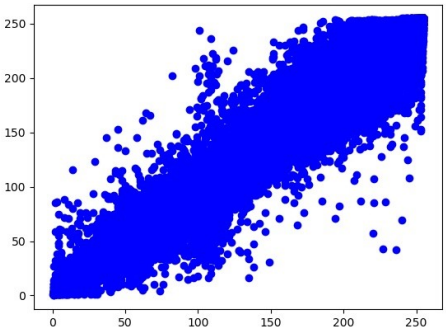
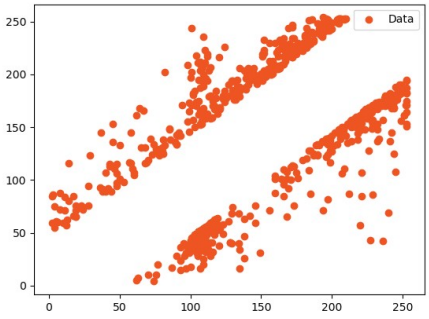
COSC6373 Computer Vision HW 2 Report
Yuan Zi 1881448

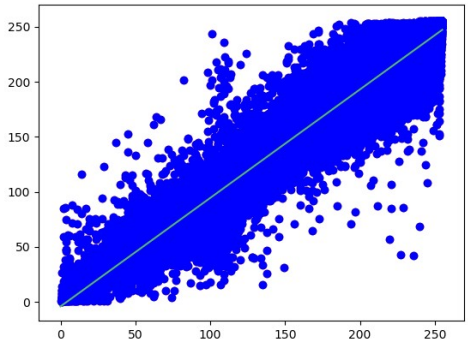
1) Least Squared Regression
Compare Input Images

