NYU TANDON SCHOOL OF ENGINEERING

3D Computer Vision: Techniques & Applications

Project 4: 3D Shape Segmentation

Project Deadline: 11:55 PM, Nov. 18, 2015

No late submission will be accepted

In this project, you are going to implement 3D shape segmentation on given 3 centaur models with different poses (centaur1.off, centaur2.off and centaur3.off) as shown in Fig. 1.

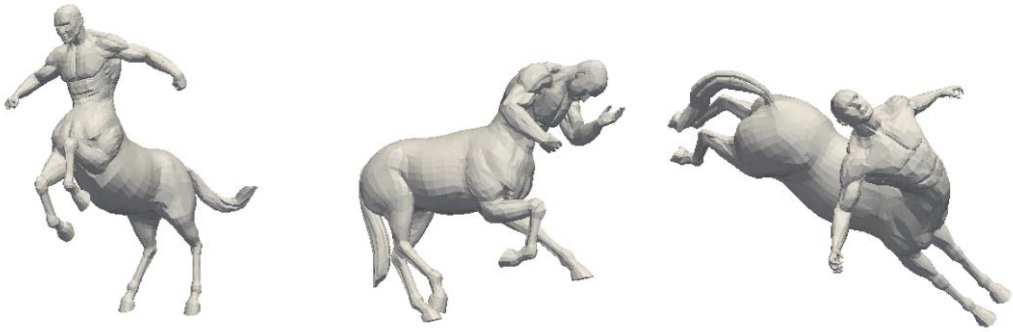

Fig. 1 Three centaur models with different poses

Detailed project instructions are given as following:

1. Implement a 3D segmentation using K-center clustering algorithm based on HKS density function (feature space) and geodesic distance (spatial space) (Refer to lecture slides Lecture_006.ppt). The HKS density function value will be provided in centaur_HKS.mat (See figure below for illustration of HKS density function mapped on centaur model surface). The HKS density function is computed based on average of HKS feature vector at all scales.

Fig. 2 Illustration of HKS density function on 3D surface

2. Implement a spatial constrained K-mean based on weighted combination of HKS feature and coordinates for 3D model segmentation (Refer to lecture slides Lecture_006.ppt)

3. Color the segments and generate .vtk file. Please assign different colors for different segments as shown in Fig. 3. You do not need to generate exactly the same colors as the examples shown below, but your project should be able to segment 10 different parts on the models.

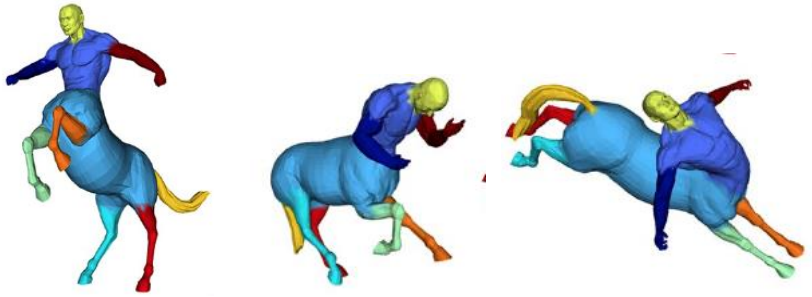

Fig. 3 Examples of coloring segments

4. **100** bonus points will be given for those who implement Center shift segmentation for 3D shape segmentation. (Reference: Center-Shift: An Approach Towards Automatic Robust Mesh Segmentation (ARMS), CVPR, 2012)

Note: You may discuss the general concepts in this project with other students, but you must finish your program on your own. NO SHARING OF CODE OR REPORT IS ALLOWED. Violation of this policy can result in grade penalty.

What to submit

Please submit a .zip file containing (1) a working project, (2) generated .vtk files for all the 3 centaur models and (3) a report for the detailed description of the project (how the project was coded, how to run your project and screenshots of the colorful output). Before submit your project, please make sure to test your program on all the given models.