

BUILDING HOUSEHOLD INFORMATION DETERMINING METHOD AND APPARATUS AND ELECTRONIC DEVICE

5 The present application claims the priority to a Chinese patent application No. 202210623382.8 filed with the China National Intellectual Property Administration (CNIPA) on June 02, 2022, and entitled “BUILDING HOUSEHOLD INFORMATION DETERMINING METHOD, APPARATUS AND ELECTRONIC DEVICE”, which is incorporated herein by reference in its entirety.

10 Technical Field

 The present application relates to the technical field of image processing, in particular to a building household information determining method, apparatus and an electronic device.

Background

15 In some application scenarios, it is often necessary to determine positions of individual building households in a building image, so as to facilitate the management of the building.

 In the related technology, usually, regions where individual building households are located in the building are drawn in the image manually, and actual building household information corresponding to each of the regions is input manually one by one, so as to establish a correspondence between the region in the image and the building household information, which
20 can reflect the positions of individual building households in the image.

 However, this method is cumbersome to operate, and the efficiency of determining the building household information is low.

Summary

25 The purpose of the embodiments in the present application is to provide a building household information determining method, apparatus and an electronic device to improve the efficiency of determining building household information. The specific technical solutions are as follows.

 In a first aspect, an embodiment of the present application provides a building household

information determining method, including:

obtaining a target scaling ratio, a to-be-drawn region in a building image and a reference sub-region in the to-be-drawn region;

5 dividing an undivided region into multiple drawn sub-regions according to the target scaling ratio and height information of the reference sub-region, so that a ratio between height information values of any two adjacent sub-regions within the to-be-drawn region satisfies the target scaling ratio, wherein the undivided region is a further region in the to-be-drawn region other than the reference sub-region.

10 In combination with the first aspect, the present application provides a second possible embodiment,

the reference sub-region includes a first reference sub-region and a second reference sub-region, and the first reference sub-region is adjacent to the second reference sub-region;

wherein obtaining the target scaling ratio includes:

15 determining first reference height information of the first reference sub-region and second reference height information of the second reference sub-region;

calculating a ratio of the first reference height information to the second reference height information as the target scaling ratio.

In combination with the first aspect, the present application provides a third possible embodiment,

20 obtaining the to-be-drawn region in the building image and the reference sub-region in the to-be-drawn region includes:

displaying the building image;

determining at least two building spacing lines and at least two initial floor lines in the building image;

25 determining a region between two adjacent building spacing lines as the to-be-drawn region;

determining a region located between two adjacent initial floor lines within the to-be-drawn region as the reference sub-region in the to-be-drawn region.

In combination with the third possible embodiment of the first aspect, the present application provides a fourth possible embodiment, dividing the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region includes:

determining first reference height information of the reference sub-region;

determining height information of a further sub-region according to the target scaling ratio and the first reference height information as second drawn height information;

dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines.

In combination with the fourth possible embodiment of the first aspect, the present application provides a fifth possible embodiment, dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines includes:

determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, linear equations of the building spacing lines and linear equations of the initial floor line; or, determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and linear equations of the building spacing lines;

connecting the intersection points of the same floor line.

In combination with the fifth possible embodiment of the first aspect, the present application provides a sixth possible embodiment, the height information of the reference sub-region includes a first height value of the reference sub-region; the second drawn height information includes a second height value of a divided sub-region;

wherein determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the

linear equations of the building spacing lines and the linear equations of the initial floor lines includes:

determining a linear equation of a floor line corresponding to the second height value according to the second height value and the linear equations of the initial floor lines;

- 5 determining intersection points of the linear equation of the floor line and the linear equations of the building spacing lines.

In combination with the fifth possible embodiment of the first aspect, the present application provides a seventh possible embodiment, the height information of the reference sub-region includes a first length of the building spacing lines in the reference sub-region; the
10 second drawn height information includes a second length of the building spacing lines contained in a divided sub-region;

wherein determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and the linear equations of the building spacing lines includes:

- 15 determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines on the linear equations of the building spacing lines according to the second length and the linear equations of the building spacing lines.

In combination with the fourth possible embodiment of the first aspect, the present application provides an eighth possible embodiment, dividing the undivided region into the
20 multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines includes:

translating at least two points on a target floor line in a vertical direction by a second height value represented by the second drawn height information according to the second drawn height information, to obtain at least two translated points, wherein the target floor line is initially one
25 of the initial floor lines;

connecting the at least two translated points to obtain a drawn floor line;

taking the drawn floor line as a new target floor line, and returning to perform an operation of translating the at least two points on the target floor line in the vertical direction by the second

height value represented by the second drawn height information according to the second drawn height information, to obtain the at least two translated points.

In combination with the first aspect, the present application provides a ninth possible embodiment, the method further includes:

5 displaying all sub-regions within the to-be-drawn region;

 adjusting the target scaling ratio and/or the height information of the reference sub-region in response to a first adjustment instruction input for a displayed sub-region, to obtain an adjusted scaling ratio and/or adjusted height information of the reference sub-region;

10 taking the adjusted scaling ratio as a new target scaling ratio, and/or taking the adjusted height information of the reference sub-region as new height information of the reference sub-region, and returning to perform an operation of dividing the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region.

15 In combination with the first aspect, the present application provides a tenth possible embodiment, the method further includes:

 obtaining building household information corresponding to the reference sub-region;

 determining building household information corresponding to each of the drawn sub-regions according to the building household information corresponding to the reference sub-region and positions of individual sub-regions in the to-be-drawn region.

20 In a second aspect, an embodiment of the present application provides a building household information determining apparatus, including:

 an obtaining module, configured to obtain a target scaling ratio, a to-be-drawn region in a building image and a reference sub-region in the to-be-drawn region;

25 a dividing module, configured to divide an undivided region into multiple drawn sub-regions according to the target scaling ratio and height information of the reference sub-region, so that a ratio between height information values of any two adjacent sub-regions within the to-be-drawn region satisfies the target scaling ratio, wherein the undivided region is a further region in the to-be-drawn region other than the reference sub-region.

In combination with the second aspect, the present application provides a second possible embodiment,

the reference sub-region includes a first reference sub-region and a second reference sub-region, and the first reference sub-region is adjacent to the second reference sub-region;

5 obtaining, by the obtaining module, the target scaling ratio includes:

determining first reference height information of the first reference sub-region and second reference height information of the second reference sub-region;

calculating a ratio of the first reference height information to the second reference height information as the target scaling ratio;

10 wherein obtaining, by the obtaining module, the to-be-drawn region in the building image and the reference sub-region in the to-be-drawn region includes:

displaying the building image;

determining at least two building spacing lines and at least two initial floor lines in the building image;

15 determining a region between two adjacent building spacing lines as the to-be-drawn region;

determining a region located between two adjacent initial floor lines within the to-be-drawn region as the reference sub-region in the to-be-drawn region;

20 wherein dividing, by the dividing module, the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region includes:

determining first reference height information of the reference sub-region;

determining height information of a further sub-region according to the target scaling ratio and the first reference height information as second drawn height information;

25 dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines;

wherein dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines includes:

5 determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, linear equations of the building spacing lines and linear equations of the initial floor lines; or, determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and linear equations of the building spacing lines;

10 connecting the intersection points of the same floor line;

wherein the height information of the reference sub-region includes a first height value of the reference sub-region; the second drawn height information includes a second height value of a divided sub-region;

15 determining, by the dividing module, the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the linear equations of the building spacing lines, and/or the linear equations of the initial floor lines includes:

determining a linear equation of a floor line corresponding to the second height value according to the second height value and the linear equations of the initial floor lines;

20 determining intersection points of the linear equation of the floor line and the linear equations of the building spacing lines;

wherein the height information of the reference sub-region includes a first length of the building spacing lines in the reference sub-region; the second drawn height information includes a second length of the building spacing lines contained in a divided sub-region;

25 determining, by the dividing module, the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the linear equations of the building spacing lines and the linear equations of the floor lines includes:

determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines on the linear equations of the building spacing lines according to the second length and the linear equations of the building spacing lines;

5 wherein dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines includes:

10 translating at least two points on a target floor line in a vertical direction by a second height value represented by the second drawn height information according to the second drawn height information, to obtain at least two translated points, wherein the target floor line is initially one of the initial floor line;

connecting the at least two translated points to obtain a drawn floor line;

15 taking the drawn floor line as a new target floor line, and returning to perform an operation of translating the at least two points on the target floor line in the vertical direction by the second height value represented by the second drawn height information according to the second drawn height information, to obtain the at least two translated points;

wherein the apparatus further includes an adjustment module, configured to display all sub-regions within the to-be-drawn region;

20 adjust the target scaling ratio and/or the height information of the reference sub-region in response to a first adjustment instruction input for a displayed sub-region, to obtain an adjusted scaling ratio and/or adjusted height information of the reference sub-region;

25 take the adjusted scaling ratio as a new target scaling ratio, and/or take the adjusted height information of the reference sub-region as new height information of the reference sub-region, and return to perform an operation of dividing the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region;

wherein the apparatus further includes a building household information determining module, configured to obtain building household information corresponding to the reference sub-region;

determine building household information corresponding to each of the drawn sub-regions according to the building household information corresponding to the reference sub-region and positions of individual sub-regions in the to-be-drawn region.