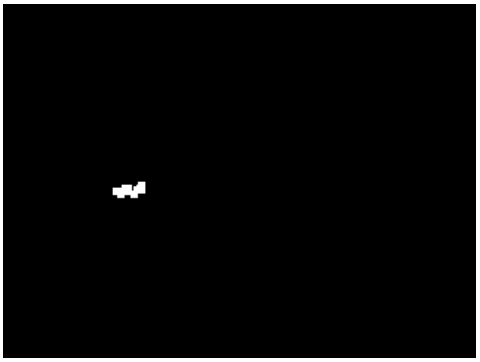
Plot of data points





Least Square Line Fitting

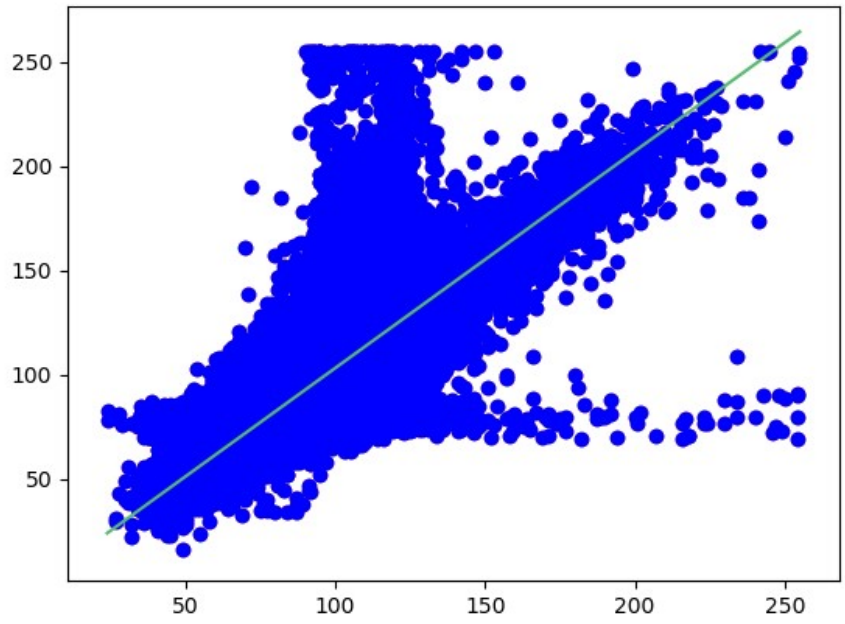


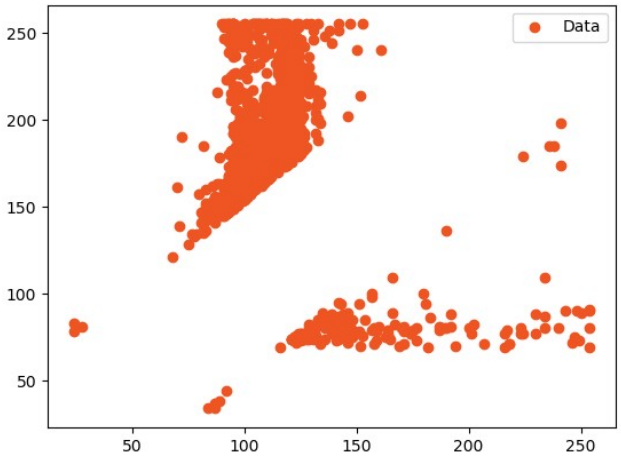


Delete in threshold points. **After segmentation**

Compare Input Images

Plot of data points Least Square Line Fitting



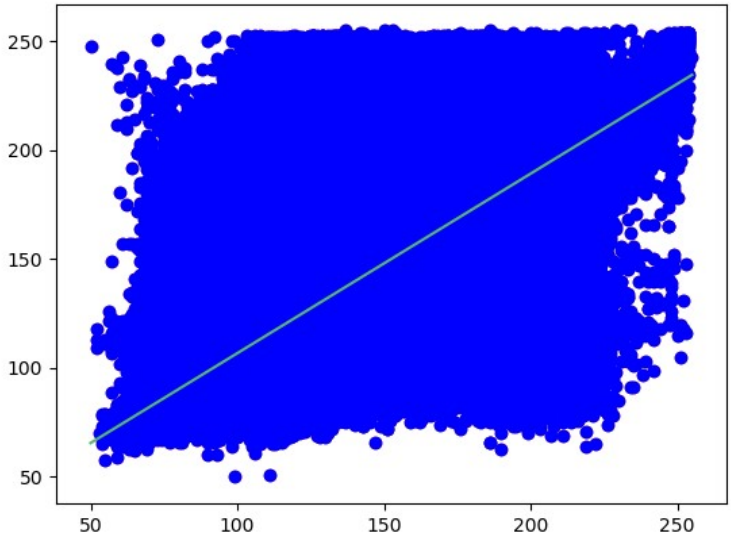


Delete in threshold points.

