

Efficient 3D Content Creation using Point Sampled Geometry

Markus Gross

Abstract

In recent years, point primitives have received a growing attention in computer graphics. The emergence of affordable 3D scanning devices along with the demand for ever more geometric detail has created the need to efficiently process and display very large point sampled models. At data sizes where triangle based methods approach their limits, point representations feature a variety of advantages. Since points provide a discretization of geometry without explicit storage of topology, they enable us to generate highly optimized object representations. In spite of the great challenges they pose for graphics processing, the latest generation of algorithms includes advanced modeling, sophisticated geometry processing, and high quality rendering.

In this talk I will introduce points as a powerful and versatile graphics primitive for efficient 3D content creation and present a survey the latest research results in point based computer graphics. Novel concepts for the representation of point sampled shapes will be discussed, as well as algorithms for interactive modeling of point clouds. In addition, I will address methods for geometric processing, filtering and resampling of point models. I will also give examples of algorithms for high performance rendering of point clouds, including advanced shading, antialiasing, and transparency. Finally, I will introduce Pointshop3D, an open source software for 3D photo editing of point sampled geometry, which includes all of the presented algorithms.