5 In a third aspect, an embodiment of the present application provides an electronic device, including a processor, a communication interface, a memory and a communication bus, wherein the processor, the communication interface and the memory communicate with each other through the communication bus;

the memory is configured to store a computer program;

10 the processor is configured to carry out the building household information determining method according to the first aspect when executing the program stored on the memory.

In a fourth aspect, an embodiment of the present application provides a computer-readable storage medium having a computer program stored therein, wherein the computer program, when executed by a processor, carries out the building household information determining method according to the first aspect.

15 Beneficial effects of the embodiments of the present application are as follows:

With the embodiments of the present application provide the building household information determining method, apparatus and an electronic device provided by the embodiments of the present application, the to-be-drawn region is divided into multiple sub-regions having heights which are varied in the geometric proportion, according to height information of the reference sub-region and the target scaling ratio; and the multiple sub-regions having heights which are varied in the geometric proportion, can be regarded as positions of the building households in a building image. According to the principle of optical imaging, in the building image captured by the image acquisition device, the heights of the regions where the building households are located will decrease in the geometric proportion from the lower floors to the higher floors. Therefore, a group of the sub-regions having the heights which are varied in the geometric proportion, can be regarded as the positions of individual building households. Since the positions of the building households which have the adjacent floors, in the building image, should be adjacent, and the position of the reference building household in the building image is known, by using the embodiments provided by the present application, the to-be-drawn

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region can be automatically divided into a group of sub-regions having the heights which are varied in the geometric proportion, without manually drawing the sub-regions where the building households are located in the building image one by one. Moreover, the building household information of other sub-regions can be quickly determined in combination with the reference sub-region having known building household information, so that the efficiency of determining building household information is effectively improved.

Of course, it is not necessary for any product or method implementing the present application to achieve all the advantages described above simultaneously.

Brief Description of the Drawings

The accompanying drawings described here are used to provide a further understanding of the present application and constitute a part of the same. The illustrative embodiments of the present application and their descriptions are used to explain the present application and do not constitute an improper limitation of the present application.

Fig. 1 is a schematic flow chart of a building household information determining method provided by the present application;

Fig. 2 is a schematic diagram for calculating a target scaling ratio provided by the present application;

Fig. 3 is a schematic diagram of a building image provided by the present application;

Fig. 4 is a schematic diagram of an interactive interface for building household information provided by the present application;

Fig. 5 is a schematic diagram of a division effect of sub-regions where building households are located provided by the present application;

Fig. 6-1 is a schematic diagram for determining a sub-region where a building household is located provided by the present application;

Fig. 6-2 is an another schematic diagram for determining a sub-region where a building household is located provided in the present application;

Fig. 7 is a schematic effect diagram of determined building household information provided by the present application;

Fig. 8 is a schematic structural diagram of a building household information determining apparatus provided by the present application;

Fig 9 is a schematic block diagram of an electronic device provided by the present application.

5 Detailed Description

In order to make the objective, technical solutions and advantages of the present application clearer and more understandable, the present application will be described in more detail below with reference to the accompanying drawings and embodiments. Obviously, the described embodiments are only some, and not all, of the embodiments of the present application. All other
10 embodiments obtained based on the embodiments of the present application by those skilled in the art fall into the scope of protection of the present application.

In order to illustrate the building household information determining method provided by the embodiment of the present application more clearly, two possible application scenarios of the building household information determining method provided by the embodiment of the present
15 application will be described illustratively in the following. It can be understood that the following examples are only possible application scenarios of the building household information determining method provided by the embodiment of the present application. In other possible embodiments, the building household information determining method provided by the embodiment of the present application can also be applied to other possible application scenarios,
20 and there is no limitation in the present disclosure.

Application Scenario 1:

In order to effectively control illegally hung billboards on a building exterior wall, a target building can be captured by an image acquisition equipment to obtain an image of the building, and a billboard detection method is used to detect whether there is an illegally hung billboard in
25 the image. If there is an illegally hung billboard in the image, a building household hanging the billboard is determined according to a region where the billboard is located in the image so as to contact a resident of the building household to deal with the billboard.

Application Scenario 2:

In order to accurately determine a resident throwing objects from height, a target residential

building can be captured by an image acquisition equipment to obtain an image of the residential building, and a detection model for throwing objects from height is used to detect whether there is a behavior of throwing objects from height in the image. If there is a behavior of throwing objects from height, the building household that produces the behavior of throwing objects from height is determined according to the region where the behavior of throwing objects from height occurs. This process is referred to as tracing the source of throwing objects from height below.

In both application scenarios 1 and 2, it is necessary to obtain regions where individual building households are located in the image. In one possible embodiment, the relevant person can manually draw the regions where individual building households are located in the image and input building household information for each of the regions, so as to establish a correspondence between the region and the building household information. The regions where individual building households are located in the image can be determined according to the correspondence. Herein, the process of establishing the correspondence is referred to as determining building household information.

The building household information herein refers to any information that can uniquely identify a building household. For the sake of description, in the following, it is assumed that the building household information includes a building number, a unit number, a floor number and a building household number, and the building household information is represented in the form of LX-Y-NM, wherein X is the building number of a building to which the building household belongs, Y is the unit number of an unit to which the building household belongs, N is the floor number of a floor to which the building household belongs, and M is the house number of the building household. By way of example, the building household information of a building household in house number 01 on the first floor of Unit 1, Building 1 is L01-1-0101.

Taking the above application scenario 2 as an example, it is assumed that a region where a behavior of throwing objects from height occurs is determined by detection to be region a, and the building household information corresponding to the region a in the established correspondence is L01-1-2301. Then it can be determined that the resident performing the behavior of throwing objects from height is the resident in house number 01 on the 23rd floor of Unit 1, Building 1.

However, on the one hand, the method for manually determining the building household information is cumbersome to operate, resulting in low efficiency. On the other hand, the region

where a building household away from the image acquisition device is located in the image is small, and when manually drawing the region where the building household is located, it is easy to cause a big difference between the drawn region and the actual region due to misoperation, which leads to an inaccurate correspondence being established. By way of example, taking the
5 above application scenario 2 as an example, if the image is taken from a lower angle from the bottom of the building, a region where a high-floor building household, such as L01-1-2401, in the image is smaller. Then, due to misoperation, when drawing the region where the building household of L01-1-2401 is located, the relevant person may assign the region a in a region where the building household of L01-1-2301 is originally located, to the region where the
10 building household of L01-1-2401 is located. Then, for the scenario where the region where behavior of throwing objects from height occurs is determined as region a, the household performing the behavior of throwing objects from height will be incorrectly determined as the household of L01-1-2401.

Based on this, an embodiment of the present application provides a building household
15 information determining method. The building household information determining method provided by the embodiment of the present application can be applied to any electronic device with an ability to determine building household information, including but not limited to a mobile terminal, a personal computer, etc. The building household information determining method provided by the embodiment of the present application can be shown in Fig. 1, including
20 the following steps:

S101: obtaining a target scaling ratio, a to-be-drawn region in a building image and a reference sub-region in the to-be-drawn region.

S102: dividing an undivided region into multiple drawn sub-regions according to the target scaling ratio and height information of the reference sub-region, so that a ratio between height
25 information values of any two adjacent sub-regions within the to-be-drawn region satisfies the target scaling ratio, wherein the undivided region is a further region in the to-be-drawn region other than the reference sub-region.

With the embodiment of the present application, by obtaining the target scaling ratio, the to-be-drawn region in the building image and the reference sub-region in the to-be-drawn region,
30 a further region in the to-be-drawn region other than the reference sub-region is divided into the multiple drawn sub-regions according to the target scaling ratio and the height information of the

reference sub-region. Thus, the undivided region can be automatically divided into multiple drawn sub-regions without manually drawing the regions where individual building households are located in the image, thus effectively improving the efficiency of determining the drawn sub-regions where individual building households are located in the building image. Because there is no need to manually draw the regions where individual building households are located, the inaccuracy caused by manual misoperation in the manually drawing process can be avoided, that is, the accuracy of determining the building household information can be improved effectively.

In order to illustrate the building household information determining method provided in the present application clearly, the above steps S101-S102 are described below.

Since the image acquisition device captures a building in the real physical world as a building image according to the principle of optical imaging. In the building image, the imaging effect of the building will satisfy the optical imaging rule. In a possible case, in the building image, the imaging effect of the building will follow the following rule: the floors are parallel to each other, that is, top edges (or bottom edges) of regions where building households on different floors are located, are parallel to each other; and heights of the building households from lower to the higher floors of the building are in a geometric proportion relationship to each other (if the building is captured from a lower angle, the heights are decreasing from the lower floors to the higher floors), or the heights of the building households from higher to the lower floors are in a geometric proportion relationship to each other (if the building is captured from a lower angle, the heights are increasing from the higher floors to the lower floors). By way of example, in the building image shown in Fig. 3, the imaging effect shows a residential building with 24 floors, where individual floors are parallel to each other, and the heights of the building households from the lower floors to the higher floors are in a geometric proportion relationship to each other, that is, in the building image, a ratio between a height of a building household on the 12th floor and a height of a building household on the 11th floor is the same as a ratio between a height of a building household on the 11th floor and a height of a building household on the 10th floor. In the present application, the top edge of a region where a building household is located, refers to a boundary line, close to the top of the image, of the region where the building household is located, the bottom edge of a region where a building household is located, refers to a boundary

line, close to the bottom of the image, of the region where the building household is located, and a height of a building household in the building image refers to a space between the top edge and the bottom edge of the region where the building household is located.