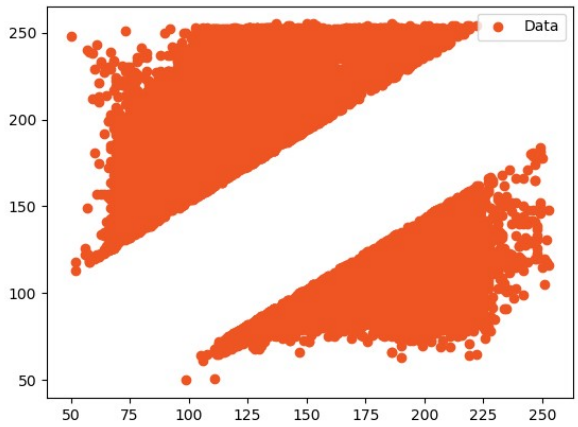
After segmentation

Two Images to Compare

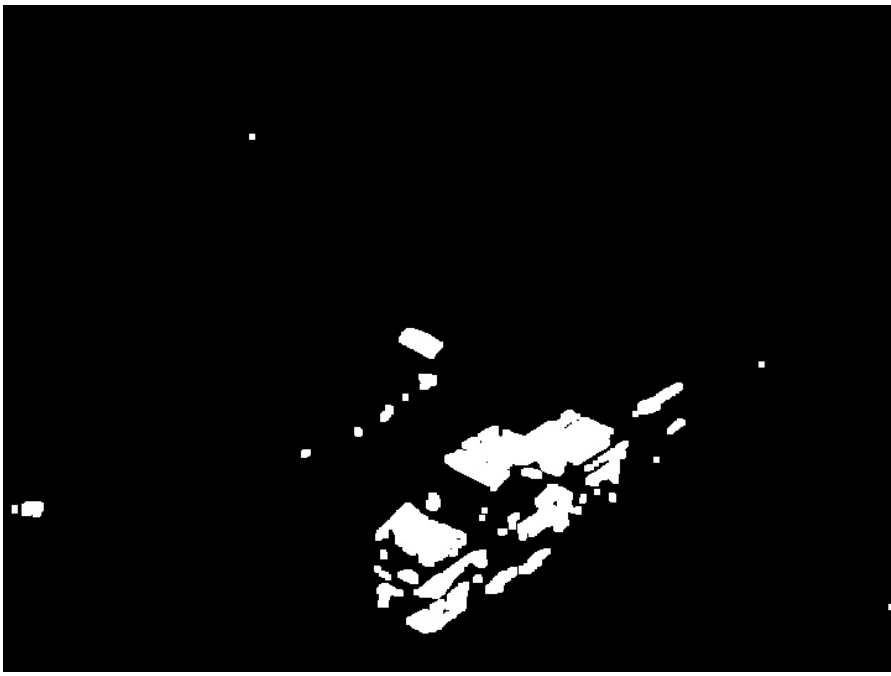
Plot of data points **Least Square Line Fitting**



Delete in threshold points.



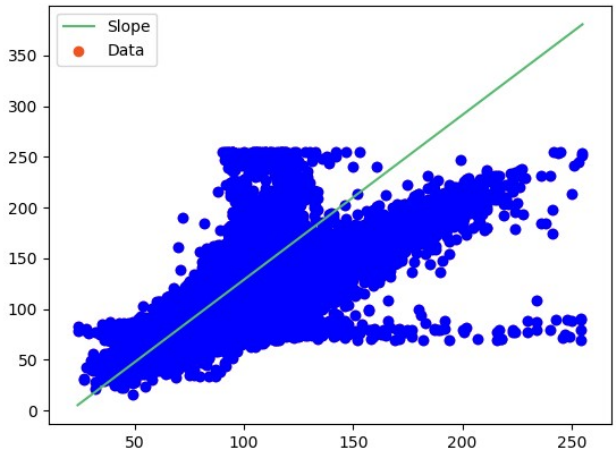
After segmentation

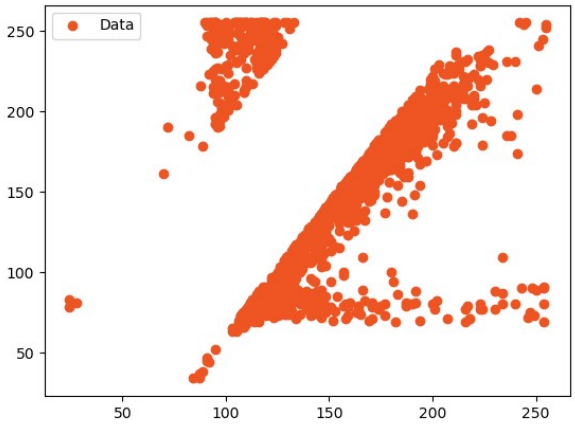


I set distance of threshold to 35(same to circle ci test) far from the least squared line. Successfully detect anomaly changing of scene. If tuning higher threshold will give more precisely result, give lower can give roughly result. But because of erosion, the isolated noise can be deleted. So if there are slightly changing needed be identified we may use a lower threshold to make sure all potential changing be detected.

