ME492 Homework 1

due by 24:00, September 20, 2024

You want to identify objects that car's cameras capture for autonomous driving. From the two-dimensional camera images, you segment objects by separating the objects from the background or other objects and you want to classify the segmented images into different categories. For the classification of these segmented images, you have decided to use area information of the segmented image as a feature for training.

1. You have decided to provide the coordinates of the points located inside and the boundary of each segmented object. The input file format is as follows:

   ```
   1 4
   1 5
   1 6
   2 5
   2 6
   2 7
   ...
   ```

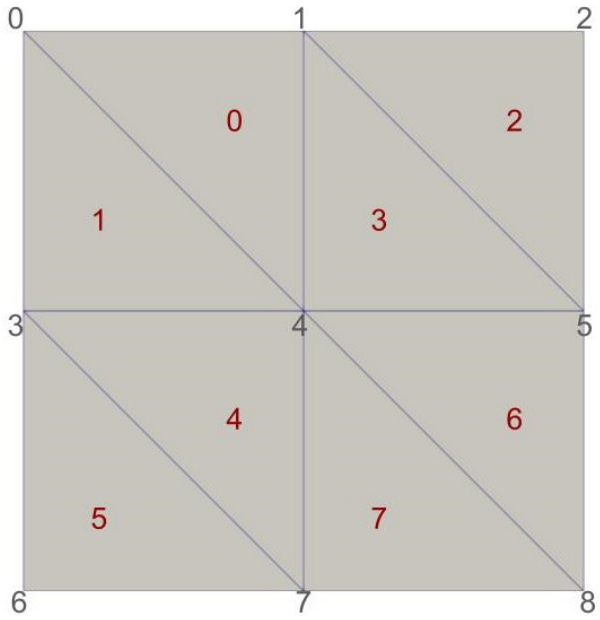
   Let's assume the first column data represents the location in the x-axis which goes from 0 to 255 from left to right. The second column data represents the location in the y-axis which goes from 0 to 255 from bottom to top.

   (a) Develop a class to contain this input point data

   (b) Develop a method inside the class to read an input file as shown above and save point data to the class

   (c) Develop a method to compute the area of the input point data

2. Now you have decided to post-process the segmented image data and construct a two-dimensional mesh consisting of triangles as follows:



Now the input file contains additional information followed by the location information of the point locations. For example, the following input file will be generated for the example above:

```
0 2
1 2
2 2
0 1
1 1
2 1
0 0
1 0
2 0
0 4 1
0 3 4
1 5 2
1 4 5
3 7 4
3 6 7
4 8 5
4 7 8
```

(a) Modify the class to include the triangle information

(b) Develop a method inside the class to read an input file as shown above and save point data to the class

(c) Develop a method to compute the area of the input point data