected, the calibration event is triggered. Operation and control direction selection information is sent out in the interface of the mobile terminal to request the user to select a mobile terminal operation and control direction at the current moment. The mobile terminal operation and control direction includes a horizontal-screen operation and a vertical-screen operation.

After the mobile terminal operation and control direction selected by the user is received, the prompt message is sent out to remind the user maintain the mobile terminal at an inclination angle most suitable for the operation habits of the user within a preset time.

In this embodiment of the application, the inclination angle of the mobile terminal within a preset time is detected through the internal direction sensor, so that the inclination angles of the mobile terminals in all directions are determined and are identified as reference angles.

When the user implements single-handed operation and control on the picture, the inclination angle of the mobile terminal is detected and is identified as an absolute inclination angle. A relative inclination angle is worked out according to the difference between the absolute inclination angle and the reference angle. Determination is made based on the relative inclination angle when the switching direction of the focus is controlled and the image areas are scaled subsequently.

In this embodiment of the application, the calibration event is triggered according to different using habits of the mobile terminal user, so that a common inclination angle suitable for the user is determined, and the inclination angle detected at each moment can be adjusted based on the reference angle to allow the user to implement single-handed operation and control on the picture more conveniently in accordance with the using habits, thus, reducing the difficulty of operating and controlling the picture, and greatly improving the efficiency of operating and controlling a picture in a large-screen mobile terminal.

It should be understood that the serial numbers of the steps in the above embodiments do not indicate the implementation sequence of these steps and are not intended to limit the implementation process of the embodiments of this application. The implementation sequence of the steps depends on the functions and internal logics of these steps.

Corresponding to the picture operation and control method for a mobile terminal in the above

embodiments, FIG. 9 shows a structural block diagram of a picture operation and control device for a mobile terminal in one embodiment of this application. For the sake of a brief description, only the parts relating to the embodiments of this application are shown.

Referring to FIG. 9, the device comprises:

5 A division module 901 used for dividing a picture displayed in an interface of a mobile terminal into multiple image areas;

A first detection module 902 used for detecting an inclination direction and an inclination angle of the mobile terminal;

10 A switching module 903 used for performing focus switching among the multiple image areas according to the inclination direction and the inclination angle;

A selection module 904 used for triggering an image area selecting operation so as to select, in the interface, an image area where a focus stays if it is detected that the inclination direction is the same as a preset direction, wherein the preset direction is a direction which is preset corresponding to the image area selecting operation;

15 An acquisition module 905 used for acquiring a picture scaling factor that simultaneously corresponds to the inclination direction and the inclination angle; and

A scaling module 906 used for scaling the selected image area based on the picture scaling factor.

Optionally, the division module 901 comprises:

20 A detection sub-module used for detecting accelerations of the mobile terminal in all directions;

A triggering sub-module used for triggering a picture division event if it is detected, within a first preset time, that the acceleration in any one direction continuously changes between positive values and negative values;

25 A counting sub-module used for counting the number of continuous changes between the positive values and the negative values of the acceleration within the first preset time, so as to determine an area division number of the picture according to the number of continuous changes; and

A division sub-module used for dividing the picture displayed in the interface of the mobile terminal into multiple image areas according to the image area division number.

Optionally, as shown in FIG. 10, the picture operation and control device for a mobile terminal further comprises:

A second detection module 907 used for detecting the accelerations of the mobile terminal in all directions;

5 A horizontal movement module 908 used for horizontally moving a scaled image area according to the current inclination direction and the current inclination angle of the mobile terminal if it is not detected, within the first preset time, that the acceleration in any one direction continuously changes between negative values and positive values.

Optionally, the switching module 903 comprises:

10 A generation sub-module used for generating a detection box which is initially located in one image area in the picture; and

A control sub-module used for controlling the detection box to move among the multiple image areas according to the inclination direction and the inclination angle.

15 Optionally, as shown in FIG. 11, the picture operation and control device for a mobile terminal further comprises:

A prompt module 909 used for sending out a prompt message when a calibration event is triggered, wherein the prompt information is used for reminding a user to maintain the mobile terminal at a common inclination angle within a second preset time, and the common inclination angle is an inclination angle at which the mobile terminal is used by the user most frequently; and

20 A calibration module 910 used for detecting an inclination angle of the mobile terminal within the second preset time and identifying the inclination angle as a reference angle used for detecting the inclination direction and inclination angle of the mobile terminal.