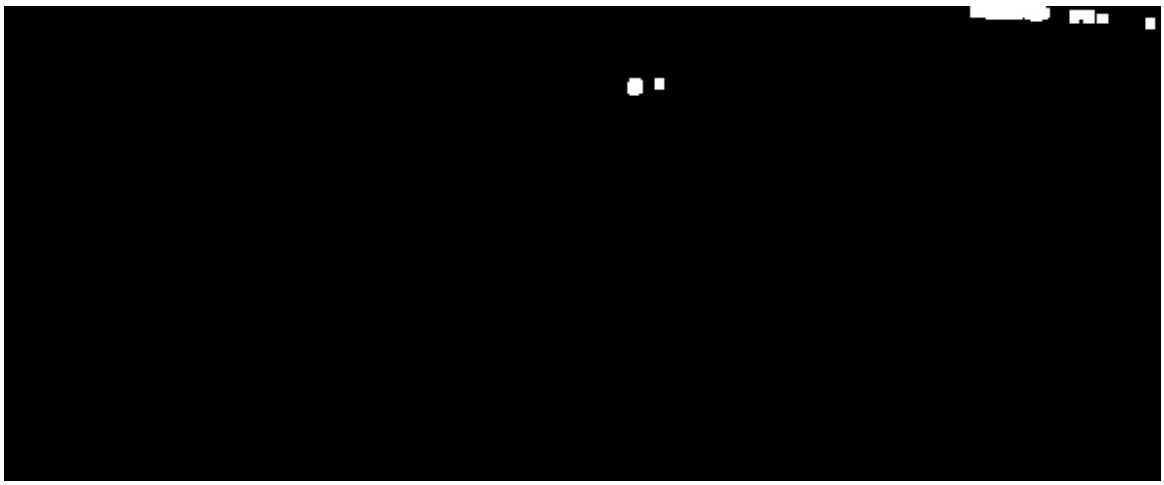
Robust Estimator
Two Images to Compare

Plot of data points and Least Square Line Fitting





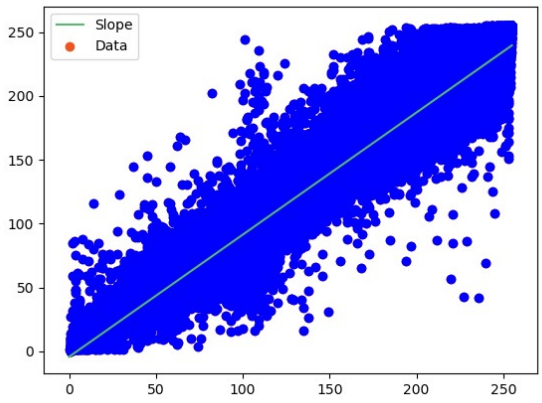
After thres hold



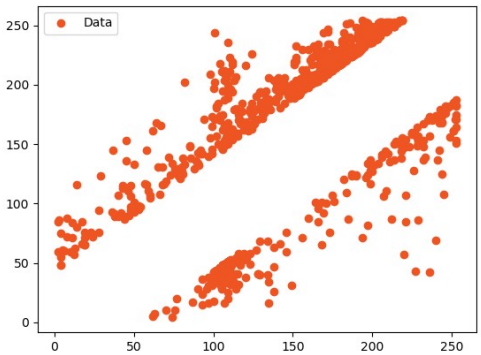
After segmentation

Two Images to Compare