In the embodiment of the present application, the geometric proportion relationship between the heights of the building households from the lower to the higher (or from the higher to the lower) floors of the building in the building image is represented by the target scaling ratio. Therefore, the target scaling ratio can be a ratio between the height information for any two adjacent floors in the building image, wherein, the adjacent floors are two floors with adjacent floor numbers. By way of example, it is assumed that there is one residential building with 24 floors in the building image, and the two adjacent floors with adjacent floor numbers are 12th floor and 13th floor. In this case, the target scaling ratio can be a ratio between a floor height of the 12th floor and a floor height of the 13th floor in the image, that is, the target scaling ratio = the floor height of the 12th floor/the floor height of the 13th floor; the target scaling ratio can also be a ratio between the floor height of 13th floor and the floor height of 12th floor in the image, that is, the target scaling ratio = the floor height of the 13th floor/the floor height of the 12th floor.

In one possible case, the reference sub-region is a sub-region where a reference building household having known building household information is located in the building image. The reference sub-region can be a sub-region where one reference building household having known building household information is located, or the reference sub-region can be a set of sub-regions where multiple reference building households having known building household information are located. By way of example, assuming that a residential building with 24 floors is a unit residential building, which contains 3 units, namely, unit 1, unit 2 and unit 3, the reference building household can be a building household having known building household information of L01-1-0101, and the reference sub-region can be a drawn sub-region where the building household of L01-1-0101 is located in the building image; if the reference building household is a set of the building household having known building household information of L01-1-0101 and the building household having known building household information of L01-1-0201, the reference sub-region can be a set of drawn sub-regions where the building household with L01-1-0101 and the building household with L01-1-0201 are located respectively in the building

image. There is no specific limitation in the present application.

In the embodiment of the present application, there is a one-to-one correspondence between each building household and a sub-region where the building household is located, and there is also a one-to-one correspondence between the building household information of each building household and a sub-region where the building household is located, that is, there is a unique mapping relationship among a building household, building household information, and a drawn sub-region where the building household is located”, where, one sub-region is used to represent a location of one building household in the building image, and the building household information of one building household is used to represent the specific location of the building household in the captured building in the building image. For example, if the building household information of a building household is L01-1-2401, the building household information represents the specific location of the building household is: household 01, 24th floor, Unit 1, building 1. By way of example, as shown in Fig. 4, it is assumed that a closed region enclosed by a second horizontal line, a third horizontal line and two vertical lines in Fig. 4 is the first reference sub-region, which is used to represent the position of the first reference building household in the building image. Because of a one-to-one correspondence between the first reference building household and building household information of the first reference building household and a one-to-one correspondence between the first reference building household and the first reference sub-region, there is a one-to-one correspondence between the closed region and the building household information of the first reference building household.

In step S101, the target scaling ratio can be obtained by reading a pre-configured configuration file; or can be obtained by providing the user with a user interaction interface and inputting by the user the target scaling ratio in the interaction interface. The target scaling ratio configured in the configuration file and the target scaling ratio input by the user in the interactive interface can be determined by the user according to actual experience or demand.

Moreover, the target scaling ratio can also be determined based on the sub-region where the reference building household is located. For example, in one possible embodiment, the target scaling ratio is determined based on the height information of two or more sub-regions where reference building households having known building household information are located in the building image, where the two or more sub-regions may be adjacent or non-adjacent. For the

sake of description, the case in which the two or more sub-regions are adjacent is taken as an example to illustrate. The principle is the same for the case in which the two or more sub-regions are non-adjacent, which will not be repeated here. By way of example, the reference sub-region includes the first reference sub-region and the second reference sub-region, and the first
5 reference sub-region is adjacent to the second reference sub-region. That is, the first reference building household corresponding to the first reference sub-region can be a building household on an upper floor of a floor on which the second reference building household corresponding to the second reference sub-region is located, or the first reference building household corresponding to the first reference sub-region can be a building household on a lower floor of a
10 floor on which the second reference building household corresponding to the second reference sub-region is located.

Therefore, the above step S101 of obtaining the target scaling ratio is specifically as follows: determining first reference height information of the first reference sub-region and second reference height information of the second reference sub-region in the building image, and
15 obtaining the target scaling ratio according to a ratio of the first reference height information to the second drawn height information. For example, the ratio is taken as the target scaling ratio, or the ratio is combined with a coefficient to determine the target scaling ratio. In this way, the target scaling ratio can be directly obtained from the building image without manual configuration or input of the target scaling ratio, which further reduces the amount of operations
20 required by the building household information determining method

Specifically, in a possible schematic diagram of sub-regions as shown in Fig. 2, it is assumed that the first reference sub-region is the lower first trapezoidal region, and the second reference sub-region is the upper second trapezoidal region, wherein h_1 is a height of the first trapezoidal region, L_1 is one waist length of the first trapezoidal region, h_2 is a height of the
25 second trapezoidal region, and L_2 is one waist length of the second trapezoidal region. The height of the trapezoidal region can be calculated according to the mathematical method in combination with the waist length L of the trapezoid region. In a possible case, the first reference height information of the first reference sub-region can be the waist length L_1 of the first trapezoidal region, and the second reference height information of the second reference
30 sub-region can be the waist length L_2 of the second trapezoidal region, and accordingly the

target scaling ratio $q=L1/L2$ can be calculated. In another possible case, the first reference height information of the first reference sub-region can be the height $h1$ of the first trapezoidal region, and the second reference height information of the second reference sub-region can be the height $h2$ of the second trapezoidal region, and accordingly the target scaling ratio $q=h1/h2$ can be calculated.

In a possible case, the target scaling ratio can be calculated through a rectangular plane coordinate system by using a linear equation of the building spacing line in combination with a linear equation of the first floor line and a linear equation of the second floor line. By way of example, as shown in Fig. 6-1, the reference sub-region is located in one coordinate system. It is assumed that in Fig. 6-1, the first floor line is the first reference floor line, and the second floor line is the second reference floor line. If the first building spacing line is a connecting line between a point $(x1, y1)$ and a point $(x3, y3)$, and the second building spacing line is a connecting line between a point $(x2, y2)$ and a point $(x4, y4)$, then the linear equation of the first building spacing line can be constructed according to the point $(x1, y1)$ and the point $(x3, y3)$, and the linear equation of the second building spacing line is constructed according to the point $(x2, y2)$ and the point $(x4, y4)$. If the first floor line is a connecting line between a point $(x5, y5)$ and a point $(x7, y7)$, and the second floor line is a connecting line between a point $(x6, y6)$ and a point $(x8, y8)$, then the linear equation of the first floor line can be constructed according to the point $(x5, y5)$ and the point $(x7, y7)$ and the linear equation of the second floor line is constructed according to the point $(x6, y6)$ and the point $(x8, y8)$.

Therefore, an intersection point $P1(a, b)$ between the first building spacing line and the first floor line can be calculated by using the linear equation of the first building spacing line and the linear equation of the first floor line, and an intersection point $P2(c, d)$ between the first building spacing line and the second floor line can be calculated by using the linear equation of the first building spacing line and the linear equation of the second floor line, wherein, the first floor line and the second floor line are two adjacent floor lines.

Based on this, in combination with the knowledge of plane geometry, an angle β between the first floor line and the first building spacing line can be calculated, and a distance s between $P1$ and $P2$ can be calculated according to a formula of distance between two points, that is, $s = \sqrt{(a - c)^2 + (b - d)^2}$; and according to trigonometric functions, in combination with the

formula $\sin \beta = s/h$, a vertical distance h_1 between the first floor line and the second floor line can be calculated. Similarly, a vertical distance h_2 between the second floor line and third floor line can be calculated, wherein the third floor line is adjacent to the second floor line. The target scaling ratio q can be calculated according to h_1 and h_2 , that is, $q=h_1/h_2$, or $q=h_2/h_1$.

5 In one possible case, after step S101 of obtaining the target scaling ratio in the embodiment of the present application, the target scaling ratio can be verified for the capturing mode in which the building image is captured. By way of example, the target scaling ratio can be verified according to the actual capturing angle of the image acquisition device. Specifically, the target scaling ratio for the building image captured from different angles is varied. For example, for the
10 building image captured from lower angle, the target scaling ratio should not be less than 1 when the target scaling ratio = a floor height of a current floor / a floor height of an upper floor of the current floor; and the target scaling ratio should not be greater than 1 when the target scaling ratio = a floor height of an upper floor of a current floor / a floor height of the current floor. For the building image captured from high angle, the target scaling ratio should not be greater than 1
15 when the target scaling ratio = a floor height of a current floor / a floor height of an upper floor of the current floor, and the target scaling ratio should not be less than 1 when the target scaling ratio = a floor height of an upper floor of a current floor / a floor height of the current floor. If the obtained target scaling ratio does not satisfy the range of target scaling ratio corresponding to the actual capturing mode, it indicates that the obtained target scaling ratio is not accurate. The
20 user can be informed, by sending a reminder message, that the obtained target scaling ratio is not accurate, and it is returned to step S101 to obtain the target scaling ratio again.

