

Abstract

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The objective of this thesis is to empirically investigate the imaginable performance for data structures suitable for effectively representing extreme-resolution 3D polygonal surfaces; designed for multi-resolution rendering on GPUs.

To this end, supporting algorithms will be designed, implemented, and tested that transform "traditional" (i.e., indexed) high-resolution triangular meshes into the analyzed data structures, and then measure the approximation errors introduced through appropriate geometric measurements.

Other alternative schemes will be studied, which are considered variants of the so-called "micro-meshes" scheme offered by the latest generation of vendor-specific GPU hardware. These data structures are characterized by the use of a semi-regular subdivision of a medium-resolution "basic mesh", followed by displacement of the generated vertices. Variants introduced may include the adoption of an anisotropic subdivision step, the adoption of an irregular recursive subdivision scheme, or others.