TU Clausthal

Diplomanden- und Doktorandenseminar
des Instituts für Informatik

Fast Sphere Packing with Adaptive Grids

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Sphere packing of virtual objects can be used in many different applications ranging from computer graphics via path finding and physical simulations through to medicine. Weller and Zachmann [2010] introduced a novel algorithm, called Protosphere, to compute polydisperse sphere packings of arbitrary objects using a prototype-based approach as known from machine learning. In this thesis we will advance their approach and show several improvements to speed up the sphere packing.

The original Protosphere algorithm uses rigid uniform grids to successively approximate the objects' medial axis and to parallelise the process. This is a very simple, yet effective approach, but it has some drawbacks. We will address these drawbacks by introducing two new hierarchical grids and one hybrid that are applied to Protosphere. Furthermore we will outline two different improvements that enhance the effectiveness of the packing. Overall, this improvements lead to a significant speedup compared to the original implementation, especially on meshes with a high polygon count. The computation of the first spheres is even accelerated by two orders of magnitude, allowing for close to real-time approximation of the medial axis of most objects.

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