COMPARISON OF SKELETON EXTRACTION TECHNIQUES FOR 2D AND 3D OBJECTS

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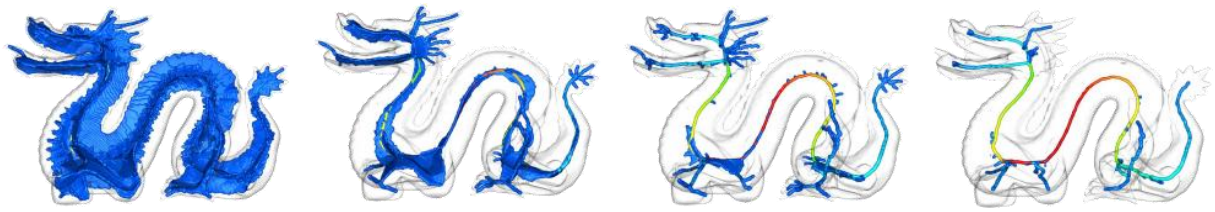
Abstract

Skeletons are compact shape descriptors. The skeleton, or medial axis, of a 2D object can be defined as the centers of maximally inscribed discs. In 3D, this definition can be extended to the centers of maximally inscribed balls. Skeletons are of significant interest in many application areas such as object representation, flow visualization, path planning, medical visualization, computer vision, and computer animation.



There are a lot of different techniques that have their own approach for finding a skeleton of a specific shape. For our research we will focus on three different techniques: An Augmented Fast Marching Method for Computing Skeletons and Centerlines, Computing Multiscale Curve and Surface Skeletons Using a Global Importance Measure and Directional 3D Thinning using 8 Subiterations. These techniques are discussed in different papers and they all focus on one technique at a time. Our research will focus on the inner workings of the technique itself, the advantages and disadvantages of this technique and how this compares to the other techniques.

We will discuss and judge the methods based on the complexity of their algorithm, usability and robustness. The complexity of the algorithms will be determined by assessing the pseudo code segments and the explanations of the algorithms given by the papers. During this assessment we will look at the number of parameters, the implementation and the documentation of the algorithms. The robustness of the algorithms depends on the way in which the techniques handle noise and how close the resulting skeleton is to the expected skeleton. Not only the previously named complexity and robustness but also the ease in which the techniques can be implemented and used will be taken into account when assessing the usability. We expect that the techniques will give skeletons of similar quality but that their complexity will highly differ. The complexity will therefore most likely have a big impact on the decision to determine which technique should be used. Certain areas might want to use a more complex technique because of better results or a decrease in execution time.

Keywords: skeleton extraction, centerlines, directional thinning, global importance measure, augmented fast marching method
Field of research: skeleton extraction
Topic: comparison of skeleton extraction techniques
Focus / research question: skeleton extraction algorithms and their properties, what are their advantages and disadvantages and for what area are they best suited?
Expected findings / results: Some techniques are very hard to understand but give only slightly better skeletons. Best choice depends on area in which it is used.