



MIC Assignment 4

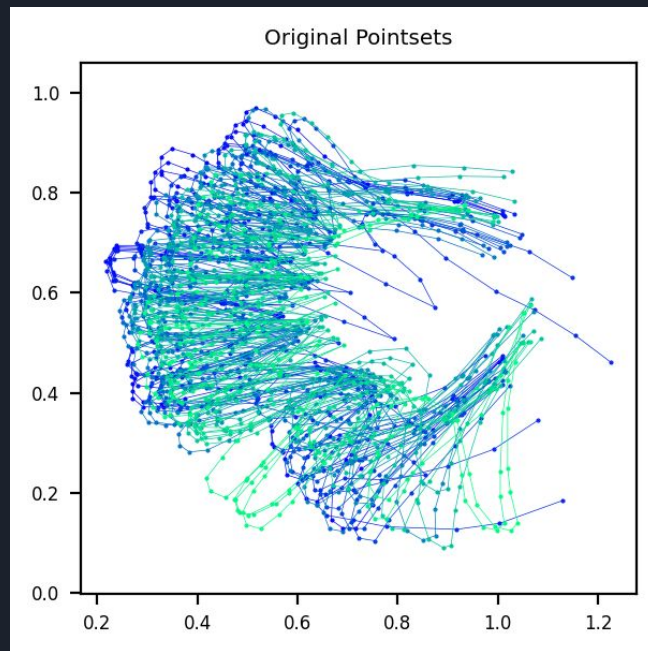
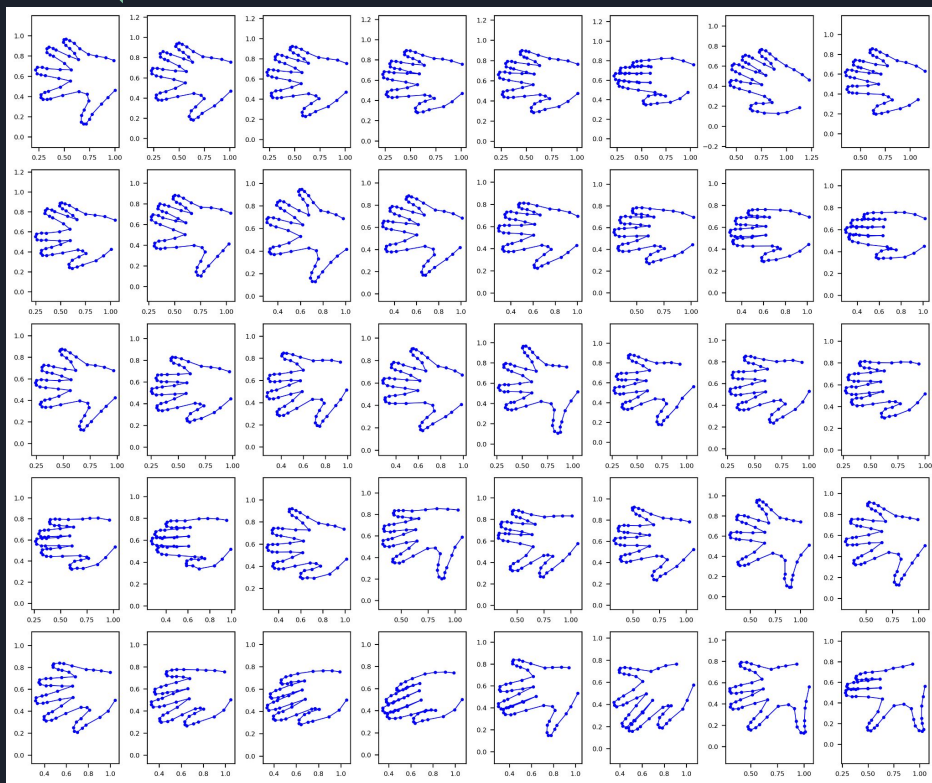
Mohana Evuri - 23B1017
Gautam - 23B0957/8

Shape Analysis on Human Hand Shapes



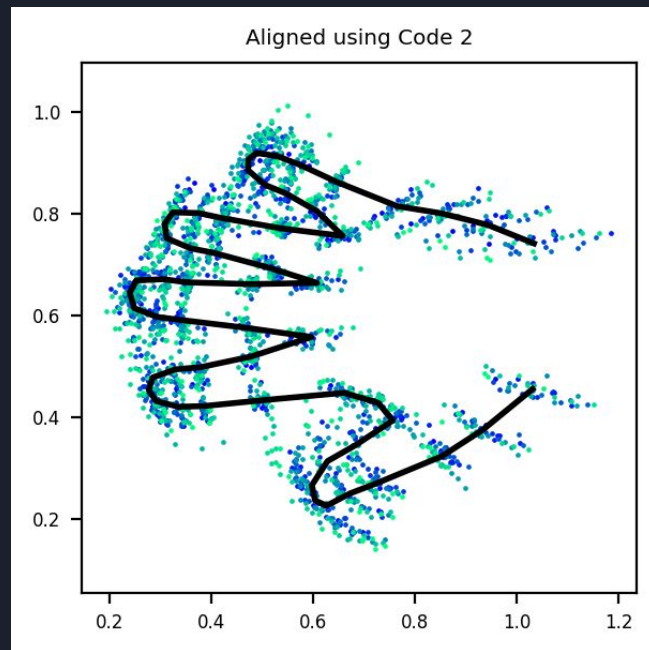
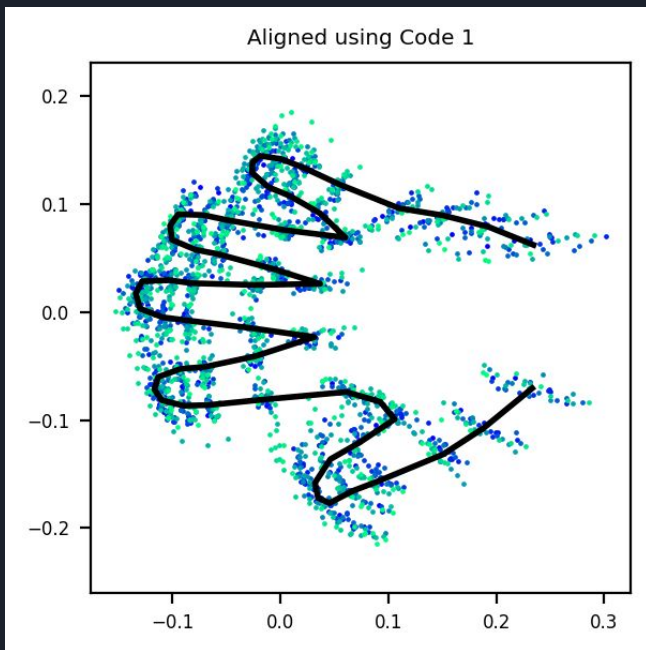
The Pointsets

- ❖ We were given 40 pointsets, each having 56 points.



