CLAIMS

[Claim 1]

A method for recognizing a touch of an object by a server, the method comprising the steps of:

(a) extracting, on the basis of sensing information about at least one object sensed through a LiDAR sensor, coordinates of the object;

(b) performing clustering on the coordinates of the object extracted from a first frame so as to calculate a first touch object of the first frame and first coordinates of the first touch object;

(c) determining a state of the first touch object by using the first touch object of the first frame and the first coordinates of the first touch object in consideration of another frame that is continuous with the first frame;

(d) converting the first coordinates to real coordinates so as to determine whether the first coordinates are located in a preset effective area; and

(e) displaying the first touch object at the real coordinates if it is determined that the first touch object is located in the effective area.

[Claim 2]

The method according to claim 1, wherein

the step of (a) comprises a step of displaying the coordinates of the object in a planar coordinate system for each frame, the coordinates of the object being two-dimensional coordinates.

[Claim 3]

The method according to claim 2, wherein

the step of (b) further comprises the steps of:

calculating a first distance between coordinates of at least one object displayed in a planar coordinate system corresponding to the first frame;

performing clustering by comparing the first distance with a preset first distance threshold value; and

setting a cluster generated by performing clustering as the first touch object.

[Claim 4]

The method according to claim 3, further comprising the steps of:

generating a touch object list by using the first touch object, the first coordinates of the first touch object, and the number of the objects included in the first touch object; and

removing the first touch object from the touch object list if the first touch object of which the number of the objects is equal to or less than a preset number exists in the touch object list.

[Claim 5]

The method according to claim 1, wherein

the step of (c) comprises:

determining whether a second touch object exists in a second frame that is a previous frame continuous with the first frame;

calculating a second distance between the first coordinates and second coordinates of the second touch object if the second touch object exists; and

determining the state of the first touch object by comparing the second distance with a preset second threshold value.

[Claim 6]

The method according to claim 1, wherein

the step of (c) comprises:

determining whether a third touch object exists in a third frame that is a next frame continuous with the first frame;

calculating a third distance between the first coordinates and third coordinates of the third touch object if the third touch object exists; and

determining the state of the first touch object by comparing the third distance with a preset second threshold value.

[Claim 7]

A device for recognizing a touch of an object, the device comprising:

a sensor unit that detects at least one object through a LiDAR sensor so as to generate sensing information;

a coordinate extraction unit that extracts coordinates of the object on the basis of the sensing information;

a data management unit that performs clustering on the coordinates of the object extracted from a first frame so as to extract a first touch object of the first frame and first coordinates of the first touch object;

a state determination unit that determines the state of the first touch object by using the first touch object of the first frame and the first coordinates of the first touch object in consideration of another frame that is continuous with the first frame;

a conversion unit that converts the first coordinates to real coordinates so as to determine whether the first touch object is located in a preset effective area; and

a display unit that displays the first touch object at the real coordinates if the first touch object is located in the effective area.

[Claim 8]

The device according to claim 7, wherein

the data management unit calculates a first distance between coordinates of at least one object included in the first frame, performs clustering by comparing the first distance with a preset first distance threshold, and sets a generated cluster as the first touch object.

[Claim 9]

The device according to claim 7, wherein

the state determination unit

determines whether a second touch object exists in a second frame that is a previous frame continuous with the first frame, and

determines the first touch object as an enter state if the second touch object does not exist, and

calculates a second distance between the first coordinates and a second coordinates of the second touch object if the second touch object exists, and determines the first touch object as an enter state if the second distance is greater than or equal to the second distance threshold value.

[Claim 10]

The device according to claim 9, wherein

the state determination unit

determines the first touch object as a stay state if the first coordinates and the second coordinates are the same, and

determines the first touch object as a move state if the first coordinates and the second coordinates are not the same and the second distance is less than or equal to a preset second distance threshold.

[Claim 11]

The device according to claim 7, wherein

the state determination unit

determines whether a third touch object exists in a third frame that is a next frame continuous with the first frame,

determines the first touch object as an exit state if the third touch object does not exist, and

calculates a third distance between the first coordinates and a third coordinates of the third touch object if the third touch object exists, and determines the first touch object as an exit state if the third distance is equal to or greater than the third distance threshold value.