In step S101, obtaining the to-be-drawn region in the building image can include: obtaining the to-be-drawn region in the building image by reading the building image with a pre-drawn or pre-framed to-be-drawn region. At this time, the pre-drawn or pre-framed to-be-drawn region is
25 the to-be-drawn region in the building image.

The to-be-drawn region in the building image can also be obtained by providing the user with a user interaction interface in which the building image is displayed to the user and then drawing or box-selecting a target to-be-drawn region by the user in the displayed building image. At this time, the target to-be-drawn region drawn or framed by the user in the displayed building
30 image is the to-be-drawn region in the building image. The target to-be-drawn region framed by

the user in the displayed building image includes at least two building spacing lines and at least two initial floor lines. It should be noted that the building spacing line in the present application is not limited to reflecting a real building spacing in the actual building, as long as the to-be-drawn region can be determined by two adjacent straight lines.

5 Accordingly, the reference sub-region can be obtained by reading the building image in which the drawn sub-region where the reference building household is located, is drawn or framed in advance.

10 The reference sub-region can also be obtained by providing the user with the user interaction interface, displaying the building image to the user in the user interaction interface, and then drawing or box-selecting the drawn sub-region where the reference building household is located by the user in the displayed building image. When the user box-selects the drawn sub-region where the reference building household is located in the displayed building image, the framed region contains at least two building spacing lines and at least two initial floor lines.

15 By way of example, as shown in Fig. 4, the respective building image is displayed to the user through the user interaction interface, and then at least two building spacing lines and at least two initial floor lines are determined in the building image, and a region between two adjacent building spacing lines is determined as the to-be-drawn region; a region located between two adjacent initial floor lines within the to-be-drawn region is determined as one reference sub-region of the to-be-drawn region.

20 Specifically, the method for determining at least two building spacing lines in the building image can be as follows.

25 Method 1: Determining extension lines of two waist lengths of a target trapezoidal region, where the extension lines of the two waist lengths are two building spacing lines. By way of example, as shown in Fig. 4, the extension lines of the waist lengths of the lower trapezoidal region (i.e., the two vertical white lines in the figure) can be determined as the two building spacing lines.

Method 2: Selecting a first feature point and a second feature point on a top-floor building household of a building in the building image, and selecting a third feature point and a fourth feature point on a ground-floor building household of the building, determining a connecting line

between the first feature point and the third feature point as a first building spacing line, and determining a connecting line between the second feature point and the fourth feature point as a second building spacing line, so that the two building spacing lines can be obtained. As shown in Fig. 6-1, the first feature point and the third feature point are located on the same side of the building in the vertical direction in the building image, and the second feature point and the fourth feature point are both located on the other side of the building in the vertical direction in the building image. By way of example, in the building image shown in Fig. 4, assuming that windows of the building shown in the building image face south, the first feature point can be a vertex at upper left corner of a southwest window of a building household on the top floor, the second feature point can be a vertex at upper right corner of a southeast window of a building household on the top floor, the third feature point is a vertex at upper left corner of a southwest window of a building household on the ground floor, and the fourth feature point is a vertex at upper right corner of a southeast window of a building household on the ground floor.

Method 3: According to the displayed building image, manually drawing, by the user, two adjacent building spacing lines in the building image that can represent the to-be-drawn region.

Similarly, the method for determining at least two initial floor lines in the building image can be as follows.

Method 1: Determining two parallel edges of the target trapezoidal region in the building image. As shown in Fig. 4, two parallel edges of a bottom closed trapezoidal region are two initial floor lines.

Method 2: Determining a fifth feature point, a sixth feature point, a seventh feature point and an eighth feature point in a target building household in the building image, determining a connecting line between the fifth feature point and the seventh feature point as a first initial floor line, and determining a connecting line between the sixth feature point and the eighth feature point as a second initial floor line, so that the two initial floor lines can be obtained. The fifth feature point and the seventh feature point are located in the same height plane of the building in the building image, and the sixth feature point and the eighth feature point are located in another height plane in the horizontal direction of the building in the building image. By way of example, as shown in Fig. 4, assuming that windows of the building shown in the building image face south and the target building household is located on the sixth floor, then the fifth feature point

can be a vertex at a southwest corner of a ceiling of the sixth floor, the sixth feature point can be a vertex at a southwest corner of a ceiling of the fifth floor, the seventh feature point can be a vertex at a southeast corner of a ceiling of the sixth floor, and the eighth feature point can be a vertex at a southeast corner of a ceiling of the fifth floor.

5 Method 3: According to the shown building image, manually drawing, by the user, two adjacent floor lines in the building image that can represent a floor where the target building household is located.

10 A reference sub-region can be determined according to the two building spacing lines and the two initial floor lines, that is, as shown in Fig. 4, a closed region can be determined according to two vertical building spacing lines and two horizontal initial floor lines, and the closed region is a reference sub-region. By using the embodiment of the present application, a reference sub-region can be quickly determined within the to-be-drawn region in the building image according to the two determined building spacing lines and two determined initial floor lines which facilitates improving the efficiency of determining and drawing individual sub-regions.

15 Based on the at least two determined building spacing lines and the at least two determined initial floor lines, the above step S102 can include:

 determining first reference height information of the reference sub-region;

20 determining height information of a further sub-region as second drawn height information according to the target scaling ratio and the first reference height information of the reference sub-region, and dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines. The second drawn height information refers to information that can determine a second height value of the further sub-region. For example, as shown in Fig. 6-1, the second drawn height information can be the waist length L2 of the further sub-region, or the second drawn height information can be the second height value H2 of the further sub-region, or the second drawn height information can be a length of a diagonal of the further sub-region (such as the diagonal of the trapezoid region in Fig. 6-2), and so on, wherein, a projected height value of the second drawn height information in the vertical direction is equal to the second height value.

 Similarly, the first reference height information of the reference sub-region refers to

information that can determine the reference height value of the reference sub-region. For example, the first reference height information can be the waist length of the reference sub-region, or the first reference height information can be the reference height value of the reference sub-region, or the first reference height information can be a diagonal length of the reference sub-region, and so on. A projected height value of the first reference height information in the vertical direction is equal to the reference height value of the reference sub-region.

Since the target scaling ratio is the ratio between the height information for adjacent floors in the building image, the height information of the further sub-region within the to-be-drawn region can be determined according to the target scaling ratio and the first reference height information of the reference sub-region. In one way, the second drawn height information of the further sub-region is calculated according to the geometric proportion formula $h_n = h * q^{(n-1)}$, wherein h_n is the second drawn height information of the target sub-region, h is the first reference height information of the reference sub-region, n is the floor number of a floor on which the target sub-region is located, and q is the target scaling ratio.

In one possible embodiment, dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines can be implemented by the following operations:

determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, linear equations of the building spacing lines and linear equations of the initial floor lines, and connecting intersection points on the same floor.

By way of example, as shown in Fig. 6-1, assuming that the reference sub-region and the further sub-region are located in the same coordinate system, and assuming that the first floor line in Fig. 6-1 is the first reference floor line of the reference sub-region, and the second floor line in Fig. 6-1 is the second drawn floor line of the further sub-region. At this time, it is necessary to determine an intersection point of the second floor line and the first building spacing line. As mentioned above, the linear equations of the building spacing lines and the linear equations of the initial floor lines can be determined according to the coordinates of the first feature point to the eighth feature point, and initial target intersection points between the

building spacing lines and the initial floor lines can be calculated by combining the linear equations of the building spacing lines and the linear equations of the initial floor lines.

5 In the embodiment of the present application, based on the initial target intersection points and in combination with the second drawn height information h_n , coordinates of the intersection points between the floor line of the further sub-region and the building spacing lines can be determined. Wherein, if intersection points between the building spacing lines and the initial floor lines are a first intersection point, and the determined intersection points between the floor line of the further sub-region and the building spacing lines are a second intersection point, then the projected height value in the vertical direction between the first intersection point and the second intersection point should be equal to the projected height value of the second drawn height information in the vertical direction.

Specifically, if the first building spacing line is the connecting line between the first feature point (x_1, y_1) and the third feature point (x_3, y_3) , and the second building spacing line is the connecting line between the second feature point (x_2, y_2) and the fourth feature point (x_4, y_4) , then the linear equation of the first building spacing line, denoted as $f(x, y)=0$, can be calculated according to the first feature point (x_1, y_1) and the third feature point (x_3, y_3) , and the linear equation of the first floor line, denoted as $g(x, y)=0$, can be calculated according to the fifth feature point (x_5, y_5) and the seventh feature point (x_7, y_7) . According to the linear equation $f(x, y)=0$ of the first building spacing line and the linear equation $g(x, y)=0$ of the first floor line, and in combination with the knowledge of plane geometry, the coordinates (a, b) of the intersection point P1 between the first building spacing line and the first floor line can be calculated, wherein $f(a, b)=0$ and $g(a, b)=0$. In this case, one point P2(c, d) is determined; if P2(c, d) satisfies that the projected height value in the vertical direction between P2(c, d) and P1(a, b) is equal to the projected height value of the second drawn height information in the vertical direction, and $f(c, d)=0$ (that is, P2(c, d) is located on the first building spacing line), then P2(c, d) is the intersection point of the floor line of the further sub-region and the first building spacing line. Herein, the projected height value in the vertical direction between the two points refer to the projected length of the line connecting the two points in the vertical direction.