Plot of data points and Least Square Line Fitting



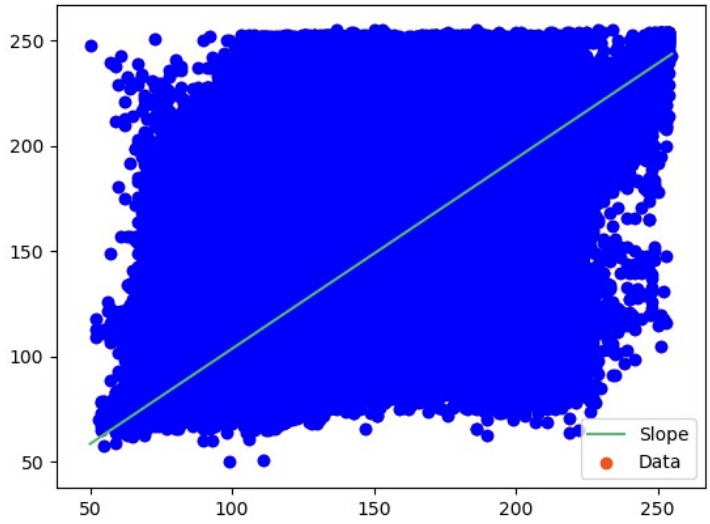
After threshold



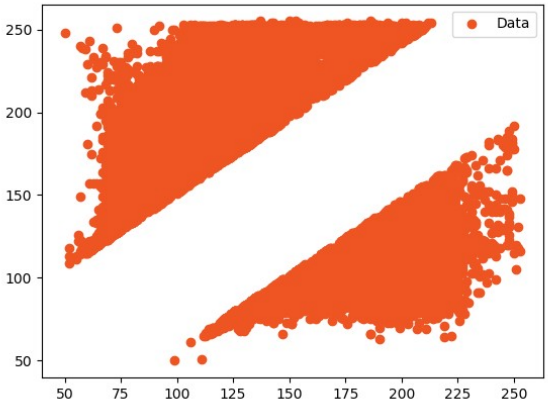
After segmentation

Two Images to Compare

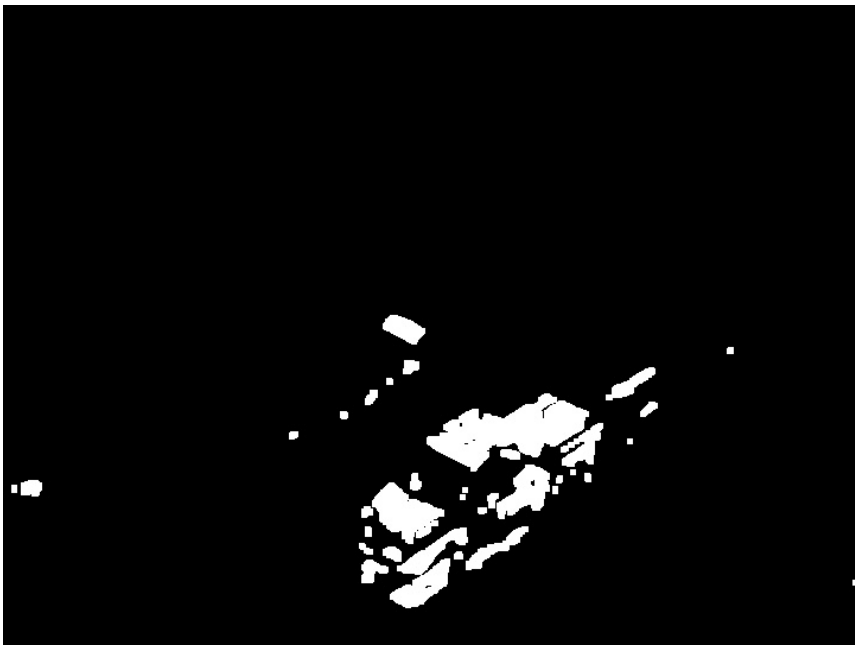
Plot of data points and robust estimation fitting