FIG. 12 is a schematic diagram of a mobile terminal provided by one embodiment of this application. As shown in FIG. 12, the mobile terminal 12 in this embodiment comprises a processor 1200 and a memory 1201, wherein a computer-readable instruction 1202, such as a picture operation and control program, which is able to run on the processor 1200 is stored in the memory 1201. The processor 1200 executes the computer-readable instruction 1202 to implement the steps of the picture operation and control method for a mobile terminal in the above embodiments, such as S101 to S106

shown in FIG. 1. Or, the processor 1200 executes the computer-readable instruction 1202 to fulfill the functions of all the modules/units of the device in the above embodiments, such as the functions of the modules 901-906 shown in FIG. 9.

For example, the computer-readable instruction 1202 can be divided into one or more modules/units which are stored in the memory 1201, and is executed by the processor 1200 to complete this application. The one or more modules/units are a series of computer-readable instruction segments capable of fulfilling specific functions, and the instruction segments are used for describing the implementation process of the computer-readable instruction 1202 in the mobile terminal 12.

The mobile terminal 12 is a computing device such as a desk computer, a notebook computer, a personal digital assistant, or a cloud server. The mobile terminal includes, but is not limited to, the processor 1200 and the memory 1201. Those skilled in the art would appreciate that FIG. 12 is only used for illustrating the mobile terminal 12, and is not intended to limit the mobile terminal 12. The mobile terminal 12 can include more or less components or can combine certain components or different components. For instance, the mobile terminal may further comprise an input-output device, a network access facility, a bus, and the like.

The processor 1200 is a central processing unit (CPU), other universal processors, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field-programmable gate array (FPGA), other programmable logical devices, a discrete gate or transistor logic device, a discrete hardware assembly, or the like. The universal processors are microprocessors or any conventional processors.

The memory 1201 is an internal memory cell of the mobile terminal 12, such as a hard disk or an internal memory of the mobile terminal 9. Or, the memory 1201 is an external memory device of the mobile terminal 12, such as a pluggable hard disk, a smart media card (SMC), a secure digital (SD), or a flash card on the mobile terminal 12. Furthermore, the memory 1201 may comprise an internal memory cell and an external memory device of the mobile terminal 12. The memory 1201 is used for storing a computer-readable instruction and other programs and data required by the mobile terminal. The memory 1201 is also used for temporarily storing output data or to-be-output data.

In addition, all functional units of the embodiments of this application are integrated in one processing unit or physically exist independently, or two or more units are integrated in one unit. Integrated units are implemented in the form of hardware or in the form of software functional units.

The integrated units are stored in one computer-readable storage medium when implemented in the form of software functional units and sold or used as independent products. On the basis of such appreciation, the technical solution of the invention or the parts making a contribution to the prior art can be essentially reflected in the form of a computer software product, which is stored in a storage medium and includes a plurality of instructions used for instructing a computer device (such as a personal computer, a server, or a network device) to implement all or part of the steps of the method in the embodiments of the invention. The storage medium is a USB flash disk, a mobile hard disk, a read-only memory (ROM), a random access memory (RAM), a disk, a CD, or other media capable of storing program codes.

The above embodiments are only used for explaining the technical solutions of this application, and are not intended to limit the invention. Although this application is detailed with the above embodiments, those ordinarily skilled in the art would appreciate that amendments of the technical solutions in the above embodiments, or equivalent substitutes of part of the technical characteristics can be made without essentially deviating from the spirit and scope of the technical solutions of the embodiments.

CLAIMS

1. A picture operation and control method for a mobile terminal, comprising: dividing a picture displayed in an interface of a mobile terminal into multiple image areas;

detecting an inclination direction and an inclination angle of the mobile terminal;

5 performing focus switching among the multiple image areas according to the inclination direction and the inclination angle;

if it is detected that the inclination direction is the same as a preset direction, triggering an image area selecting operation so as to select, in the interface, an image area where a focus stays, wherein the preset direction is a direction which is preset corresponding to the image area selecting operation;

10 acquiring a picture scaling factor that simultaneously corresponds to the inclination direction and the inclination angle; and

scaling the selected image area based on the picture scaling factor.

2. The picture operation and control method according to Claim 1, wherein the step of dividing the picture displayed in the interface of the mobile terminal into multiple image areas
15 comprises:

detecting accelerations of the mobile terminal in all directions;

triggering a picture division event if it is detected, within a first preset time, that the acceleration in any one said direction continuously changes between positive values and negative values;

counting the number of continuous changes between the positive values and the negative values
20 of the acceleration within the first preset time to determine an area division number of the picture according to the number of continuous changes; and

dividing the picture displayed in the interface of the mobile terminal into multiple image areas based on the image division number of the picture.