More specifically, if the height information of the reference sub-region includes the first length L2 of the building spacing line in the reference sub-region, an intersection point between

the second floor line and the first building spacing line can be determined according to the first length $L2$ and the first floor line. Specifically, if the first floor line is $f(x, y)=0$ and an intersection point between the first floor line and the first building spacing line is $P1(a, b)$, and assuming that the second floor line is $g(x, y)=0$, then an intersection point between the second floor line and the first building spacing line should meet the following conditions:

$$\begin{cases} g(c, d) = 0 \\ \sqrt{(a - c)^2 - (b - d)^2} = L2 \end{cases}$$

$P(c, d)$ that satisfies the above conditions is determined as the intersection point between the second floor line and the first building spacing line. Similarly, the intersection point between the second floor line and the second building spacing line can be calculated.

In another possible embodiment, dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines can be implemented by the following operations:

determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and linear equations of the building spacing lines, and connecting intersection points on the same floor.

Specifically, within the to-be-drawn region as shown in Fig. 6-1, two points, $(x11, y11)$ and $(x12, y11)$, are selected, wherein the two points satisfy that vertical coordinates of the two points are the same. A point $P3(e, f)$ and a point $P4(m, n)$ are determined according to the second drawn height information. The point $P3(e, f)$ should satisfy that the projected height value in the vertical direction between the point $P3(e, f)$ and $(x11, y11)$ is equal to the projected height value of the second drawn height information in the vertical direction;

point $P4(m, n)$ should satisfy that the projected height value in the vertical direction between the point $P4(m, n)$ and $(x12, y11)$ are equal to the projected height value of the second drawn height information in the vertical direction;

in this case, the point $P3(e, f)$ is an intersection point of the floor line corresponding to the further sub-region and the first building spacing line, and the point $P4(m, n)$ is an intersection point of the floor line corresponding to the further sub-region and the second building spacing line, and a line connecting the point $P3(e, f)$ and the point $P4(m, n)$ is the floor line

corresponding to the further sub-region.

In this embodiment, if the first reference height information is a diagonal of the reference sub-region, and the second drawn height information is a diagonal of the further sub-region, the intersection points of the floor line of the further sub-region and the building spacing lines can be determined according to the diagonal of the reference sub-region. Specifically, as shown in Fig. 6-2, assuming that the white trapezoidal region is the reference sub-region, the point B is any point on the bottom edge of the reference sub-region, and it is known that $|AB|=x$ and $|BC|=s$, and the target scaling ratio is q , then a circle with a center of point C and a radius of $q*x$ is taken, the circle intersecting with the upper bottom edge of the reference sub-region at a point D, and then a circle with a center of the point D and a radius of $q*s$, the circle intersecting the left building spacing line at a point E. Since $DE/BC=CD/AB$ and $\angle CAB=\angle ECD$, $\triangle ABC$ is similar to $\triangle CDE$. Therefore, $CE/AC=DE/BC=q$, that is, $CE=q*AC$. It can be seen that the point E satisfies that the lengths of the building spacing lines are in geometric proportion relation to each other. It can be seen that the point E is the intersection point of a building spacing line and a floor line, and thus the intersection point of the floor line of the further sub-region and the building spacing line can be calculated.

In another possible embodiment, dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines includes:

translating at least two points on a target floor line in a vertical direction by a second height value represented by the second drawn height information according to the second drawn height information, to obtain at least two translated points, wherein the target floor line is initially the initial floor line; connecting the at least two translated points to obtain a drawn floor line; taking the drawn floor line as a new target floor line, and returning to perform the operation of translating the at least two points on the target floor line in the vertical direction by the second height value represented by the second drawn height information according to the second drawn height information, to obtain the at least two translated points.

Specifically, in combination with Fig. 5, it can be understood that at least two points on the target floor line are translated in the vertical direction by a second height value represented by the second drawn height information, to obtain at least two translated points. If in an initial state,

the target floor line is the initial floor line, the whole process can be regarded as selecting two points on the initial floor line, where the two points may be located at the intersection points of the initial floor line and the target floor line, or the two points may not be located at the intersection points. Then the two points are translated in the vertical direction by a displacement
5 of the second height value, and then the two translated points are connected, so as to obtain the drawn floor line. This process is cycled, and the number of cycles is equal to the total number of floors minus the number of reference floor lines of the reference sub-region. By using the embodiment of the present application, the floor line drawn according to the previous process can be used as the initial floor line, to draw a supplementary floor line, so as to further realize the
10 supplementary drawing of floor lines of the whole to-be-drawn region.

In this way, the obtained closed region enclosed by the two adjacent floor lines and two adjacent building spacing lines is a drawn sub-region. By using the embodiment of the present application, the height information of the other sub-regions can be quickly determined according to the first reference height information of the reference sub-region and the target scaling ratio,
15 and the floor lines of the other sub-regions can be determined, which can effectively improve the efficiency of dividing the undivided region into multiple drawn sub-regions.

In the embodiment of the present application, the specific method for obtaining the target scaling ratio, the to-be-drawn region in the building image and the reference sub-region in the to-be-drawn region can be flexibly selected by the operator according to the actual operation,
20 which is not limited in the present application.

In the embodiment of the present application, the bottom floor in the building image does not need to be the first floor, but can be any floor. By way of example, the building image can be captured by the image acquisition device in lower angle, and the bottom floor of the building image can be the sixth floor, or any other floor.

25 The captured building in a building image contains both a reference building household having known building household information and a building household whose building household information is to be determined, that is, the union of the reference building household and the building household whose building household information is to be determined is all building households in the building. Therefore, in the embodiment of the present application, in
30 the building image, one sub-region is used to represent the specific position of one building

household in the building, and the union of all sub-regions where individual building households are located, is the to-be-drawn region in the building image. Therefore, in the building image, the union of sub-regions where all building households whose building household information is to be determined are located, is the further region in the to-be-drawn region other than the reference sub-region. Therefore, in the above step S102, the undivided region can be the union of sub-regions where all building households whose building household information is to be determined are located, that is, the undivided region is the further region in the to-be-drawn region other than the reference sub-region.

Based on this, in the above step S102, the undivided region can be divided into the multiple sub-regions according to the target scaling ratio and the height information of the reference sub-region, and then the sub-regions where individual building households whose building household information is to be determined are located in the building image can be obtained.

Since the building household information of the reference building household is known, the sub-region where the reference building household is located within the to-be-drawn region is known. Therefore, according to the relative position relationship between the reference sub-region and sub-regions of building households whose building household information is to be determined are located, sub-regions where individual building households whose building household information is to be determined are located can be determined in the building image. In combination with the known building household information of the reference building household, the building household information corresponding to a sub-region where each of other building households whose building household information is to be determined are located. By way of example, it is assumed that there are three units in the building, namely unit 1, unit 2 and unit 3 from west to east, and there are two households in each unit, namely household 01 and household 02 from west to east, and in the captured building image, the left side of the image is west, and the right side is east. If the building household information of the reference building household is L01-2-1001, then a sub-region adjacent to the reference sub-region and located above the reference sub-region corresponds to the building household information L01-2-1101, and a sub-region adjacent to the reference sub-region and located below the reference sub-region corresponds to the building household information L01-2-0901, a sub-region adjacent to the reference sub-region and located to the left of the reference sub-region corresponds to the

building household information L01-1-1002, and a sub-region adjacent to the reference sub-region and located to the right of the reference sub-region corresponds to the building household information L01-2-1002.

In order to display the result of determining the building household information to the user more intuitively and quickly, the building household information determining method provided by the embodiment of the present application can also display all sub-regions within the to-be-drawn region to the user with the help of the user interaction interface shown in Fig. 4. For example, a closed region enclosed by a white box in Fig. 4 is used to represent a sub-region.

In one possible case, attribute information of the building can be displayed to the user by the user interaction interface. The attribute information of the building can include the number of floors of the building, the height information of the reference sub-region having the known building household information in the building image, and the target scaling ratio. A building household information input window can also provide to the user in the user interaction interface, so that the user can input the attribute information of the building according to needs in the building household information input window.

When information input by the user is detected in the user interaction interface, a first adjustment instruction input for the displayed sub-region is generated according to the information input by the user, and the attribute information of the building is adjusted to the information input by the user in response to the first adjustment instruction input for the displayed sub-region. For example, in response to the first adjustment instruction input for the displayed sub-region, the target scaling ratio and/or the height information of the reference sub-region is adjusted, and the adjusted target scaling ratio is determined as a new target scaling ratio, and/or, the adjusted new height information of the reference sub-region as new height information of the reference sub-region, so that in the above step S102, the undivided region is divided according to the new target scaling ratio and/or the new height information of the reference sub-region, to obtain multiple drawn sub-regions.