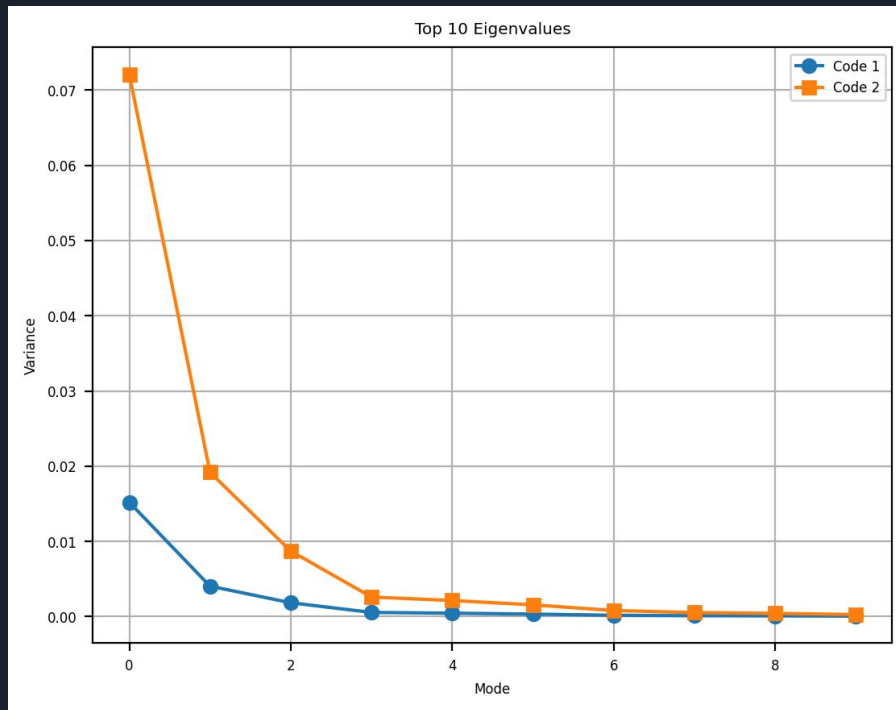
Code 11 and Code 22

- ❖ Code 11 has first done the mean + translation, and then only rotation in every iteration.
- ❖ Code 22 is iteratively doing both mean + translation and rotation in every iteration.



The Eigenvalues

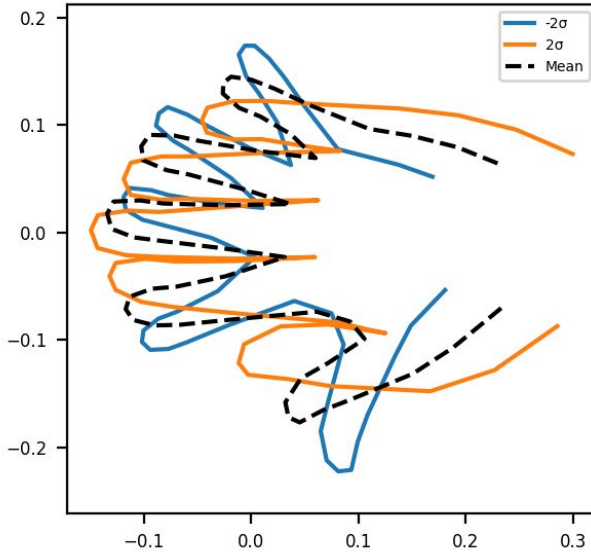
- ❖ The plots of the eigenvalues are here. A point to note is that Code 11's values are from the normalized values, whereas Code 22's aren't.



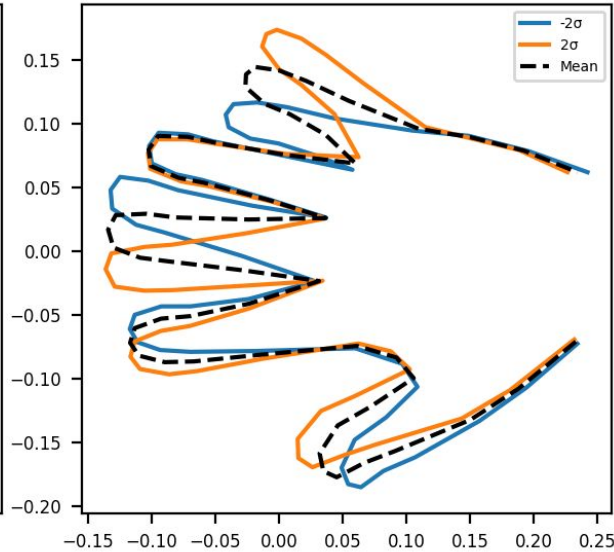
The final Mean and the Deviations

- ❖ The below graphs (this and the next slides) have the means and the deviations.
- ❖ For Code 11:

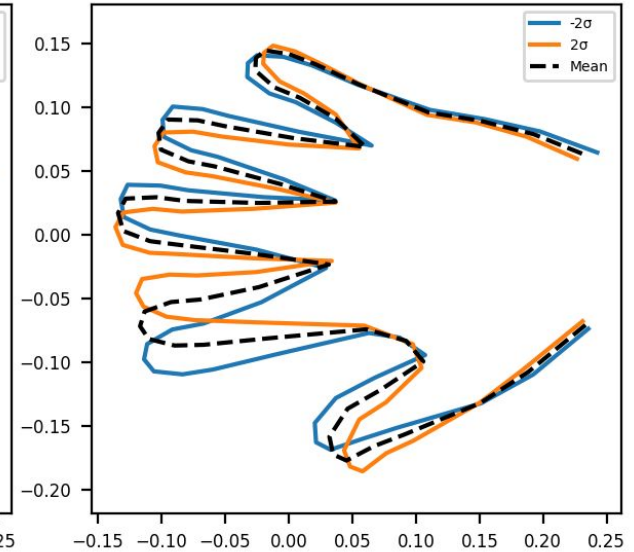
Code 1 - Mode 1



Code 1 - Mode 2



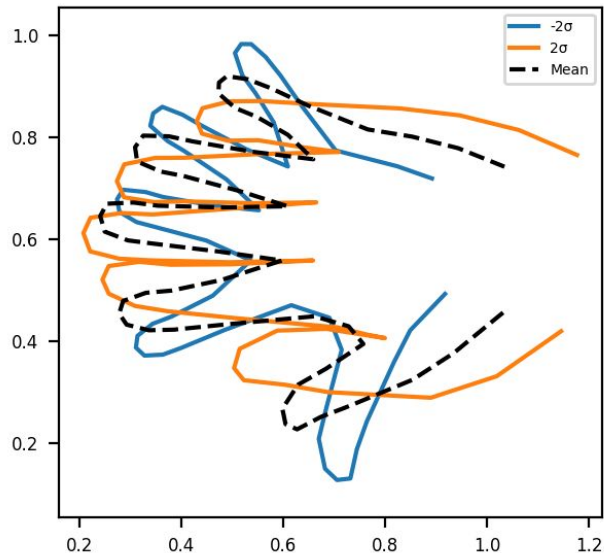
Code 1 - Mode 3



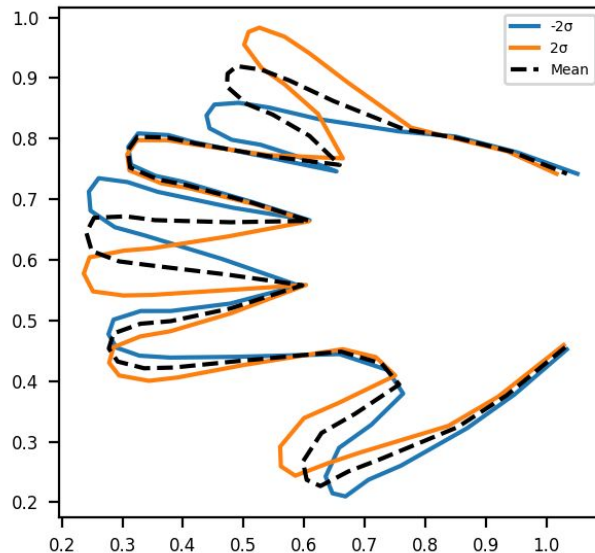
The final Mean and the Deviations

- ❖ The below graphs (this and the previous slides) have the means and the deviations.
- ❖ For Code 22:

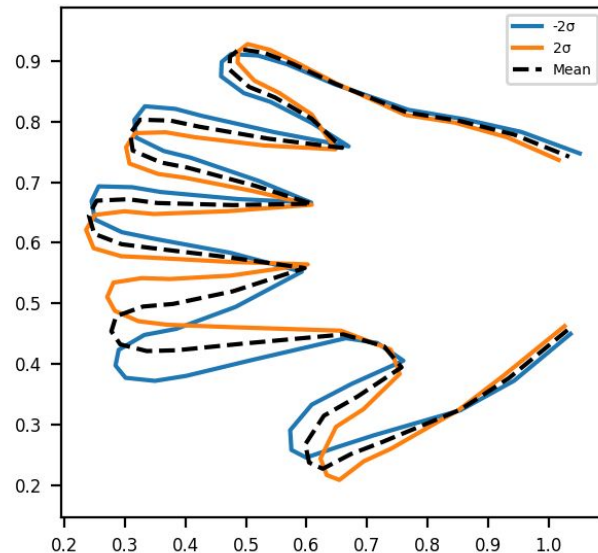
Code 2 - Mode 1



Code 2 - Mode 2



Code 2 - Mode 3

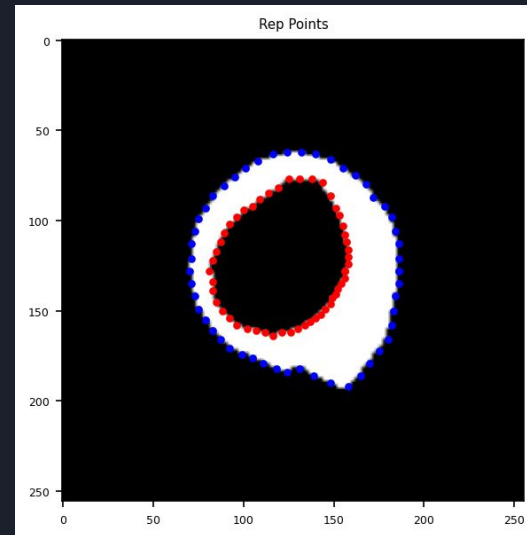
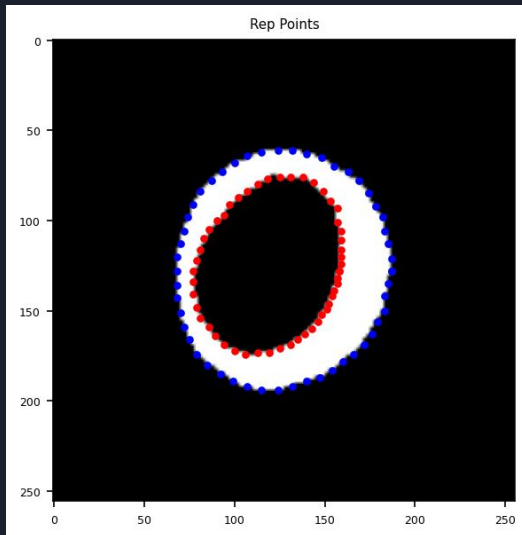


Shape Analysis on Human Cardiac Shapes



The Pointsets

- ❖ This question is very much similar to the previous question, with 2 major differences:
 - We have to generate the representative points.
 - We have to do the gescent for not one, but two borders simultaneously.
- ❖ For the pointsets, I have drawn lines radially from the center of the image and found the intersection points of the inner and the outer boundaries.



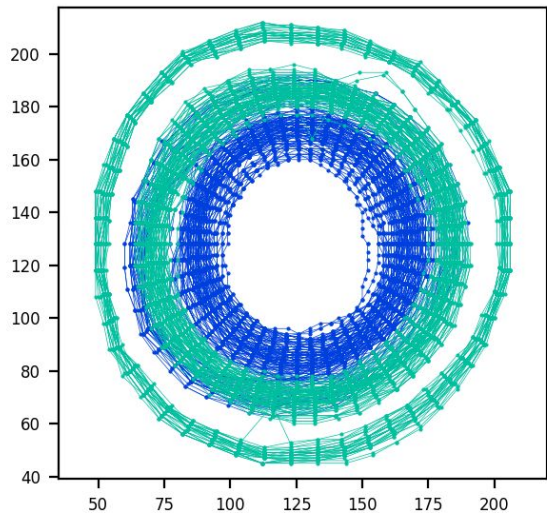


Changes to Code 11

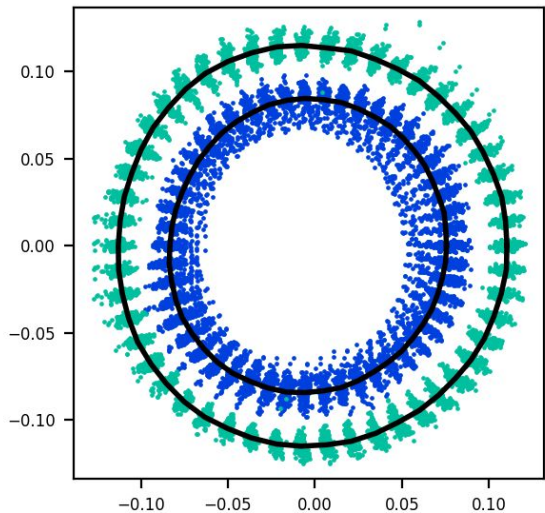
- ❖ This question is very much similar to the previous question, with 2 major differences:
 - We have to generate the representative points.
 - We have to do the gescent for not one, but two borders simultaneously.
- ❖ Initially, the Code 11 does the rotation, and normalizes before the next iteration. Here, If we handle inner and the outer boundaries separately, both of them will lose their scale. So, the Code 11 is to be modified to compute both the boundaries together.

