

**Comparative Study Of Several Mathematical Methods for building Continuous  
1surface  
Based On 3D Laser Scanning Clouds\***

**Prepared By  
Eng. Hussam SULAIMAN\*\***

**Supervised By  
Dr. Riyad ALMASRI\*\*\***

**Supervised By  
Dr. Omar ALKHALIL\*\*\*\***

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**Abstract**

Airborne Laser Scanning ALS or as known as Light Detection and Ranging (LIDAR) is one of the most effective and reliable means of bar earth Topography. It represents the region scanned by a large and dense clouds in 3-D space. However, they are many challenges related to the process of interpolating continuous phenomenon like Digital Terrain Model (DTM) based on known surface values of LIDAR points.

In this paper, comparisons between several mathematical interpolation methods applied on high accuracy and huge laser clouds which only represents the DTM. In order to implicate the aforementioned, a group of a variety of Laser Scanned Areas has been chosen to represent different types of terrain including complex and flat terrain, taking into account that man-made features are not involved in this study and that different Laser Clouds density is used to make the study more general.

A different set of algorithms were applied to conclude which one is more suitable. This step was followed by the comparison between different interpolation results. The results have shown that the Points' Density has a great impact on a manner in which the optimal interpolation method is applied. Moreover, it has proven that the Nearest Neighbor Algorithm is the best applied method compared with the other alternatives

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Keywords: Interpolation, Comparative, DTM, Laser cloud, Nearest Neighbor

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- For the paper in Arabic see pages (55-66).

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\*\* Civil Engineer prepare Research for doctorate degree at Faculty of civil engineering, Department of topography

\*\*\* Prof at faculty of civil engineering, Damascus University, Department of topography

\*\*\*\* Prof at faculty of engineering, Teshrine University, Department of topography

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Several methods have been developed for the automated generation of 3D indoor models from point clouds (Jung et al., 2015; Oesau et al., 2014; Ochmann et al., 2014; Xiong et al., 2013; Mura et al., 2014; Wang et al., 2016). Babacan et al. Using a self-built backpacked indoor mobile laser scanning system, we effectively and accurately acquire an indoor 3D point cloud. Our proposed method includes three stages: patch-based semantic labeling, 3D line structure feature extraction, and line framework optimization. Current methods for modeling and constructing indoor scenes from point clouds are mainly classified according to 3D line-based, plane fitting-based, 3D point clouds can be represented by a set of 2D images. Home Journals TS A Comparative Study of Object Classification Methods Using 3D Zernike Moment on 3D Point Clouds. TS. About. The three-dimensional (3D) point cloud obtained with built-in sensors such as a laser scanner, time-of-flight camera, or stereographic systems provides a reliable and convenient source of information for computer graphics [1]. Point cloud needs to be processed as a basic step in many applications such as segmentation and classification of objects, identification of uncertain areas, and completion of. Specifically, it has been constructed over several 3D point clouds of different structures for analysis. 3D Zernike Moments are expressed as the mathematical calculation of 3D monomial terms over digital point cloud voxels. generated based on the point cloud, which can be obtained as a result of the terrestrial. laser scanning [7] or processing of digital terrestrial images (Structure from Motion), taken with an appropriate longitudinal and latitudinal overlap [8], [9]. Terrestrial laser. scanning is one of the methods of remote sensing operating on the basis of. electromagnetic radiation, where during the measurement the distance is determined. between the laser scanner and the scanned object, as well as horizontal and vertical angles. Building a 3D model based on the Structure from Motion method requires using a strict. procedure of taking and processing of photos, in which it is necessary to mainly ensure. appropriate longitudinal and latitudinal overlap between the subsequent images. PDF | Laser scanning technology has been explored as a reliable and accurate method to generate point clouds for the purposes of 3D modelling, as-built | Find, read and cite all the research you need on ResearchGate. progress tracking and as-built construction activities over the course of several months on a construction. project. It was found that on one hand photogrammetry fits more a user profile for which money is an. acquire 3D point clouds. Laser scanners are based on two main technologies: (1) time-of-flight or pulse-. based, and (2) phase-based (Jacobs 2008). Pulse-based scanners send a laser pulse in a narrow beam.