In this way, when the user needs to adjust the height information of the reference sub-region and/or target scaling ratio, by using the embodiment of the present application, the first adjustment instruction can be generated according to the actual needs of the user, and then the division result of the undivided region can be adjusted according to the first adjustment

instruction.

By way of example, when individual sub-regions obtained by initially dividing the undivided region cannot truly reflect the locations of individual building households, the user can adjust the height information of the reference sub-region and/or target scaling ratio according to the actual experience or personal choice, so that the individual sub-regions obtained by dividing can truly reflect the locations of individual building households. For example, when the sub-region where a building household on the 23rd floor is located, obtained by the initial dividing, covers a building household on the 24th floor, it indicates that the sub-regions where individual building households are located, obtained by the initial dividing, cannot accurately represent the locations of individual building households. At this time, by using the embodiment of the present application, the original undivided region can be divided for the second time according to the height information or the target scaling ratio input by the user, until the sub-regions where individual building households are located can accurately represent the locations of individual building households in the building image.

In another possible case, in the user interaction interface as shown in Fig. 4, the building image can be displayed to the user, and a drawing button can be provided to the user, so that a drawing instruction can be generated according to the user's drawing action after the user clicks the drawing button, to draw a target line segment in the displayed building image. The target line segment can include the building spacing line and the floor line. The building spacing line is used to determine the to-be-drawn region, that is, the building spacing line can be used to distinguish different units in the target building, and the floor line is used to distinguish different floors in the target unit.

Specifically, after the operation of the user clicking the drawing button is detected, the drawing instruction input for the building image can be generated according to the user's drawing action, and at least two building spacing lines and at least two initial floor lines can be drawn in the displayed building image in response to the drawing instruction input for the building image. For every two adjacent building spacing lines, a region between the two adjacent building spacing lines is determined as the to-be-drawn region; and for every two adjacent initial floor lines, a region between the two adjacent initial floor lines within the to-be-drawn region is determined as the sub-region where the reference building household is located within the

to-be-drawn region in the target unit. In combination with Fig. 4, two long white line segments in the vertical direction in the image are drawn as the building spacing lines, and the lower three horizontal white line segments in the image are drawn as the initial floor lines. In the embodiment of the present application, the floor line may be a line segment whose two end points are located on the two building spacing lines. The two end points of the floor line may also not be located on the two building spacing lines, but the floor line should intersect with the two building spacing lines to construct a closed region.

In the building image captured by the image acquisition device in lower angle, an area occupied by a building household located on the low floor is larger than that occupied by a building households located on the high floor. In the building image captured by the image acquisition device in high angle, an area occupied by a building household located on the high floor is greater than that occupied by a building household located on the low floor. Therefore, in one possible case, the initial floor line can be drawn in the building image preferentially for a building household which occupies an area greater than a preset area threshold, so as to improve the accuracy of the division of the undivided region.

By way of example, as shown in Fig. 4, an area occupied by a building household on the low floor is larger than that occupied by a building household on the high floor. The user can clearly see a boundary between two building households on the low floor, so the user can clearly draw a floor line between the two building households in the building image. Specifically, the user can preferentially draw the initial floor line for a building household on the low-floor, for example, the lower three horizontal line segments in Fig. 4 are drawn as the initial floor lines, and it can be seen that the two closed sub-regions enclosed by the three horizontal line segments and the two building spacing lines are two sub-regions where two reference building households are located within the to-be-drawn region. At this time, according to the initial floor lines drawn by the user, the reference sub-region can be determined more accurately, and then the undivided region can be divided more accurately according to the reference sub-region drawn by the user.

After obtaining the building spacing lines and the initial floor lines drawn by the user, a supplementary floor line parallel to the initial floor lines can be drawn in the building image according to the target scaling ratio and the height information of the reference sub-region. As shown in Fig. 5, on the basis of the initial floor lines and the building spacing lines drawn in Fig.

4, the supplementary floor line can be drawn in the building image in combination with the target scaling ratio and the height information of the reference sub-region. That is, as shown in Fig. 5, the horizontal floor lines other than the lower three horizontal line segments are the supplementary floor lines.

5 In one possible case, by using the embodiment of the present application, the user only needs to draw two building spacing lines and three reference floor lines in the building image, wherein the three reference floor lines are used to represent three adjacent floors, that is, the three reference floor lines can be used to represent a floorboard of the first reference building household, a ceiling of the first reference building household and a ceiling of the second
10 reference building household, respectively. Based on this, by using the embodiment of the present application, the first reference height information of the first reference building household and the second drawn height information of the second reference building household can be automatically calculated, directly according to the user's manual drawing result, and the target scaling ratio can be automatically calculated according to the first reference height
15 information and the second drawn height information. Furthermore, according to the target scaling ratio and the height information of the reference building household, the supplementary floor lines of other building households can be automatically supplemented and drawn, so as to directly divide the undivided region, which greatly reduces the workload of manual operation and saves labor costs. By way of example, in the interface shown in Fig. 4, a button for
20 completing floors is provided, and the program will automatically supplement and draw the supplementary floor lines of other building households in response to the user clicking the button.

 According to the location relationship of the divided sub-regions of individual building households, and in combination with the building household information corresponding to the
25 reference sub-region, the building household information corresponding to the sub-regions where individual building households are located can be determined directly. Moreover, with the help of the user interaction interface, the mapping relationship between the sub-region where each building household is located and the building household information of the building household can be displayed to the user, that is, as shown in Fig. 7, the building household information
30 corresponding to each sub-region can be displayed to the user through the user interface. That is,

after determining the sub-regions where individual building households are located in the left part of Fig. 7, the building household information of other building households can be determined according to the reference building having known building household information. The determined building household information of the building households can be displayed in the symbols in the table on the right part of Fig. 7. Wherein, there is a one-to-one correspondence between the sub-regions where individual building households are located and the building household information of the individual building households.

In another possible case, the user interaction interface contains an input box corresponding to the building household information corresponding to each building household, so that the user can input the building household information in the input box for the building household information, and a second adjustment instruction is generated according to the building household information input by the user. In this way, the user can modify building household information corresponding to a sub-region according to the actual needs.

Specifically, in response to the second adjustment instruction input for the displayed building household information, the building household information corresponding to the sub-region where each building household is located can be adjusted. By way of example, as shown in Fig. 7, assuming that the building household information of the reference building is L07-01, that is, the building household information corresponding to the reference sub-region in the building image is L07-01. In the actual application scenario, if the user finds that the building household information of the reference building household should be L08-01, the user can input L08-01 in the input box for the building household information corresponding to the reference sub-region. That is, by using the embodiment of the present application, the building household information corresponding to a sub-region where each of other building households is located can be modified in response to L08-01 input by the user. In this way, the building household information corresponding to the sub-region where each building household is located can be adjusted according to actual situation, which can effectively improve the accuracy of determining the building household information.

In order to more clearly describe the building household information determining method provided by the present application, it is described especially in combination with the above application scenario 2:

The user interaction interface as shown in Fig. 4 can be provided to the user by using the building household information determining method provided by the present application. The user interaction interface includes a building image display window, buttons for drawing building spacing line and floor line, a button for supplementing floor line, an floor attribute information input box and a target scaling ratio input box. The building image display window can be used to display a historical building image, and can also be used to display a building image acquired at the current moment by the image acquisition device.

The building household information determining method provided by the present application is implemented through the following specific steps:

Step (1): After clicking the button for drawing building spacing line, the user can draw, in the building image displayed in the building image display window, at least two building spacing lines (two vertical lines as shown in Fig. 4) used to represent a target to-be-drawn region; the specific operation can be seen in the previous step S101 of obtaining the to-be-drawn region, which will not be repeated here;

Step (2): After clicking the button for drawing floor line, the user can draw, in the building image displayed in the building image display window, an initial floor line (the lower three horizontal lines as shown in Fig. 4) used to represent a floor where the reference building household is located. In this way, two reference sub-regions (the lower two closed regions as shown in Fig. 4) can be obtained; the specific operation can be seen in the above step S101 of obtaining the reference sub-region, which will not be repeated here;

Step (3): Automatically calculating the target scaling ratio according to the reference sub-region drawn by the user and the building spacing line drawn by the user; the specific calculation process can be seen in the above step S101, which will not be repeated here;

Step (4): After the user sets the number of floors to be supplemented (such as the n value in the geometric proportion formula) and clicks the button for supplementing floor line, the intersection point between the floor line of each other building household and the building spacing line in the building spacing lines according to the calculated target scaling ratio.