The results with this pointset

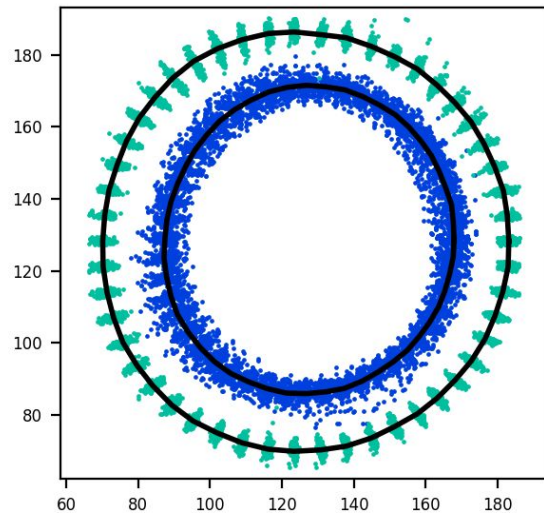
Original Pointsets



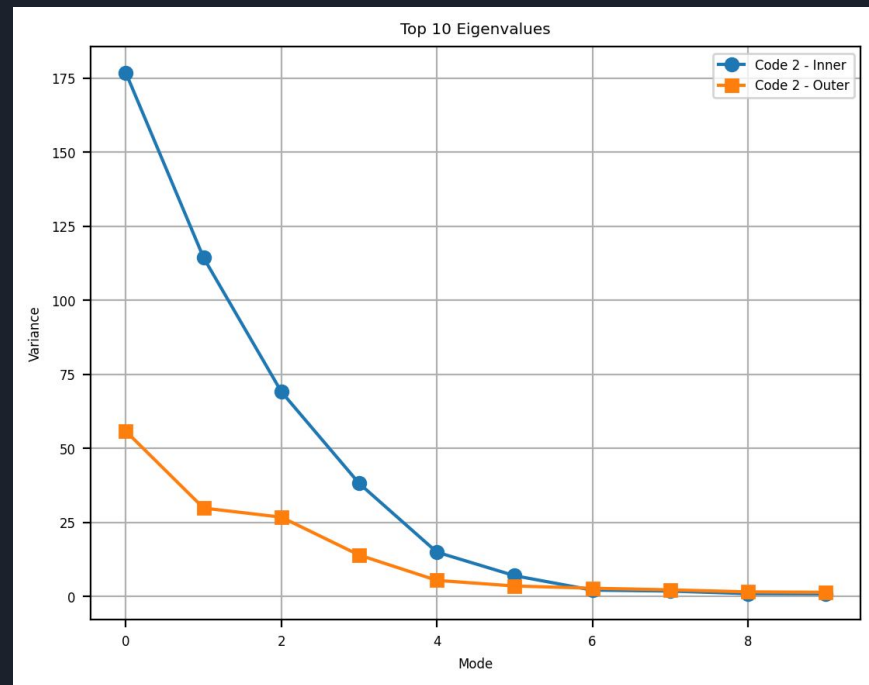
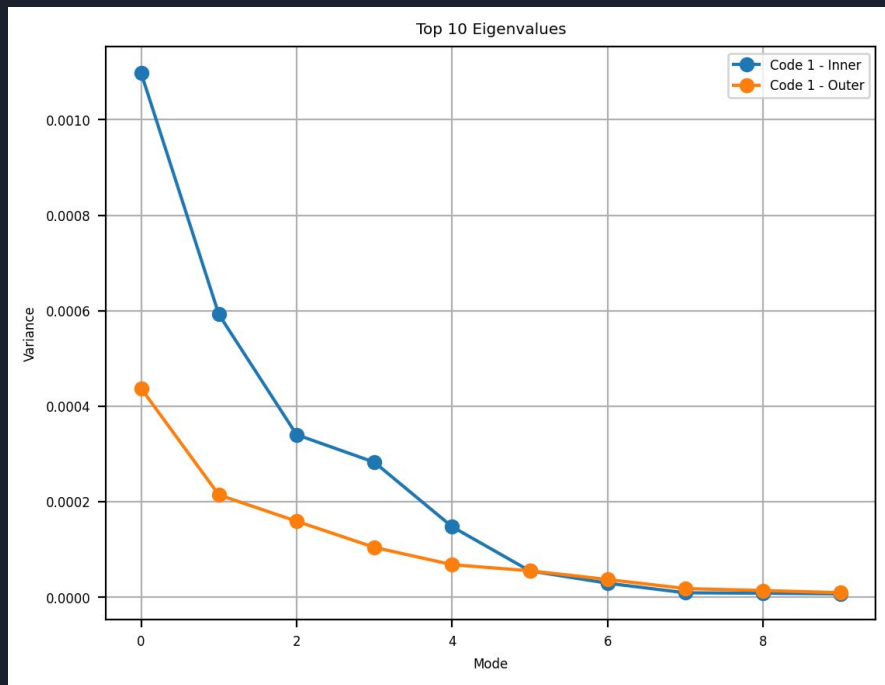
Aligned using Code 1