After threshold



After segmentation



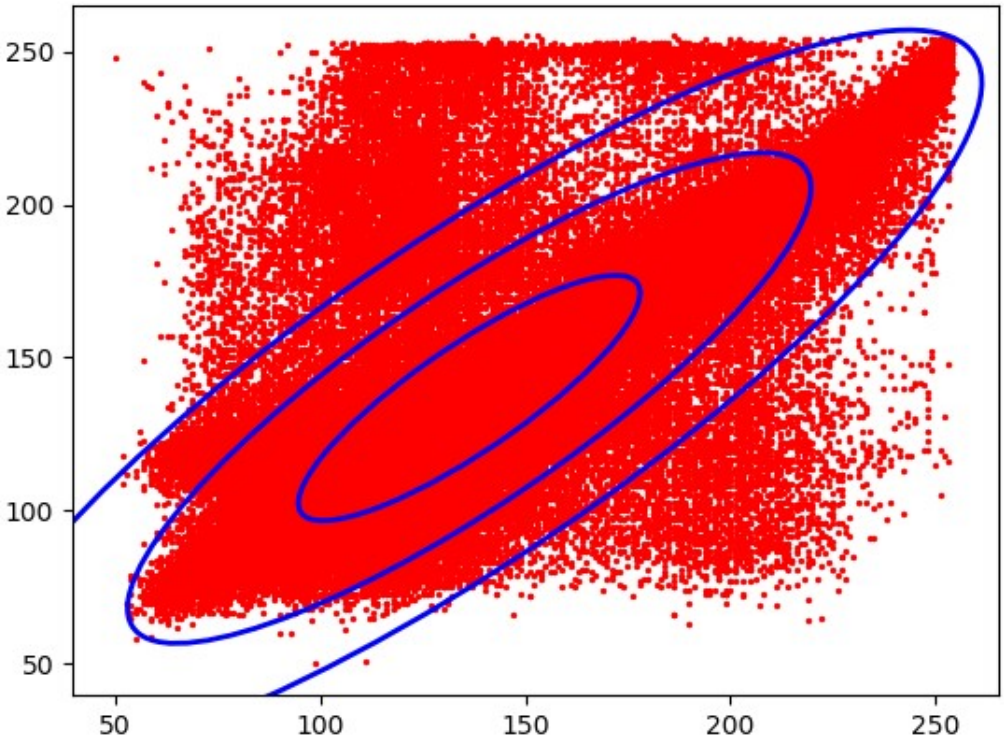
The threshold used to identify the changing was a perpendicular distance of 35 to the Robust estimation. This seems to give good results. But if tuned lower threshold or higher kernel size

may have better performance. Robust method is more robust than least square method but too cautious.

