Project Proposal for Object Recognition and Computer Vision

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1 . Basic Information

Team Member : Oscar CLIVIO (oscar.clivio@eleves.enpc.fr)

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Project Topic : Single view 3D object reconstruction

2 . Work Plan

Algorithm: Based on the paper Pixel2Mesh, we intend to reproduce and improve their 2D-3D joint network. The model uses a 2D image feature network, which guides an initial mesh in deformation. A GCN-based network learns how to produce the final output and how to regularize it.

Dataset: We will evaluate the algorithm on ShapeNet with the same evaluation metrics indicated in the paper, i.e. F-score, Chamfer Distance and Earth Mover's Distance. The dataset contains 50000 pairs of images and meshes belonging to 13 object categories. We plan to work on 3 - 5 categories in this project.

Experiments: The experiments will be performed following the protocol described in the paper. First we will reproduce their results, and then we will focus on the regularization term. At the last period, we will do some ablation studies on the network.

3 . Work Assignment

Period	Oscar	Tong
Model Implementation	The image feature network	The mesh deformation network
Regularization	Laplacian regularization	Edge length regularization
Experiments	Network structure	Loss design

4 . Timing Plan

01/12/18 - 05/12/18 Understand the article and the author's codes (in TensorFlow)

06/12/18 - 14/12/18 Implement the code in PyTorch

15/12/18 - 22/12/18 Reproduce the results in the article

23/12/18 - 31/12/18 Test different regularization methods and play with different parameters

01/01/19 - 06/01/19 Try open ideas to improve the model

07/01/19 - 13/01/19 Prepare for the presentation

14/01/19 - 20/01/19 Write the report and clean codes

5 . Open ideas

Depending on the timing, we will try to improve the algorithm from one or several following aspects:

A. Try different initial meshes depending on the category of the input image

B. Inspired by AtlasNet, we can reconstruct the mesh by part, which not only simplifies the deformation, but also improve the smoothness.

C. May come soon...