Aligned using Code 2

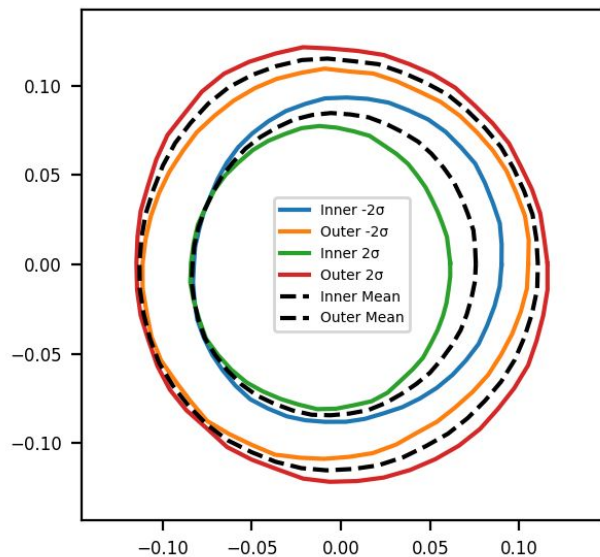


The results with this pointset

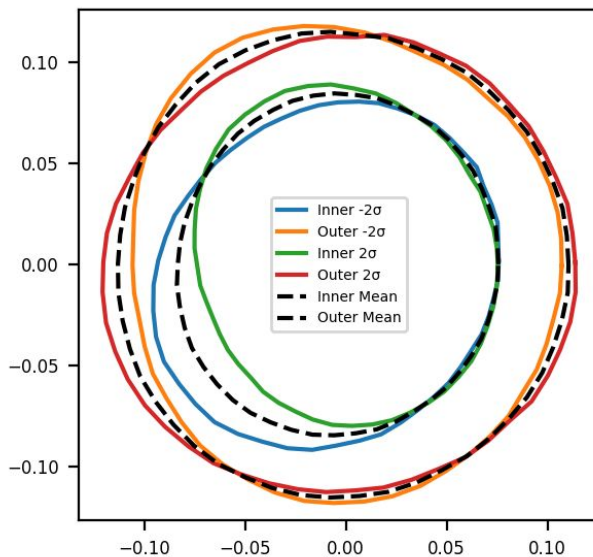


The results with this pointset

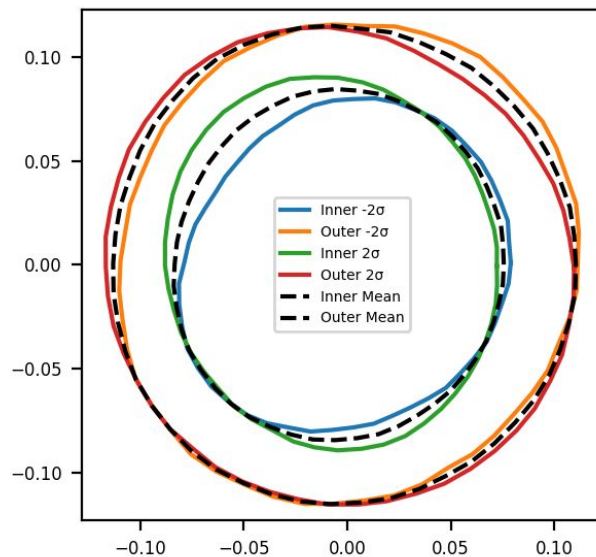
Code 1 - Mode 1



Code 1 - Mode 2

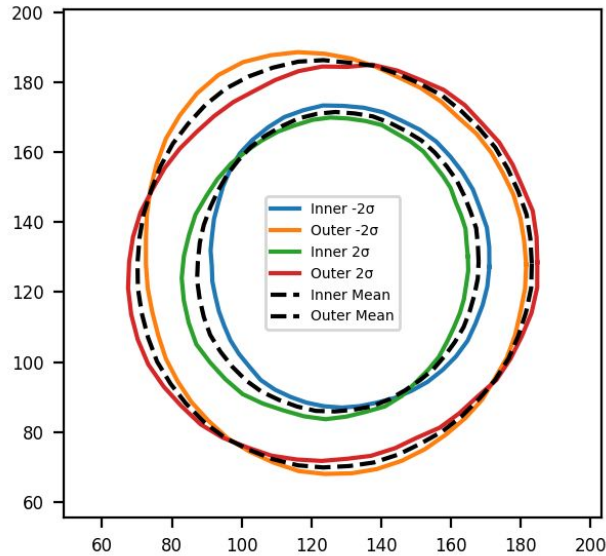


Code 1 - Mode 3

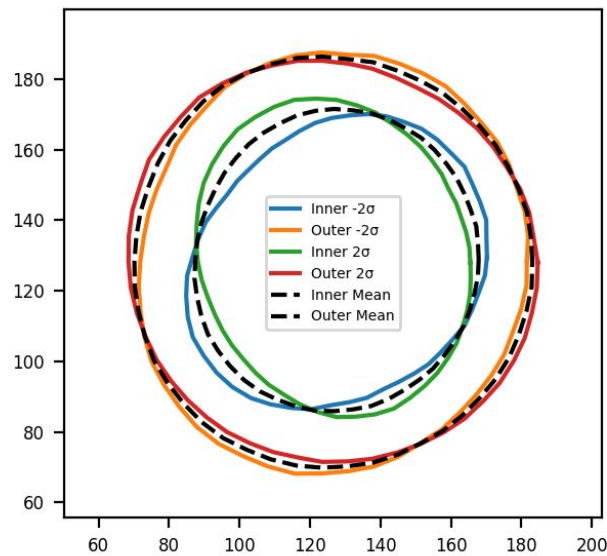


The results with this pointset

