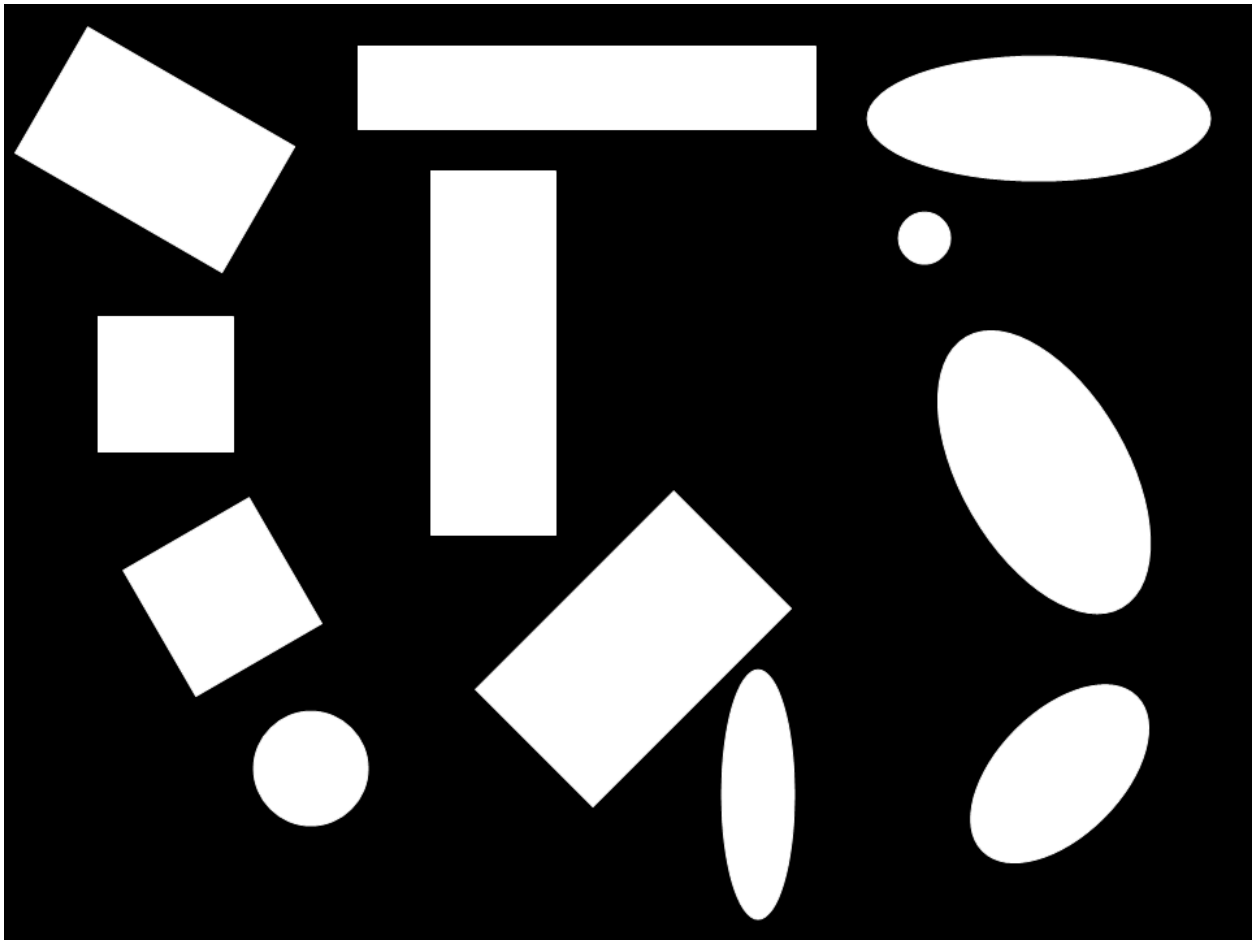
Jacob Oakes & Graham Fuller

Lab 4



Elongation and Circularity for Different Shapes

In this lab we determined the elongation and circularity for different kinds of rectangles and ellipses in the image above. These features were then used to help classify these shapes as either a square, circle, rectangle, or ellipse. For circularity, we calculated C1 rather than C2. From top to bottom, left to right, here are the values for elongation and circularity:

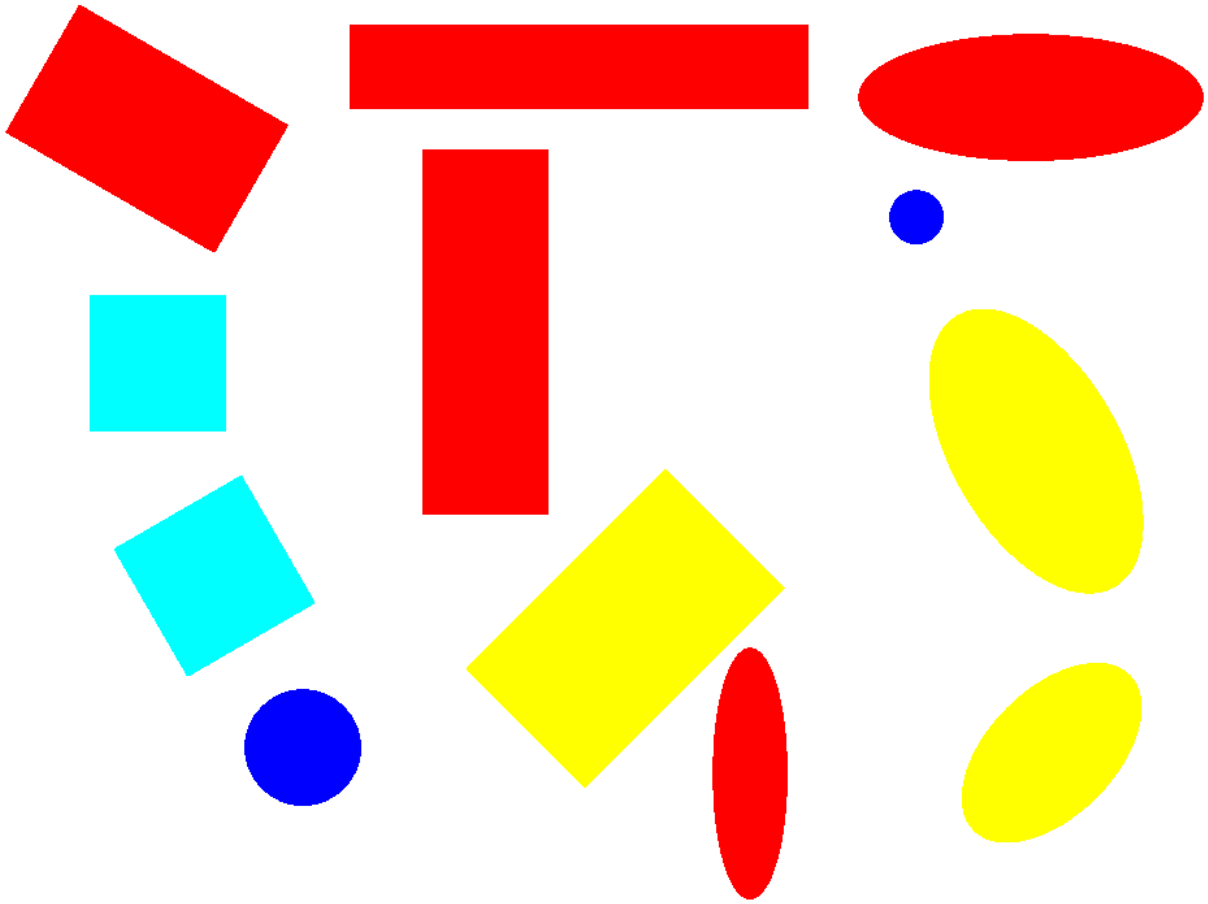
Shape	Elongation	Circularity
1	1.6326	19.2531

2	1	15.6967
3	1.0006	17.9457
4	1.0005	13.7401
5	5.4314	30.1688
6	2.8970	20.7471
7	1.6739	16.8663
8	3.3498	22.2466
9	2.7170	19.4243
10	1.0065	13.3603
11	1.8601	15.9305
12	1.7334	15.4023

We classified the shapes using the following boundaries:

> if elongation<1.01, then the shape was either a circle or a square because the height and width were almost the same. Otherwise, it was either a rectangle or an ellipse since they were more elongated..
>
> if circularity<15 and elongation<1.01, the shape was classified as a circle because circles have minimal circularity. Otherwise, the shape was classified as a square because squares have larger circularities.
>
> If circularity<17 and elongation>1.01, the shape was classified as an ellipse. Most of the ellipses in the image were more circular than the rectangles but there was some discrepancy between the two because some of the ellipses were more elongated causing them to have lower circularity. Likewise, there were some rectangles that were less elongated but more circular.

In the end there were some rectangles classified as ellipses and some ellipses classified as rectangles due to the problem described above. We classified all of the squares and circles correctly. Here is a classification table for the image below:



Key:
Red - rectangles
Yellow - ellipses
Blue - circles
Cyan - square