CLAIMS

1. A map constructing method, adopted by a map constructing apparatus and the map constructing method comprising steps of:

a) continually capturing a colored image of a surrounding environment through an image sensor and obtaining a depth-image information of the surrounding environment through a depth sensor after the map constructing apparatus is activated;

b) executing a detecting algorithm by a processor of the map constructing apparatus for performing an image recognition procedure to the colored image to determine whether a dynamic object exists in the colored image, wherein the detecting algorithm is Histogram of Oriented Gradient (HOG) feature extraction algorithm, Support Vector Machine (SVM) algorithm, Convolutional Neural Network (CNN) algorithm, You Only Look Once (YOLO) algorithm, Single Shot multibox Detector (SSD) algorithm or an object detecting algorithm trained by neural network;

c) labelling the dynamic object and creating a bounding box that encompasses the dynamic object when the dynamic object is existing in the colored image;

d) mapping the bounding box to a depth-image coordinate adopted by the depth-image information;

e) searching and filtering the bounding box from the depth-image information for generating an adjusted depth-image information, wherein depth information of a location corresponding to the bounding box has been filtered from the content of the adjusted depth-image information;

f) executing a map constructing algorithm by the processor according to the adjusted depth-image information; and

g) establishing map data for storing in a storage by the map constructing algorithm.

2. The map constructing method in claim 1, wherein the image sensor is an RGB camera, the depth sensor is a lidar.

3. The map constructing method in claim 1, wherein the storage stores multiple object feature data corresponding to different object types, and the step b) is comparing the colored image with the multiple object feature data by the detecting algorithm and regarding a piece of image of the colored image matched with the object feature data as the dynamic object.

4. The map constructing method in claim 3, wherein the step c) is to obtain an X-axis starting coordinate (X_{start}), an X-axis ending coordinate (X_{end}), a Y-axis starting coordinate (Y_{start}) and a Y-axis ending coordinate (Y_{end}) of the dynamic object in the colored image and create the bounding box according to the coordinates (X_{start}, X_{end}, Y_{start} and Y_{end}), and the step d) is to map the coordinates of the bounding box to the depth-image coordinate, and set an extreme pixel value to all pixels inside the bounding box for generating self-defined pixel information.

5. The map constructing method in claim 4, wherein the extreme pixel value is 0 or 255.

6. The map constructing method in claim 4, wherein the step e) is to search for a range of the self-defined pixel information in the depth-image information and set depth information inside the range as 0 for generating the adjusted depth-image information.

7. The map constructing method in claim 1, wherein the map constructing algorithm is Visual Simultaneous Localization and Mapping (VSLAM) algorithm and is implemented through triangulation method, Kalman Filter, Particle Filter, Monte Carlo Localization (MCL), Mixture MCL, or Grid-Based Markov.

8. The map constructing method in claim 1, wherein the map data is stored to the storage under a file format of portable network graphics (PNG), bitmap (BMP) or portable gray map (PGM).

9. The map constructing method in claim 1, wherein the map constructing apparatus is arranged in a mobile robot, and the map constructing method further comprises steps of:

h) loading the map data from the storage and starting moving by the mobile robot;

i) continually capturing the colored image through the image sensor and obtaining the depth-image information through the depth sensor;

j) determining whether to update the map data;

k) executing the detecting algorithm to perform the image recognition procedure to the colored image when it is determined to update the map data;

l) labelling a second dynamic object in the colored image and creating a second bounding box that encompasses the second dynamic object;

m) mapping the second bounding box to the depth-image coordinate adopted by the depth-image information;

n) searching and filtering the second bounding box from the depth-image information for generating the adjusted depth-image information;

o) executing the map constructing algorithm according to the adjusted depth-image information; and

p) establishing a partial map image through the map constructing algorithm and updating the map data based on the partial map image.

10. A map constructing apparatus, comprising:

an image sensor, configured to continually capture a colored image of a surrounding environment after the map constructing apparatus is activated;

a depth sensor, configured to continually obtain depth-image information of the surrounding environment after the map constructing apparatus is activated;

a processor electrically connected with the image sensor and the depth sensor, the processor being configured to execute a detecting algorithm for performing an image recognition procedure to the colored image to determine whether a dynamic object exists in the colored image, and the processor labelling the dynamic object of the colored image and creating a bounding box that encompasses the dynamic object when the dynamic object exists, wherein the processor is further configured to map the bounding box to a depth-image coordinate adopted by the depth-image information, to search and filter the bounding box from the depth-image information for generating an adjusted depth-image information and to execute a map constructing algorithm according to the adjusted depth-image information for establishing map data, wherein depth information of a location corresponding to the bounding box is filtered from the content of the adjusted depth-image information, wherein the detecting algorithm is Histogram of Oriented Gradient (HOG) feature extraction algorithm, Support Vector Machine (SVM) algorithm, Convolutional Neural Network (CNN) algorithm, You Only Look Once (YOLO) algorithm, Single Shot multibox Detector (SSD) algorithm or an object detecting algorithm trained by neural network; and

a storage electrically connected with the processor, configured to store the map data.

11. The map constructing apparatus in claim 10, wherein the image sensor is an RGB camera, the depth sensor is a lidar.

12. The map constructing apparatus in claim 10, wherein the storage is configured to store multiple object feature data corresponding to different object types, the detecting algorithm is configured to be executed to compare the colored image with the multiple object feature data and regard a piece of image of the colored image matched with the object feature data as the dynamic object.

13. The map constructing apparatus in claim 12, wherein the detecting algorithm is configured to be executed to obtain an X-axis starting coordinate (X_{start}), an X-axis ending coordinate (X_{end}), a Y-axis starting coordinate (Y_{start}) and a Y-axis ending coordinate (Y_{end}) of the dynamic object in the colored image and to create the bounding box according to the coordinates (X_{start}, X_{end}, Y_{start} and Y_{end}), and the processor is further configured to map the coordinates of the bounding box to the depth-image coordinate, and to set an extreme pixel value to all pixels inside the bounding box for generating self-defined pixel information, wherein the processor is further configured to search for a range of the self-defined pixel information from the depth-image information and to set depth information of the range as 0 for generating the adjusted depth-image information.

14. The map constructing apparatus in claim 13, wherein the extreme pixel value is 0 or 255.

15. The map constructing apparatus in claim 10, wherein the map constructing algorithm is Visual Simultaneous Localization and Mapping (VSLAM) algorithm and is implemented through triangulation method, Kalman Filter, Particle Filter, Monte Carlo Localization (MCL), Mixture MCL, or Grid-Based Markov.

16. The map constructing apparatus in claim 10, wherein the map data is under a file format of portable network graphics (PNG), bitmap (BMP) or portable gray map (PGM).