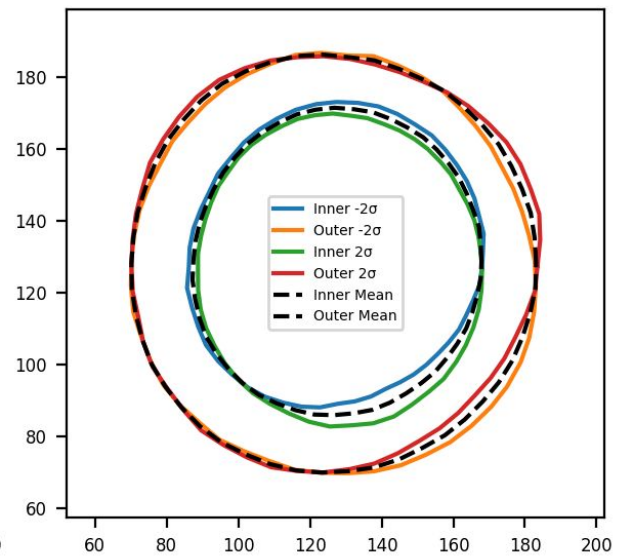
Code 2 - Mode 1



Code 2 - Mode 2



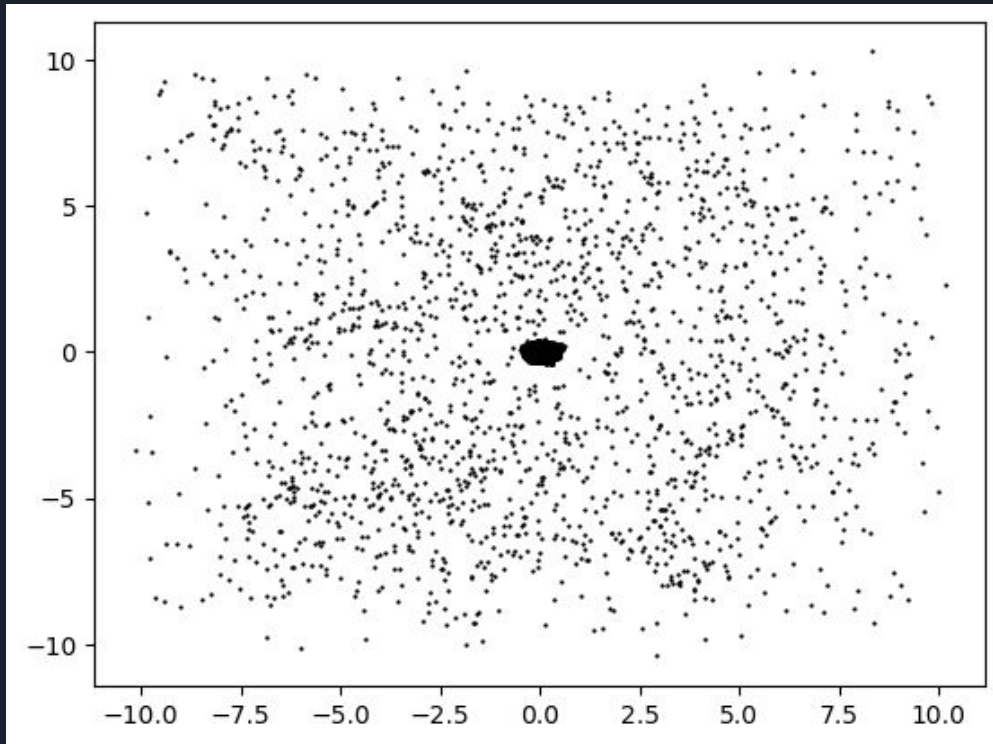
Code 2 - Mode 3



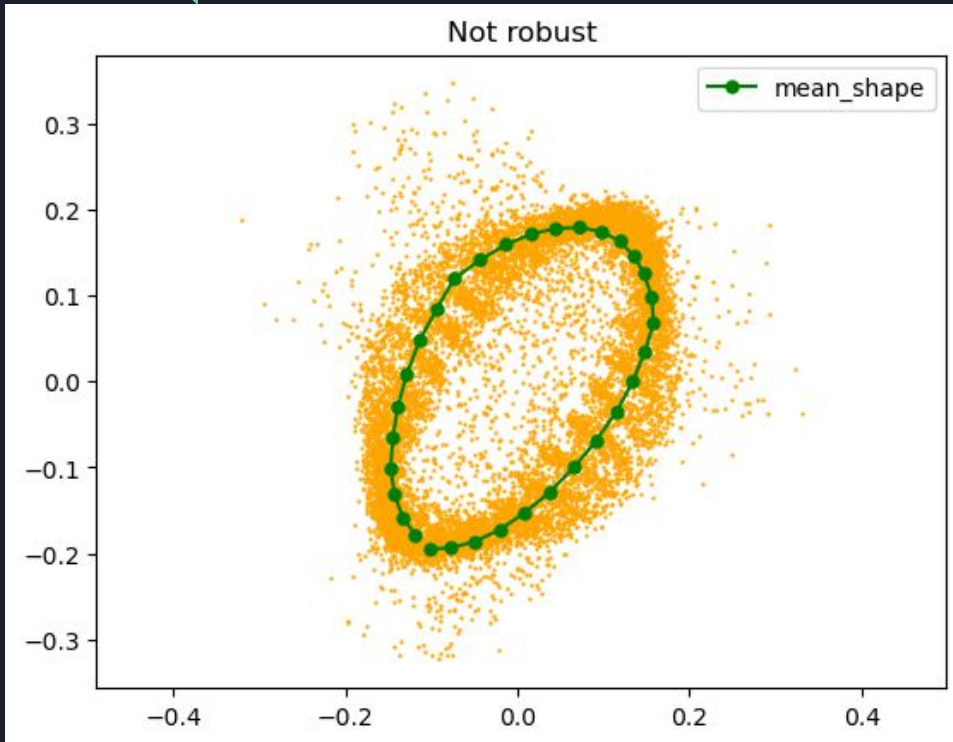
Q3



Original Pointset

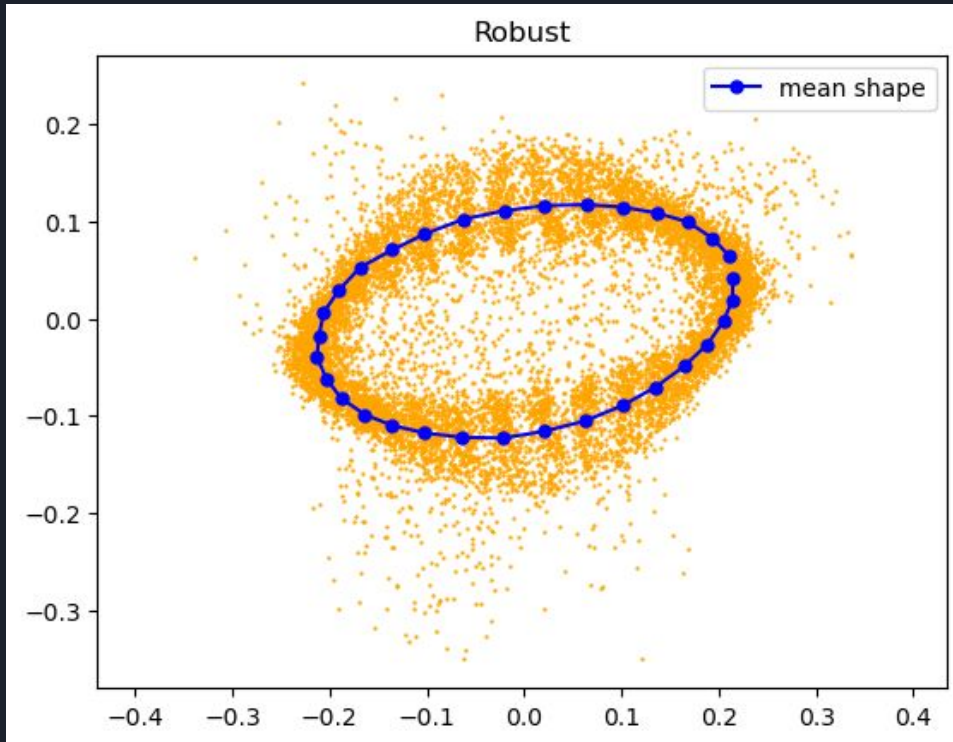


With error as squared distance



In this case, in the z (mean update) we take the mean of all the aligned pointsets