3. The picture operation and control method according to Claim 2, wherein the method
25 further comprises the following steps to be performed after the step of scaling the selected image area based on the picture scaling factor:

detecting the accelerations of the mobile terminal in the all directions; and

horizontally moving the scaled image area according to a current inclination direction and a current inclination angle of the mobile terminal if it is not detected, within the first preset time, that the acceleration in any said direction changes between positive values and negative values.

4. The picture operation and control method according to Claim 1, wherein the step of performing focus switching among the multiple image areas according to the inclination direction and the inclination angle comprises:

generating a detection box which is initially located in one said image area in the picture; and

controlling the detection box to move among the multiple image areas according to the inclination direction and the inclination angle.

5. The picture operation and control method according to Claim 1, wherein the picture operation and control method further comprises:

sending out a prompt message when a calibration event is triggered, wherein the prompt message is used for reminding a user to maintain the mobile terminal at a common inclination angle within a second preset time, and the common inclination angle is an inclination angle at which the mobile terminal is used by the user most frequently; and

detecting an inclination angle of the mobile terminal within the second preset time, and identifying the inclination angle as a reference angle used for detecting the inclination direction and the inclination angle of the mobile terminal.

6. A picture operation and control device for a mobile terminal, comprising:

a division module used for dividing a picture displayed in an interface of a mobile terminal into multiple image areas;

a first detection module used for detecting an inclination direction and an inclination angle of the mobile terminal;

a switching module used for performing focus switching among the multiple image areas according to the inclination direction and the inclination angle;

a selection module used for triggering an image area selecting operation so as to select, in the interface, an image area where a focus stays if it is detected that the inclination direction is the same as a preset direction, wherein the preset direction is a direction which is preset corresponding to the

image area selecting operation;

an acquisition module used for acquiring a picture scaling factor that simultaneously corresponds to the inclination direction and the inclination angle; and

a scaling module used for scaling the selected image area based on the picture scaling factor.

5 7. The picture operation and control device according to Claim 6, wherein the division module comprises:

a detection sub-module used for detecting accelerations of the mobile terminal in all directions;

10 a triggering sub-module used for triggering a picture division event if it is detected, within a first preset time, that the acceleration in any one said direction continuously changes between positive values and negative values;

a counting sub-module used for counting the number of continuous changes between the positive values and the negative values of the acceleration within the first preset time to determine an area division number of the picture according to the number of continuous changes; and

15 a division sub-module used for dividing the picture displayed in the interface of the mobile terminal into multiple image areas based on the area division number of the picture.

8. The picture operation and control device according to Claim 7, wherein the picture operation and control device further comprises:

a second detection module used for detecting the accelerations of the mobile terminal in the all directions; and

20 a horizontal movement module used for horizontally moving the scaled image area according to a current inclination direction and a current inclination angle of the mobile terminal if it is not detected, within the first preset time, that the acceleration in any said direction changes between positive values and negative values.

25 9. The picture operation and control device according to Claim 6, wherein the switching module comprises:

a generation sub-module used for generating a detection box which is initially located in one said image area in the picture; and

a control sub-module used for controlling the detection box to move among the multiple image

areas according to the inclination direction and the inclination angle.

10. The picture operation and control device according to Claim 6, wherein the picture operation and control device further comprises:

a prompt module used for sending out a prompt message when a calibration event is triggered,
5 wherein the prompt message is used for reminding a user to maintain the mobile terminal at a common inclination angle within a second preset time, and the common inclination angle is an inclination angle at which the mobile terminal is used by the user most frequently; and

a calibration module used for detecting an inclination angle of the mobile terminal within the second preset time and identifying the inclination angle as a reference angle used for detecting the
10 inclination direction and the inclination angle of the mobile terminal.

11. A mobile terminal, comprising a memory and a processor, wherein a computer-readable instruction which is able to run on the processor is stored in the memory, and the processor executes the computer-readable instruction to implement the following steps:

dividing a picture displayed in an interface of a mobile terminal into multiple image areas;

15 detecting an inclination direction and an inclination angle of the mobile terminal;

performing focus switching among the multiple image areas according to the inclination direction and the inclination angle;

if it is detected that the inclination direction is the same as a preset direction, triggering an image area selecting operation so as to select, in the interface, an image area where a focus stays, wherein
20 the preset direction is a direction which is preset corresponding to the image area selecting operation;

acquiring a picture scaling factor that simultaneously corresponds to the inclination direction and the inclination angle; and

scaling the selected image area based on the picture scaling factor.

