Using CloudCompare software editing tools for processing a three-dimensional point cloud of an urban development site

Dmitry Gura[1], *Ekaterina* Karamysheva[1*], and *Saida* Pshidatok[1,2]

[1]Kuban State Technological University, Krasnodar, Russia
[2]Kuban State Agrarian University, Krasnodar, Russia

Abstract. This article describes the functions that can be performed by CloudCompare, an open-source triangular mesh and 3D point cloud processing software developed through a collaboration between Telecom ParisTech and EDF R&D. CloudCompare software is used to study and analyze archaeological sites and create their 3D models. Helps engineers monitor the condition of bridges, roads, buildings, etc., identify problems and find solutions to eliminate them. The program provides a set of basic tools for editing and rendering. Some basic editing tools for working in the CloudCompare software are studied and demonstrated, such as cloning, cutting an element from the main object of study, scaling. It is concluded that the CloudCompare software is easy to use and effectively performs the functions contained in it.

1 Introduction

A point cloud is a collection of points in three-dimensional space that can be obtained using lidars by scanning a surface [1,2].

CloudCompare is an open source triangular mesh and 3D point cloud processing software developed through a collaboration between Telecom ParisTech and EDF R&D [3,4]. It has a considerable number of advantages, for example, it is free, understandable and effective to use [5,6].

CloudCompare software is used to study and analyze archaeological sites and create their 3D models [7,8]. Helps engineers monitor the condition of bridges, roads, buildings, and so on, identify problems and find solutions to eliminate them [9,10].

The software interface is shown in Figure 1.

The program provides a set of basic tools for editing and rendering [11, 12].

* Corresponding author: karamysheva3713@gmail.com

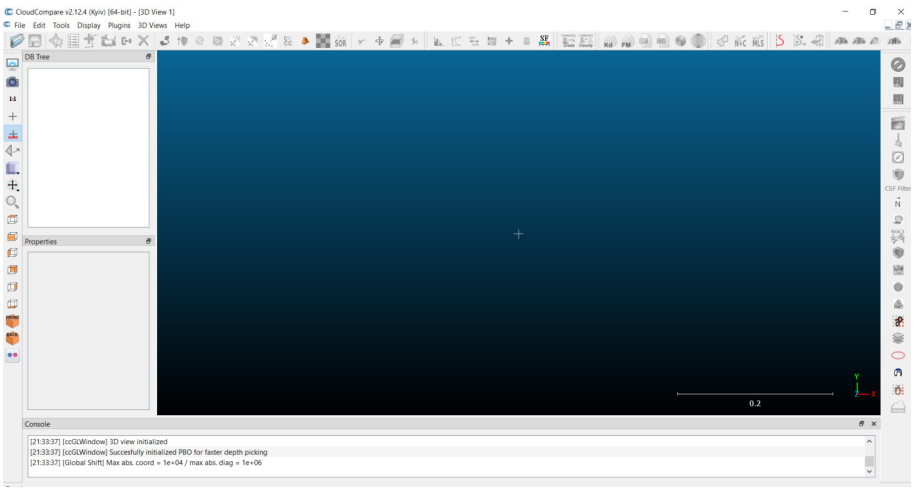

Fig. 1. CloudCompare software interface.

The software can perform the functions presented in Figure 2.

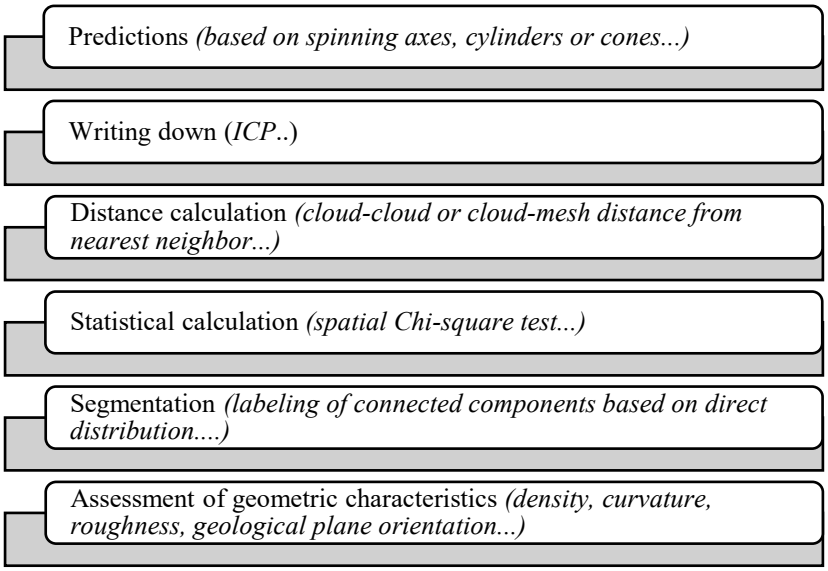

Fig. 2. Program functions.

