מכון ויצמן למדע

THE WEIZMANN INSTITUTE OF SCIENCE

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building
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at 12:15

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Multi-chart Generative Surface Modeling

Abstract:

We introduce a 3D shape generative model based on deep neural networks. A new image-like (i.e., tensor) data representation for genus-zero 3D shapes is devised. It is based on the observation that complicated shapes can be well represented by multiple parameterizations (charts), each focusing on a different part of the shape.

The new tensor data representation is used as input to Generative Adversarial Networks for the task of 3D shape generation. The 3D shape tensor representation is based on a multichart structure that enjoys a shape covering property and scale-translation rigidity. Scale-translation rigidity facilitates high quality 3D shape learning and guarantees unique reconstruction. The multi-chart structure uses as input adataset of 3D shapes (with arbitrary connectivity) and a sparse correspondence between them.

The output of our algorithm is a generative model that learns the shape distribution and is able to generate novel shapes, interpolate shapes, and explore the generated shape space. The effectiveness of the method is demonstrated for the task of anatomic shape generation including human body and bone (teeth) shape generation.