Step (5): A floor line segment is drawn according to the calculated intersection point between the floor line of each other building household and the building spacing line, to

complete the drawing of the supplementary floor lines, so as to realize the division of the undivided region into the multiple sub-regions, such as n sub-regions (the specific division effect can be seen in Fig. 5);

Step (6): When individual divided sub-regions cannot accurately represent the locations where individual building households are located, the user can manually input the building spacing or the scaling ratio, and in response to the first adjustment instruction input by the user for the displayed sub-region, the undivided region is divided again; the specific operations of step (4), step (5) and step (6) can be referred to the above step S102, which will not be repeated here;

Step (7): According to a position relationship between individual divided sub-regions, and in combination with the reference sub-region and the building household information of the reference building household, the building household information corresponding to a sub-region where each other building household in the building image is located is determined and displayed to the user (the specific displaying effect can be seen in Fig. 7);

Step (8): If the user needs to adjust the building household information, he/she can input the target building household information through the input box corresponding to the building household information, and then in response to the user's second adjustment instruction for the building household information, the building household information corresponding to the sub-region where each other building household is located is adaptively modified, and the modified accurate building household information is displayed to the user. The specific building household information corresponding to a sub-region where each building household is located can be referred to the above content of determining the building household information, which will not be repeated here.

In the present application scenario 2, the building image displayed in the above step (1) is an image containing a behavior of throwing objects from height. Using the embodiment of the present application, after the target position where the behavior of throwing objects from height occurs is determined in the building image, the building household information of the building household located at the target position can be determined according to the sub-region where target position where the behavior of throwing objects from height occurs, is located in the building image, to trace the source of the responsible person of the behavior of throwing objects

from height, and the determined target building is taken as the building household who performs the behavior of throwing objects from height. In this way, by using the embodiment of the present application, the building household where the responsible person who performs the behavior of throwing objects from height can be determined quickly and accurately according to
5 the target location where the behavior of throwing objects from height occurs, so as to accurately and efficiently trace the source of the behavior of throwing objects from height, and to assist in improving the tracking effect of the behavior of throwing objects from height.

On the other hand, corresponding to the aforementioned building household information determining method, an embodiment of the present application further provides a building
10 household information determining apparatus. As shown in Fig. 8, the building household information determining apparatus includes:

an obtaining module 801, configured to obtain a target scaling ratio, a to-be-drawn region in a building image and a reference sub-region in the to-be-drawn region;

a dividing module 802, configured to divide an undivided region into multiple drawn
15 sub-regions according to the target scaling ratio and height information of the reference sub-region, so that a ratio between height information values of any two adjacent sub-regions within the to-be-drawn region satisfies the target scaling ratio, wherein the undivided region is a further region in the to-be-drawn region other than the reference sub-region.

In one possible embodiment, the reference sub-region includes a first reference sub-region
20 and a second reference sub-region, and the first reference sub-region is adjacent to the second reference sub-region;

the obtaining module 801 is specifically configured to determine first reference height information of the first reference sub-region and second reference height information of the second reference sub-region; calculate a ratio of the first reference height information to the
25 second reference height information as the target scaling ratio;

wherein obtaining, the obtaining module 801, the to-be-drawn region in the building image and the reference sub-region in the to-be-drawn region includes:

displaying the building image;

determining at least two building spacing lines and at least two initial floor lines in the building image;

determining a region between two adjacent building spacing lines as the to-be-drawn region;

- 5 determining a region located between two adjacent initial floor lines within the to-be-drawn region as the reference sub-region in the to-be-drawn region;

wherein dividing, by the dividing module, the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region includes:

- 10 determining first reference height information of the reference sub-region;

determining height information of a further sub-region according to the target scaling ratio and the first reference height information as second drawn height information;

dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines;

- 15 wherein dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines includes:

- 20 determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, linear equations of the building spacing lines and linear equations of the initial floor lines; or, determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and linear equations of the building spacing lines;

connecting the intersection points of the same floor line;

- 25 wherein the height information of the reference sub-region includes a first height value of the reference sub-region; the second drawn height information includes a second height value of a divided sub-region;

determining, by the dividing module, the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the linear equations of the building spacing lines, and/or the linear equations of the initial floor lines includes:

5 determining a linear equation of a floor line corresponding to the second height value according to the second height value and the linear equations of the initial floor lines;

determining intersection points of the linear equation of the floor line and the linear equations of the building spacing lines;

10 wherein the height information of the reference sub-region includes a first length of the building spacing lines in the reference sub-region; the second drawn height information includes a second length of the building spacing lines contained in a divided sub-region;

15 determining, by the dividing module, the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the linear equations of the building spacing lines and the linear equations of the floor lines includes:

determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines on the linear equations of the building spacing lines according to the second length and the linear equations of the building spacing lines;

20 wherein dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines includes:

25 translating at least two points on a target floor line in a vertical direction by a second height value represented by the second drawn height information according to the second drawn height information, to obtain at least two translated points, wherein the target floor line is initially one of the initial floor line;

connecting the at least two translated points to obtain a drawn floor line;

taking the drawn floor line as a new target floor line, and returning to perform an operation of translating the at least two points on the target floor line in the vertical direction by the second

height value represented by the second drawn height information according to the second drawn height information, to obtain the at least two translated points;

wherein the apparatus further includes an adjustment module, configured to display all sub-regions within the to-be-drawn region;

5 adjust the target scaling ratio and/or the height information of the reference sub-region in response to a first adjustment instruction input for a displayed sub-region, to obtain an adjusted scaling ratio and/or adjusted height information of the reference sub-region;

10 take the adjusted scaling ratio as a new target scaling ratio, and/or take the adjusted height information of the reference sub-region as new height information of the reference sub-region, and return to perform an operation of dividing the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region;

15 wherein the apparatus further includes a building household information determining module, configured to obtain building household information corresponding to the reference sub-region;

determine building household information corresponding to each of the drawn sub-regions according to the building household information corresponding to the reference sub-region and positions of individual sub-regions in the to-be-drawn region.

20 An embodiment of the present application further provides an electronic device, as shown in the figure 9, which includes a processor 901, a communication interface 902, a memory 903 and a communication bus 904, wherein the processor 901, the communication interface 902 and the memory 903 communicate with each other through the communication bus 904;

the memory 903 is configured to store a computer program;

25 the processor 901 is configured to carry out the following steps when executing the program stored on the memory 903:

obtaining a target scaling ratio, a to-be-drawn region in a building image and a reference sub-region in the to-be-drawn region;

dividing an undivided region into multiple drawn sub-regions according to the target scaling

ratio and height information of the reference sub-region, so that a ratio between height information values of any two adjacent sub-regions within the to-be-drawn region satisfies the target scaling ratio, wherein the undivided region is a further region in the to-be-drawn region other than the reference sub-region.

5 The communication bus mentioned in the above electronic device can be a Peripheral Component Interconnect (PCI) bus or an Extended Industry Standard Architecture (EISA) bus, etc. The communication bus can be divided into an address bus, a data bus, a control bus and the like. For ease of presentation, only one thick line is shown in the figure, which does not mean that there is only one bus or one type of bus.

10 The communication interface is used for communication between the electronic device and other devices.

The memory may include a Random Access Memory (RAM), or a Non-Volatile memory (NVM), such as at least one disk memory. Optionally, the memory may also be at least one storage device located away from the processor.

15 The above processor may be a general-purpose processor, including a Central Processing Unit (CPU), a Network Processor (NP), etc.; it may also be a Digital Signal Processor (DSP), an Application Specific Integrated Circuit (ASIC), a Field-Programmable Gate Array (FPGA) or other programmable logic devices, discrete gates or transistor logic devices, discrete hardware components.

20 In yet another embodiment provided by the present application, a computer-readable storage medium is further provided, which stores a computer program therein, wherein the computer program, when executed by a processor, carries out any one of the above building household information determining methods.

25 In yet another embodiment provided by the present application, a computer program containing instructions is further provided, which when running on a computer, cause the computer to carry out any one of the building household information determining methods in the above embodiments.

In the above embodiments, it may be implemented in whole or in part by software, hardware, firmware or any combination thereof. When implemented in software, it can be

implemented in whole or in part in the form of a computer program product. The computer program product includes one or more computer instructions. When the computer program instructions are loaded and executed on a computer, the processes or functions described in the embodiments of the present application are generated in whole or in part. The computer may be a
5 general purpose computer, special purpose computer, computer network, or other programmable device. The computer instructions may be stored in a computer readable storage medium or transmitted from one computer readable storage medium to another computer readable storage medium, for example, the computer instructions may be transmitted from a website, computer, server or data center to another website, computer, server, or data center by wire (such as coaxial
10 cable, fiber optic, digital subscriber line (DSL)) or wirelessly (such as infrared, wireless, microwave, etc.). The computer-readable storage medium may be any available medium that can be accessed by a computer or a data storage device such as a server and a data center and the like that includes an integration of one or more available medium. The available medium may be magnetic media (such as a floppy disk, a hard disk, a magnetic tape), optical media (such as
15 DVD), or semiconductor media (such as Solid State Disk (SSD)) and the like.

It should be noted that in this article, relational terms such as first and second are only to distinguish one entity or operation from another, and do not necessarily require or imply any actual relationship or order between these entities or operations. Moreover, the terms "include", "contain", or any other variation thereof are intended to encompass a non-exclusive inclusion,
20 such that a process, method, article, or device that includes a series of elements not only includes those elements, but also other elements that are not explicitly listed, or also include elements inherent in such a process, method, article, or device. Without further limitations, the elements limited by the statement "including one..." do not exclude the existence of other identical elements in the process, method, article, or device that includes the elements.