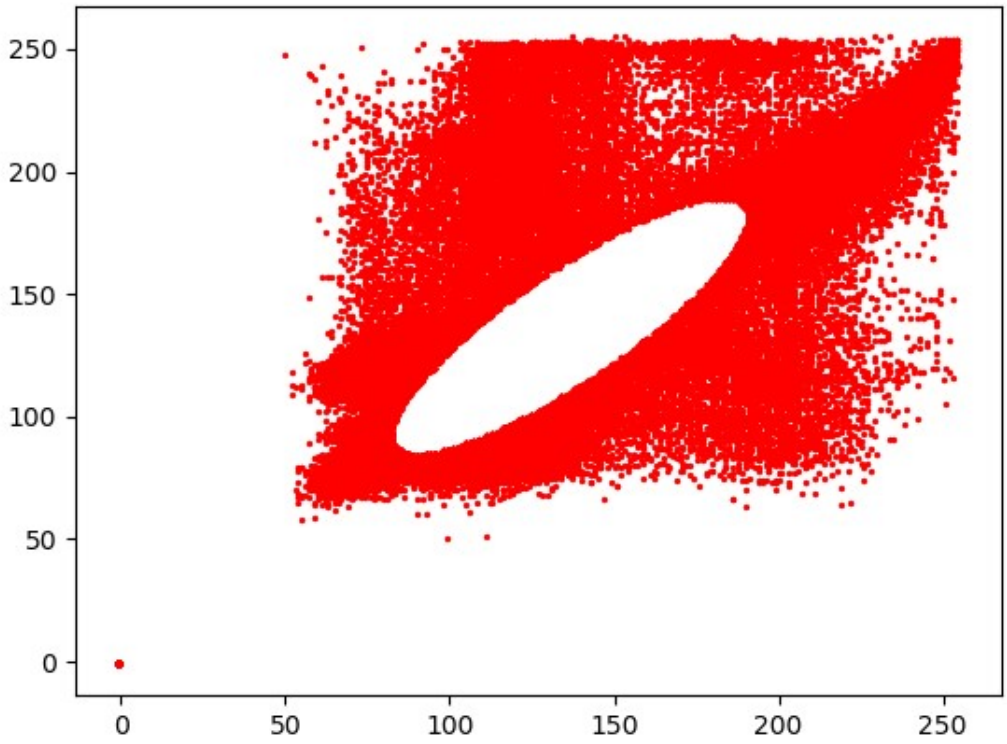
Gaussian Mehtod

Two Images to Compare

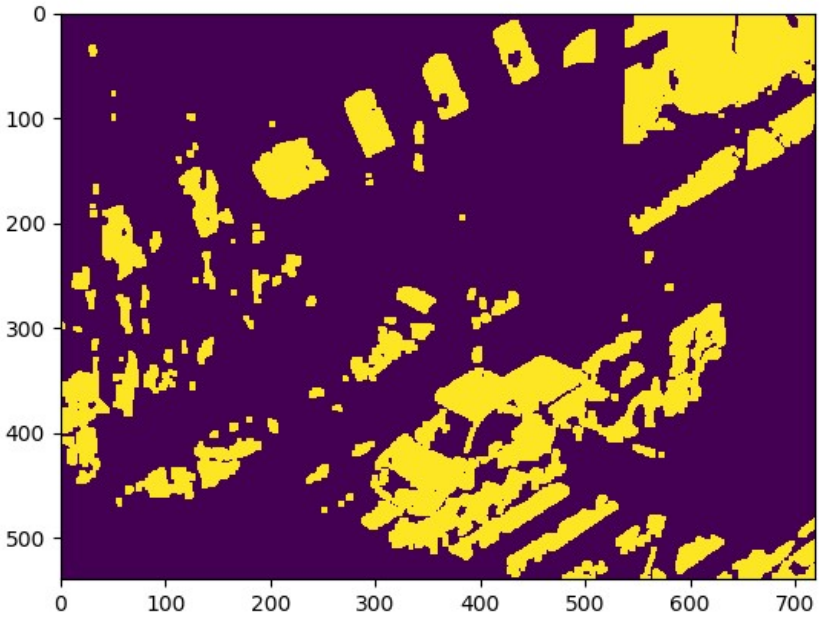
Plot of data points and gaussian fitting