12. The mobile terminal according to Claim 11, wherein the step of dividing the picture
25 displayed in the interface of the mobile terminal into multiple image areas comprises:

detecting accelerations of the mobile terminal in all directions;

triggering a picture division event if it is detected, within a first preset time, that the acceleration in any one said direction continuously changes between positive values and negative values;

counting the number of continuous changes between the positive values and the negative values of the acceleration within the first preset time to determine an area division number of the picture according to the number of continuous changes; and

dividing the picture displayed in the interface of the mobile terminal into multiple image areas
5 based on the area division number of the picture.

13. The mobile terminal according to Claim 12, wherein the processor executes the computer-readable instruction to further implement the following steps:

detecting the accelerations of the mobile terminal in the all directions; and

horizontally moving the scaled image area according to a current inclination direction and a
10 current inclination angle of the mobile terminal if it is not detected, within the first preset time, that the acceleration in any said direction changes between positive values and negative values.

14. The mobile terminal according to Claim 11, wherein the step of performing focus switching among the multiple image areas according to the inclination direction and the inclination angle comprises:

15 generating a detection box which is initially located in one said image area in the picture; and
controlling the detection box to move among the multiple image areas according to the inclination direction and the inclination angle.

15. The mobile terminal according to Claim 11, wherein the processor executes the computer-readable instruction to further implement the following steps:

20 sending out a prompt message when a calibration event is triggered, wherein the prompt message is used for reminding a user to maintain the mobile terminal at a common inclination angle within a second preset time, and the common inclination angle is an inclination angle at which the mobile terminal is used by the user most frequently; and

detecting an inclination angle of the mobile terminal within the second preset time, and
25 identifying the inclination angle as a reference angle used for detecting the inclination direction and the inclination angle of the mobile terminal.

16. A computer-readable storage medium, having a computer-readable instruction stored therein, wherein the computer-readable instruction is executed by the at least one processor to

implement the following steps:

dividing a picture displayed in an interface of a mobile terminal into multiple image areas;

detecting an inclination direction and an inclination angle of the mobile terminal;

performing focus switching among the multiple image areas according to the inclination

5 direction and the inclination angle;

if it is detected that the inclination direction is the same as a preset direction, triggering an image area selecting operation so as to select, in the interface, an image area where a focus stays, wherein the preset direction is a direction which is preset corresponding to the image area selecting operation;

acquiring a picture scaling factor that simultaneously corresponds to the inclination direction

10 and the inclination angle; and

scaling the selected image area based on the picture scaling factor.

17. The computer-readable storage medium according to Claim 16, wherein the step of dividing the picture displayed in the interface of the mobile terminal into multiple image areas comprises:

15 detecting accelerations of the mobile terminal in all directions;

triggering a picture division event if it is detected, within a first preset time, that the acceleration in any one said direction continuously changes between positive values and negative values;

counting the number of continuous changes between the positive values and the negative values of the acceleration within the first preset time to determine an area division number of the picture according to the number of continuous changes; and

20

dividing the picture displayed in the interface of the mobile terminal into multiple image areas based on the area division number of the picture.

18. The computer-readable storage medium according to Claim 17, wherein the computer-readable instruction is executed by the at least one processor to further implement the following steps:

25

detecting the accelerations of the mobile terminal in the all directions; and

horizontally moving the scaled image area according to a current inclination direction and a current inclination angle of the mobile terminal if it is not detected, within the first preset time, that

the acceleration in any said direction changes between positive values and negative values.

19. The computer-readable storage medium according to Claim 16, wherein the step of performing focus switching among the multiple image areas according to the inclination direction and the inclination angle comprises:

5 generating a detection box which is initially located in one said image area in the picture; and
 controlling the detection box to move among the multiple image areas according to the inclination direction and the inclination angle.

20. The computer-readable storage medium according to Claim 16, wherein the computer-readable instruction is executed by the at least one processor to implement the following
10 step:

 performing focus switching among the multiple image areas according to the inclination direction and the inclination angle, wherein this step comprises:

 generating a detection box which is initially located in one said image area in the picture; and
 controlling the detection box to move among the multiple image areas according to the
15 inclination direction and the inclination angle.