

Abstract

Title: Analysis of Point Clouds Representing Surfaces of Engineering Practice
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Abstract: The doctoral dissertation *Analysis of Point Clouds Representing Surfaces of Engineering Practice* addresses the development and application of methods of digital reconstruction of surfaces of engineering and construction practice from point clouds. The main outcome of the dissertation is a presentation of new procedures and methods that contribute to each of the stages of the reconstruction process from the input point clouds. The work is mainly focused on the analysis of input clouds that describe special types of surfaces. Several completely new algorithms and improvements of existing algorithms that contribute to individual steps of surface reconstruction are presented. New procedures are based on geometrical characteristics of the reconstructed object. An important result of the dissertation is an analysis of not only synthetically generated point clouds but above all an analysis of real point clouds that have been obtained from measurements of real objects. The significant contribution of the dissertation is also an implementation of all the proposed algorithms in a modern programming language and interactive environment MATLAB. All the data and programs are available on the attached removable media to allow reproducibility of presented results.

Keywords: point clouds, reconstruction of surfaces, approximation, orthogonal data fitting, 3D scanning