

MINI Project #4 Report

3D Shape Segmentation

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1. Introduction to submitted bag

K_Center.m	Script of K-centers algorithm
K_Mean_sl5352.m	Function of K-mean algorithm
K_Mean_script.m	Script of using K-mean algorithm

2. Coding comment and Run instruction

2.1 K_Center.m

To use K_Center.m, simply change HKS into different load of centaurs in line 8. And to change loaded mesh into current mesh in line 10. Find the output VTK file in current directory. The VTK file name is centaur_Kcenter.

The code consists three parts. First to load HKS matrix and to load mesh also to acquire GD. Then to find 10 centers using a loop. Set the point with largest HKS value as the begin point. Group points using GD. Find point with max HKS value within the group and set it as new center. Regroup all points and make it a loop. Write output to VTK file with different color mapped on the surface.

2.2 K_Mean_sl5352.m

To use this function, simply call this as K_Mean_script have done. Also change HKS into different centaur vector in line 7. And to change loaded mesh into current mesh in line 9.

The output goes in the same directory named as centaur_Kmean.vtk.

This K_Mean_sl5352 function got almost same idea. The difference goes to initial centers and grouping method, where defined a cost function based on GD and HKS.

3. Segment result and evaluation

3.1 K_centers

Some thing tricky that is the centaur is splited into two part. Also each hand and tail is always in different cluster. Legs are not exactly divided. Very rough.

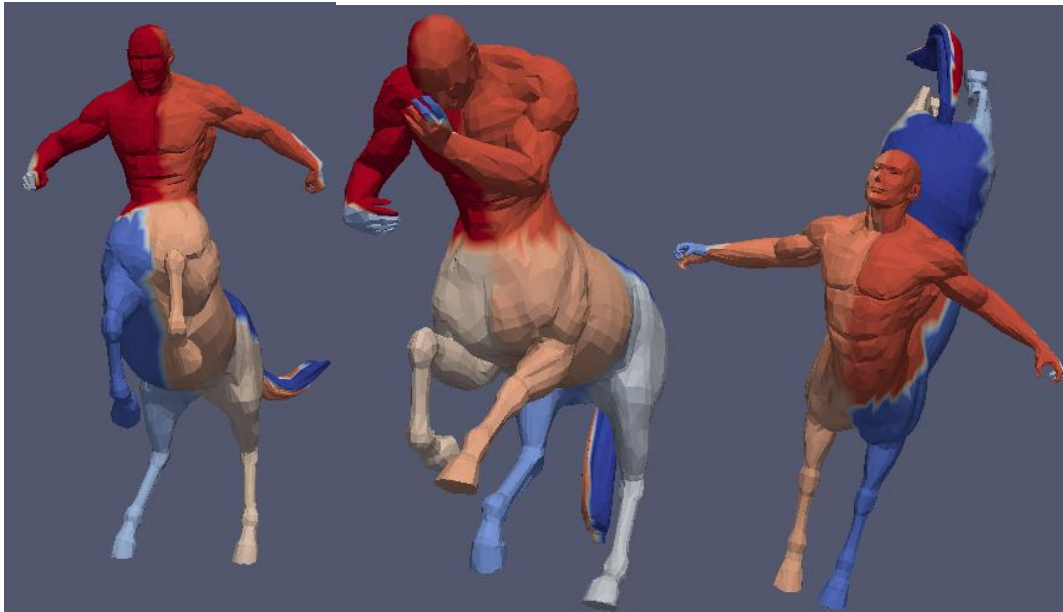


Figure1 (a-c) K_center segmentation outcome. From left to right represents centaur 1 to 3.

3.2 K_Mean



Figure2 (a-c) K_mean segmentation outcome. From left to right represents centaur 1 to 3.

The same problem happened again that every centaur is split into left and right part like from middle. Hands and tails got improvement, while still no good.

During the grouping, the step: move the center to the point with largest HKS value within the cluster could be an issue. Mean of HKS has been tried while outcome worse.

For finding centers, an issue has been solved that the code: `max(HKS(cluster_status == i))` matlab default find max value and index with in the submatrix `cluster_status == I` rather than find index in the whols HKS matrix, which caused a lot of trouble. It always got a runtime error that leads by getting one point represent several centers of different cluster.