2 Using the editing tools in the CloudCompare software

Let us give an example of using some of the main editing tools “CloudCompare” for processing a three-dimensional point cloud of an urban area - a building [13,14].

First, import the point cloud into the program (Figure 3).

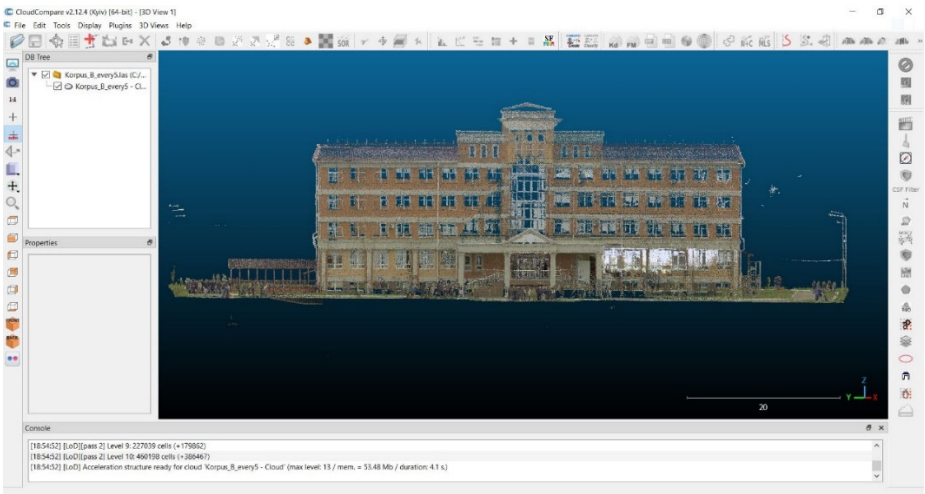

Fig. 3. Loaded point cloud into the program.

2.1 Using the Clone editing tool

This software does not have a command to cancel a completed action, as in most others [15,16]. Therefore, the Clone command is necessary for creating a project, helping to prevent mistakes that cannot be corrected in the future.

In the CloudCompare software, the Clone command allows you to clone objects; it is located in the Edit tab. Figure 4 shows the result.

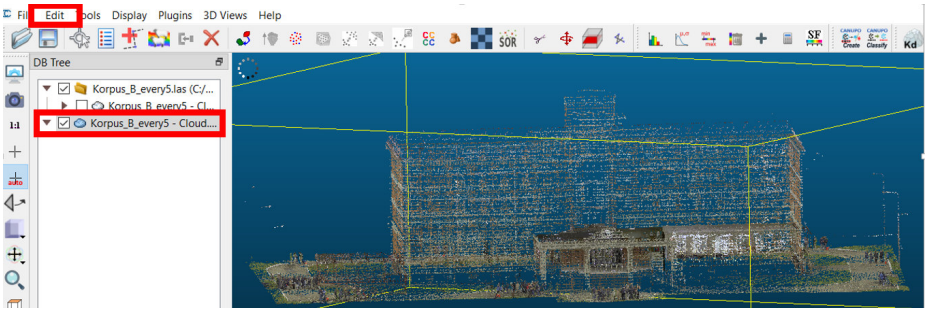

Fig. 4. The resulting result of using the “Clone” command.

2.2 Using the Segment editing tool

To cut out an object, use the “Segment” command. Using it, you can cut out individual elements (road, tree, building and other urban objects) [17]. The selected object is shown in Figure 5.

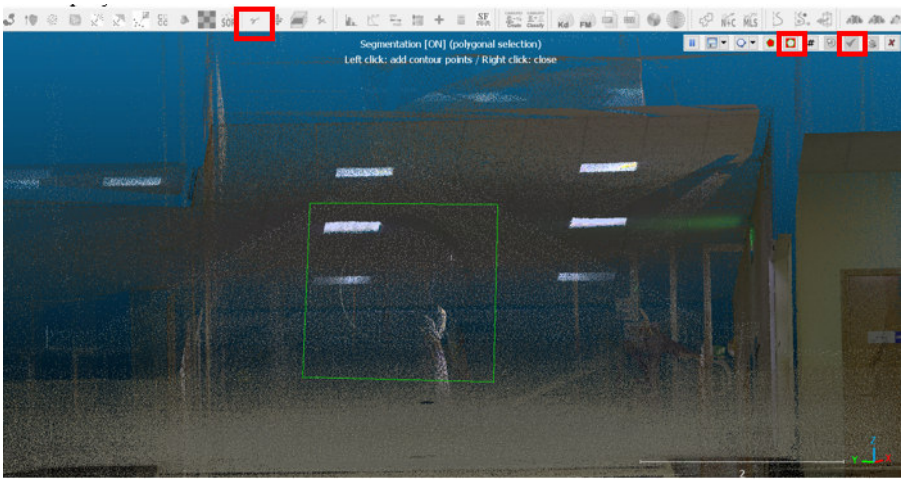

Fig. 5. Clip area of a point cloud section.

