Surface Mesh Generation Based on Segmentation via Deep Learning

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Abstract

Many previous methods on surface mesh generation including direct methods and mapping methods achieve impressive performances. However, the direct methods have deficiencies of poor computational efficiency and the mapping methods are prone to distortion during the solution process. To overcome these two drawbacks of the previous methods, we propose a novel approach for surface mesh generation by using deep Convolutional Neural Networks (CNNs). First the CAD model is segmented into a series of sub-districts via deep learning, and then the public boundaries between the sub-districts are discretized. Furthermore, all the sub-districts are meshed under the boundary constraint. Finally, assemble the sub-districts meshes into a whole mesh of the CAD model. In our approach, CNNs are trained in a supervised manner by using a large pool of classical geometric features. Experimental results on several examples show that the proposed approach is robust for various CAD models and outperforms state-of-the-art approaches.

Keywords: Surface mesh, Segmentation, Deep learning, Convolutional neural networks, Geometric features