25 The various embodiments in this specification are described in a relevant manner. Each embodiment focuses on the differences from other embodiments, and the same and similar parts between the various embodiments can be referred to each other. In particular, for the embodiments of the system, the description is relatively simple because it is basically similar to the embodiment of the method, the description is relatively simple, and the relevant points can be
30 referred to the partial description of the embodiment of the method.

The above descriptions are only preferred embodiments of the present application, and are not intended to limit the present application. Any modifications, equivalent replacements, improvements, etc. made within the spirit and principles of the present application shall be included within the scope of protection of the present application.

CLAIMS

1. A building household information determining method, comprising:

obtaining a target scaling ratio, a to-be-drawn region in a building image and a reference sub-region in the to-be-drawn region;

5 dividing an undivided region into multiple drawn sub-regions according to the target scaling ratio and height information of the reference sub-region, so that a ratio between height information values of any two adjacent sub-regions within the to-be-drawn region satisfies the target scaling ratio, wherein the undivided region is a further region in the to-be-drawn region other than the reference sub-region.

10 2. The method according to claim 1, wherein, the reference sub-region comprises a first reference sub-region and a second reference sub-region, and the first reference sub-region is adjacent to the second reference sub-region;

wherein obtaining the target scaling ratio comprises:

15 determining first reference height information of the first reference sub-region and second reference height information of the second reference sub-region;

calculating a ratio of the first reference height information to the second reference height information as the target scaling ratio.

3. The method according to of claim 1, wherein, obtaining the to-be-drawn region in the building image and the reference sub-region in the to-be-drawn region comprises:

20 displaying the building image;

determining at least two building spacing lines and at least two initial floor lines in the building image;

determining a region between two adjacent building spacing lines as the to-be-drawn region;

25 determining a region located between two adjacent initial floor lines within the to-be-drawn region as the reference sub-region in the to-be-drawn region.

4. The method according to claim 3, wherein, dividing the undivided region into the

multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region comprises:

determining first reference height information of the reference sub-region;

5 determining height information of a further sub-region according to the target scaling ratio and the first reference height information as second drawn height information;

dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines.

10 5. The method according to claim 4, wherein, dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines comprises:

15 determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, linear equations of the building spacing lines and linear equations of the initial floor line; or, determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and linear equations of the building spacing lines;

connecting the intersection points of the same floor line.

20 6. The method according to claim 5, wherein, the height information of the reference sub-region comprises a first height value of the reference sub-region; the second drawn height information comprises a second height value of a divided sub-region;

wherein determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the linear equations of the building spacing lines and the linear equations of the initial floor lines comprises:

25 determining a linear equation of a floor line corresponding to the second height value according to the second height value and the linear equations of the initial floor lines;

determining intersection points of the linear equation of the floor line and the linear equations of the building spacing lines.

7. The method according to claim 5, wherein, the height information of the reference sub-region comprises a first length of the building spacing lines in the reference sub-region; the second drawn height information comprises a second length of the building spacing lines contained in a divided sub-region;

5 wherein determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and the linear equations of the building spacing lines comprises:

10 determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines on the linear equations of the building spacing lines according to the second length and the linear equations of the building spacing lines.

8. The method according to claim 4, wherein, dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines comprises:

15 translating at least two points on a target floor line in a vertical direction by a second height value represented by the second drawn height information according to the second drawn height information, to obtain at least two translated points, wherein the target floor line is initially one of the initial floor lines;

 connecting the at least two translated points to obtain a drawn floor line;

20 taking the drawn floor line as a new target floor line, and returning to perform an operation of translating the at least two points on the target floor line in the vertical direction by the second height value represented by the second drawn height information according to the second drawn height information, to obtain the at least two translated points.

9. The method according to any one of claims 1 to 8, wherein, the method further comprises:

25 displaying all sub-regions within the to-be-drawn region;

 adjusting the target scaling ratio and/or the height information of the reference sub-region in response to a first adjustment instruction input for a displayed sub-region, to obtain an adjusted scaling ratio and/or adjusted height information of the reference sub-region;

taking the adjusted scaling ratio as a new target scaling ratio, and/or taking the adjusted height information of the reference sub-region as new height information of the reference sub-region, and returning to perform an operation of dividing the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region.

10. The method according to any one of claims 1 to 8, wherein, the method further comprises:

obtaining building household information corresponding to the reference sub-region;

determining building household information corresponding to each of the drawn sub-regions according to the building household information corresponding to the reference sub-region and positions of individual sub-regions in the to-be-drawn region.

11. A building household information determining apparatus, comprising:

an obtaining module, configured to obtain a target scaling ratio, a to-be-drawn region in a building image and a reference sub-region in the to-be-drawn region;

a dividing module, configured to divide an undivided region into multiple drawn sub-regions according to the target scaling ratio and height information of the reference sub-region, so that a ratio between height information values of any two adjacent sub-regions within the to-be-drawn region satisfies the target scaling ratio, wherein the undivided region is a further region in the to-be-drawn region other than the reference sub-region.

12. The apparatus according to claim 11, wherein, the reference sub-region comprises a first reference sub-region and a second reference sub-region, and the first reference sub-region is adjacent to the second reference sub-region;

obtaining, by the obtaining module, the target scaling ratio comprises:

determining first reference height information of the first reference sub-region and second reference height information of the second reference sub-region;

calculating a ratio of the first reference height information to the second reference height information as the target scaling ratio;

wherein obtaining, by the obtaining module, the to-be-drawn region in the building image and the reference sub-region in the to-be-drawn region comprises:

displaying the building image;

5 determining at least two building spacing lines and at least two initial floor lines in the building image;

determining a region between two adjacent building spacing lines as the to-be-drawn region;

determining a region located between two adjacent initial floor lines within the to-be-drawn region as the reference sub-region in the to-be-drawn region;

10 wherein dividing, by the dividing module, the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference sub-region comprises:

determining first reference height information of the reference sub-region;

15 determining height information of a further sub-region according to the target scaling ratio and the first reference height information as second drawn height information;

dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines;

20 wherein dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines comprises:

determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, linear equations of the building spacing lines and linear equations of the initial floor lines; or, determining intersection points of a floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information and linear equations of the building spacing lines;

25

connecting the intersection points of the same floor line;

wherein the height information of the reference sub-region comprises a first height value of the reference sub-region; the second drawn height information comprises a second height value of a divided sub-region;

5 determining, by the dividing module, the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the linear equations of the building spacing lines, and/or the linear equations of the initial floor lines comprises:

determining a linear equation of a floor line corresponding to the second height value according to the second height value and the linear equations of the initial floor lines;

10 determining intersection points of the linear equation of the floor line and the linear equations of the building spacing lines;

wherein the height information of the reference sub-region comprises a first length of the building spacing lines in the reference sub-region; the second drawn height information comprises a second length of the building spacing lines contained in a divided sub-region;

15 determining, by the dividing module, the intersection points of the floor line corresponding to the further sub-region and the building spacing lines according to the second drawn height information, the linear equations of the building spacing lines and the linear equations of the floor lines comprises:

20 determining the intersection points of the floor line corresponding to the further sub-region and the building spacing lines on the linear equations of the building spacing lines according to the second length and the linear equations of the building spacing lines;

wherein dividing the undivided region into the multiple drawn sub-regions according to the second drawn height information, the building spacing lines, and/or the initial floor lines comprises:

25 translating at least two points on a target floor line in a vertical direction by a second height value represented by the second drawn height information according to the second drawn height information, to obtain at least two translated points, wherein the target floor line is initially one of the initial floor line;

connecting the at least two translated points to obtain a drawn floor line;

taking the drawn floor line as a new target floor line, and returning to perform an operation of translating the at least two points on the target floor line in the vertical direction by the second height value represented by the second drawn height information according to the second drawn
5 height information, to obtain the at least two translated points;

wherein the apparatus further comprises an adjustment module, configured to display all sub-regions within the to-be-drawn region;

adjust the target scaling ratio and/or the height information of the reference sub-region in response to a first adjustment instruction input for a displayed sub-region, to obtain an adjusted
10 scaling ratio and/or adjusted height information of the reference sub-region;

take the adjusted scaling ratio as a new target scaling ratio, and/or take the adjusted height information of the reference sub-region as new height information of the reference sub-region, and return to perform an operation of dividing the undivided region into the multiple drawn sub-regions according to the target scaling ratio and the height information of the reference
15 sub-region;

wherein the apparatus further comprises a building household information determining module, configured to obtain building household information corresponding to the reference sub-region;

determine building household information corresponding to each of the drawn sub-regions
20 according to the building household information corresponding to the reference sub-region and positions of individual sub-regions in the to-be-drawn region.

13. An electronic device, comprising a processor, a communication interface, a memory and a communication bus, wherein the processor, the communication interface and the memory communicate with each other through the communication bus;

25 the memory is configured to store a computer program;

the processor is configured to carry out the method according to any one of claims 1 to 10 when executing the program stored on the memory.

14. A computer-readable storage medium having a computer program stored therein,

wherein the computer program, when executed by a processor, carries out the method according to any one of claims 1 to 10.