After selection, execute the “Segment Out” command, click on the check mark or “Enter” and turn off the extra layers. The result obtained is demonstrated in Figure 6.

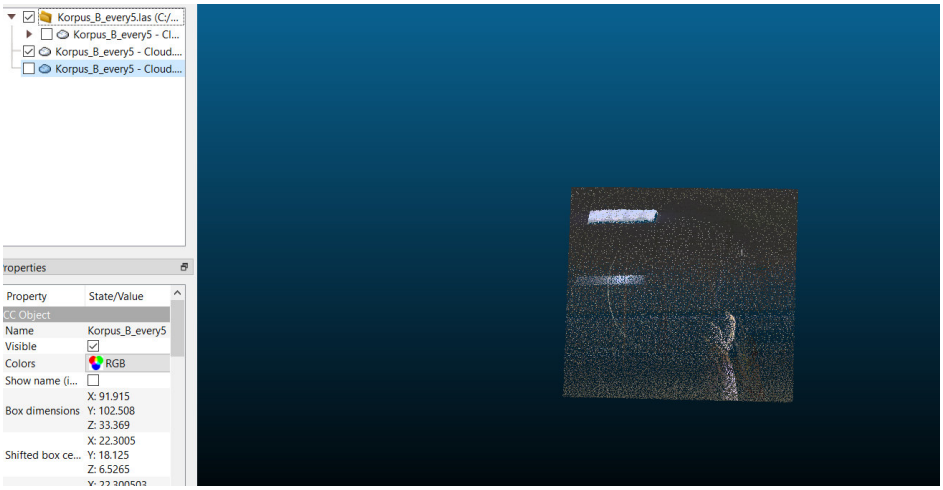

Fig. 6. The resulting result of using the "Segment Out" command.

2.3 Using the Multiply/Scale editing tool

Another important tool is “Multiply/Scale”. It is designed for scaling objects. Located in the “Edit” tab (Figure 7).

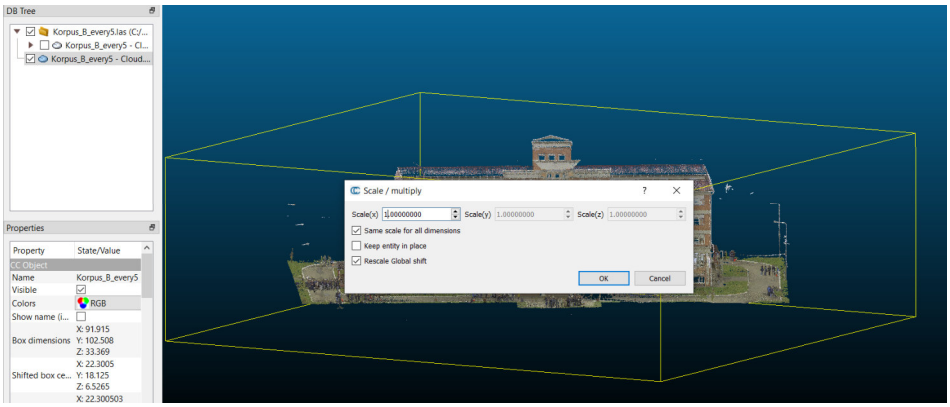

Fig. 7. Multiply/Scale window.

We reduce the object by changing 1.0 to 10.0 and get the result shown in Figure 8.

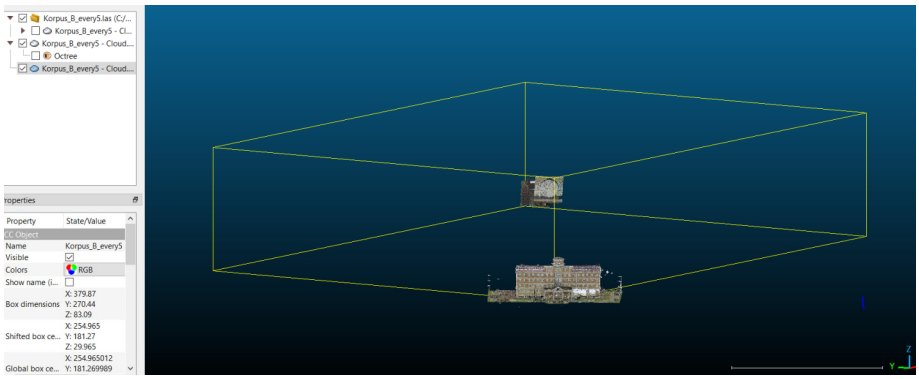

Fig. 8. The result obtained of using the “Multiply/Scale” tool.

3 Conclusion

The CloudCompare program provides the user with a large number of tools for editing three-dimensional point clouds, thereby helping to visualize the necessary objects and solve many problems in various fields of human activity.

Thus, the functionality of the CloudCompare program provides convenient and efficient processing of three-dimensional point clouds of urban areas.

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