With error as mod distance

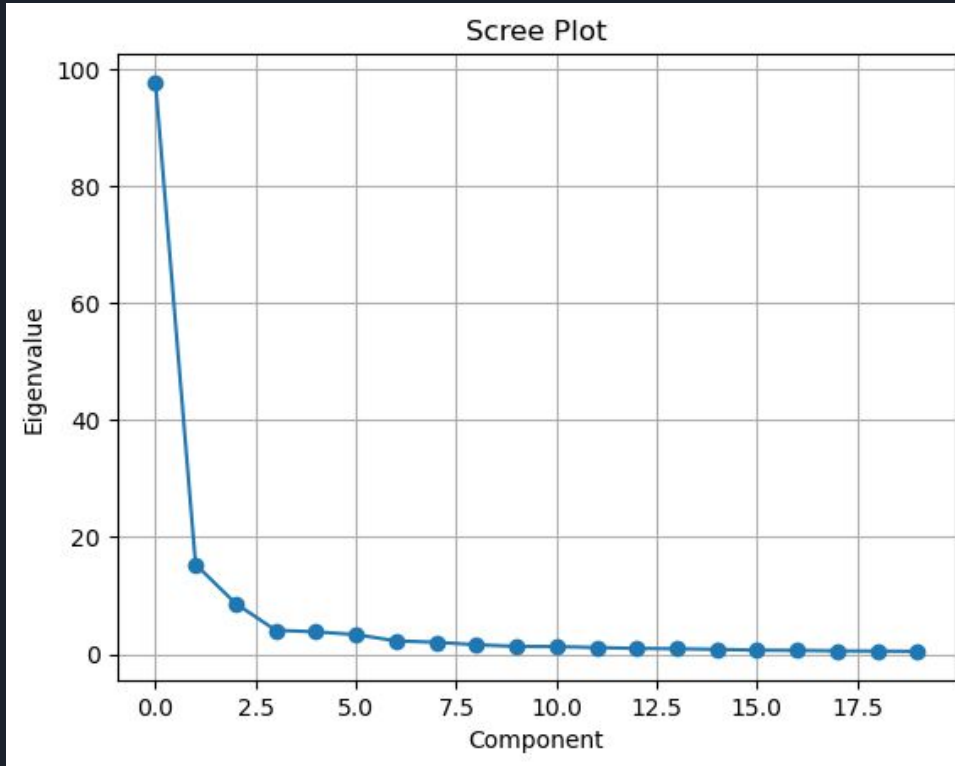


In this case, in the z (mean update) we take the median of all the aligned pointsets

Q4

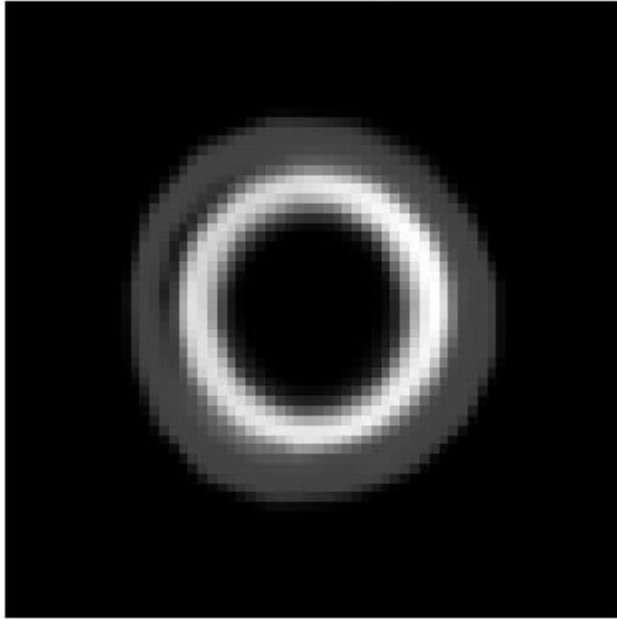


Eigen Spectrum with PCA

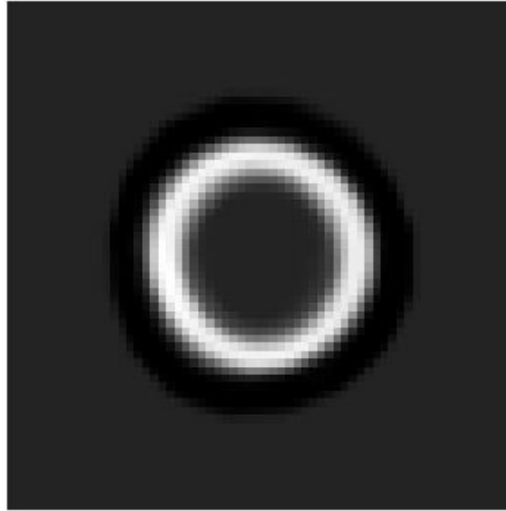


Mean Image and modes of variation with PCA

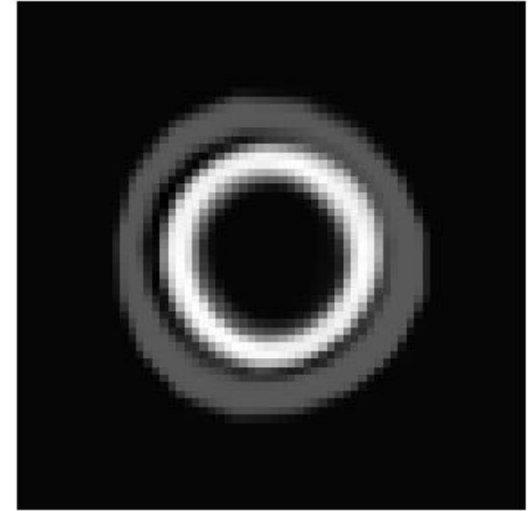
Mean Image



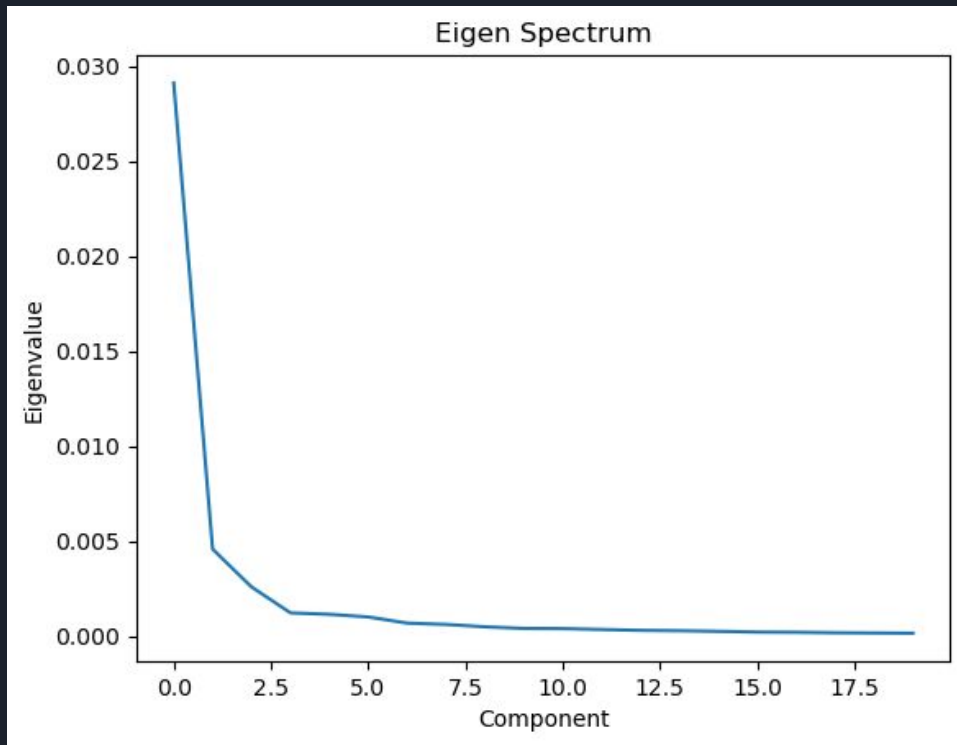
Mode 1 of Variation



Mode 2 of Variation

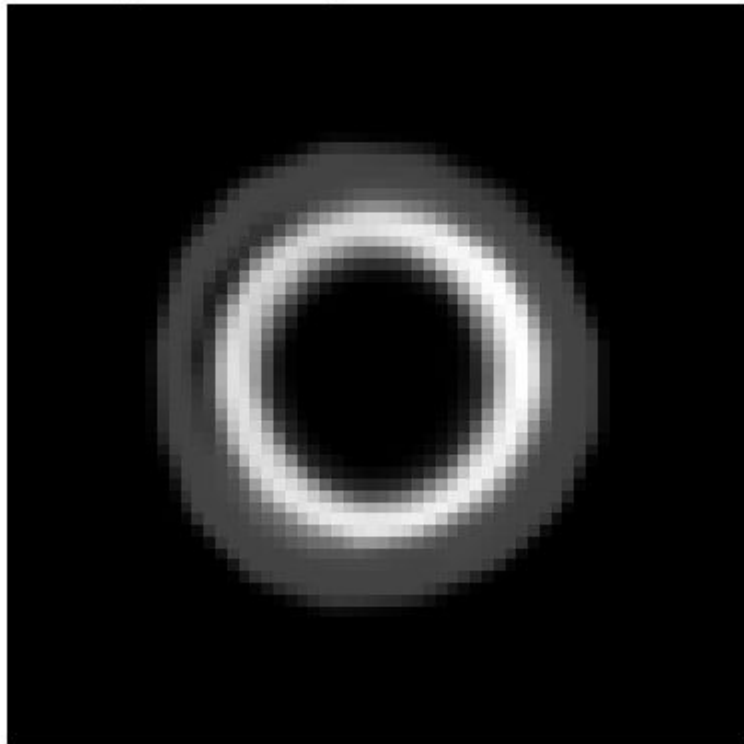


Eigen Spectrum with Kernel PCA

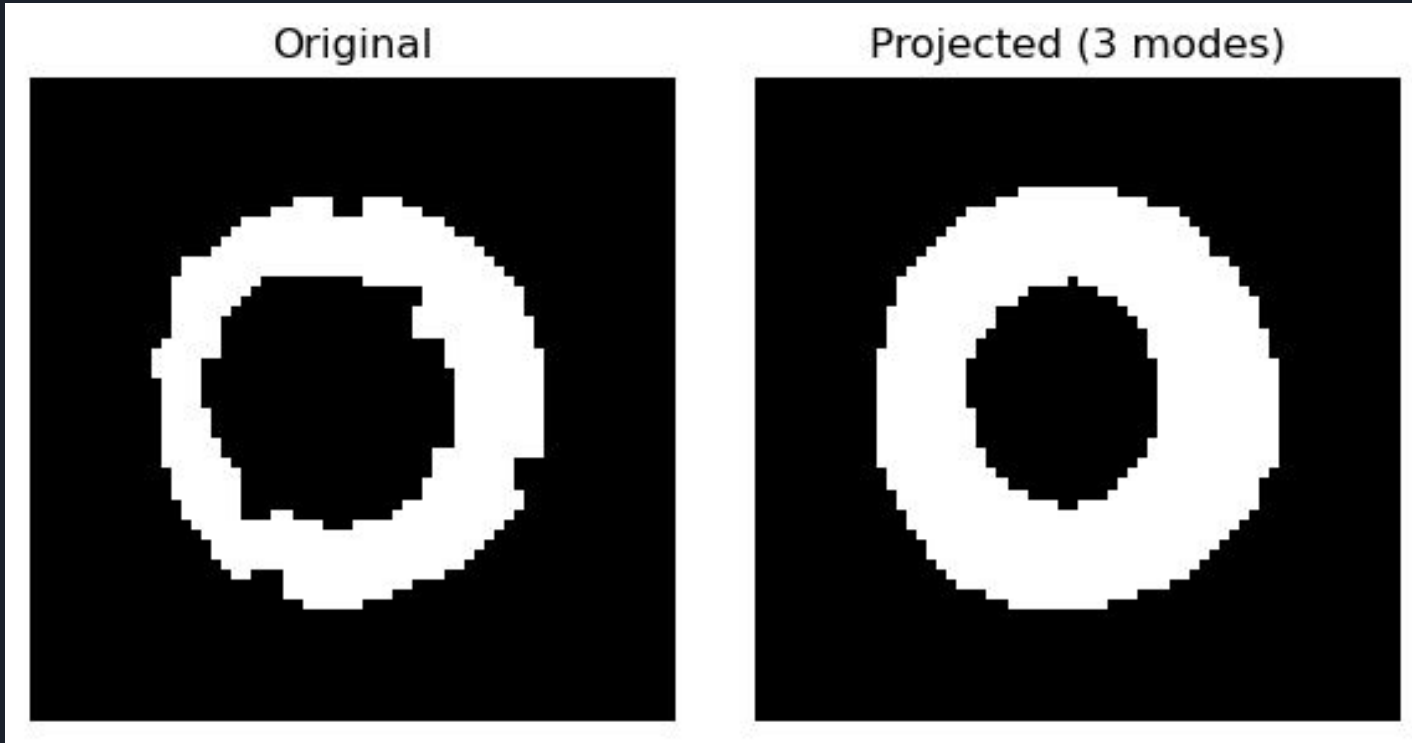


Mean Image Estimate with Kernel PCA

Pre-image Estimate (Closest to Mean in RKHS)



Undistorted image with PCA projecting on 3 eigenvectors



Undistorted image with Kernel PCA