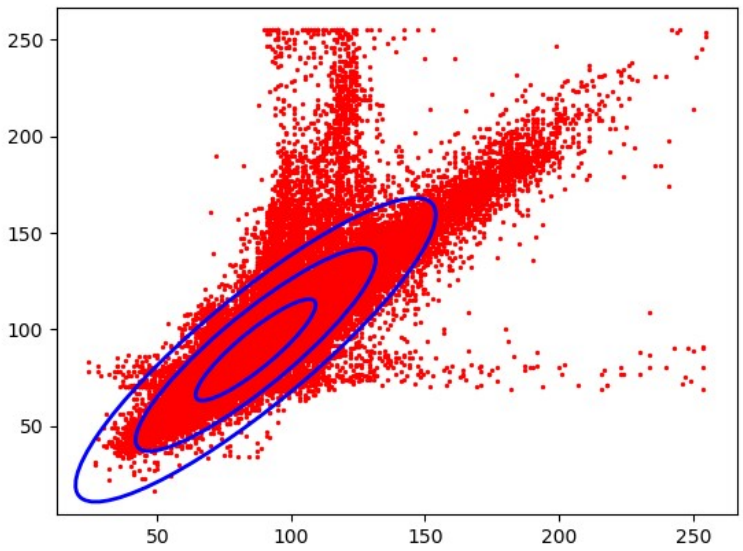
Delete in threshold points



After Segmentation Image

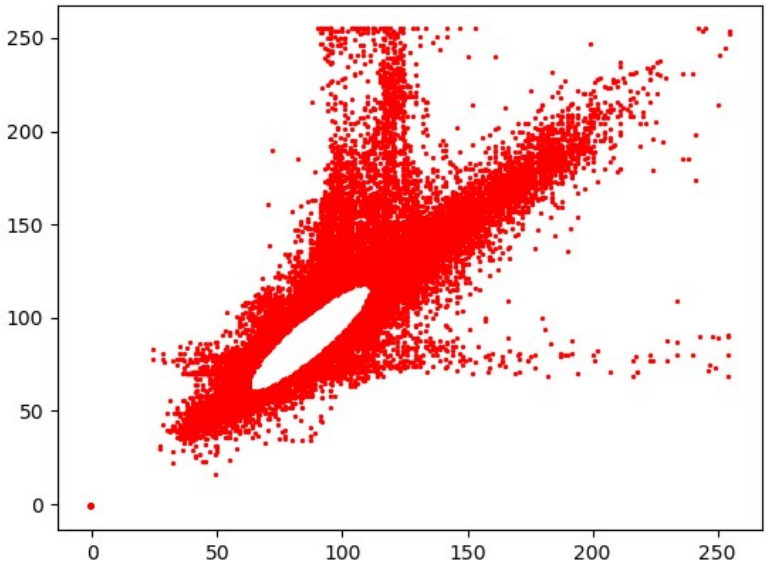


Two Images to Compare

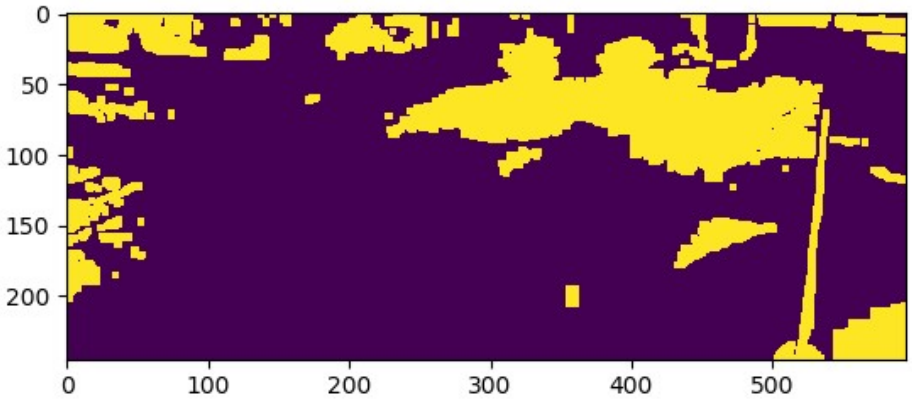


Plot of data points and gaussian fitting

After threshold

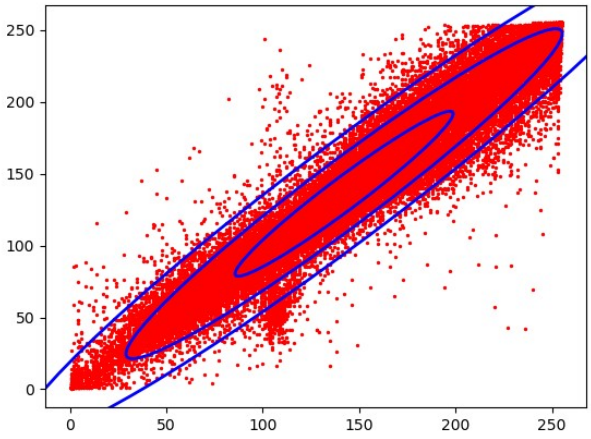


After segmentation

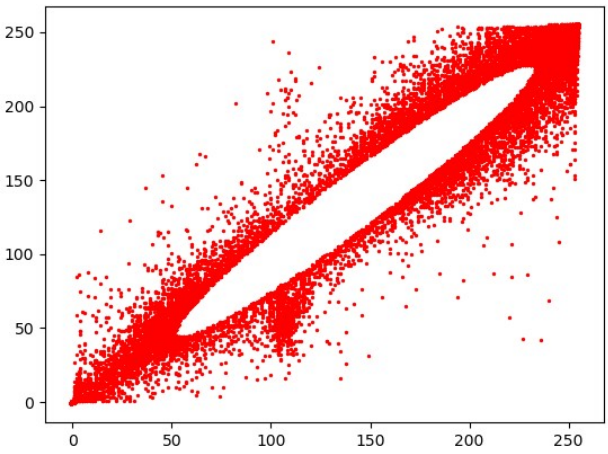


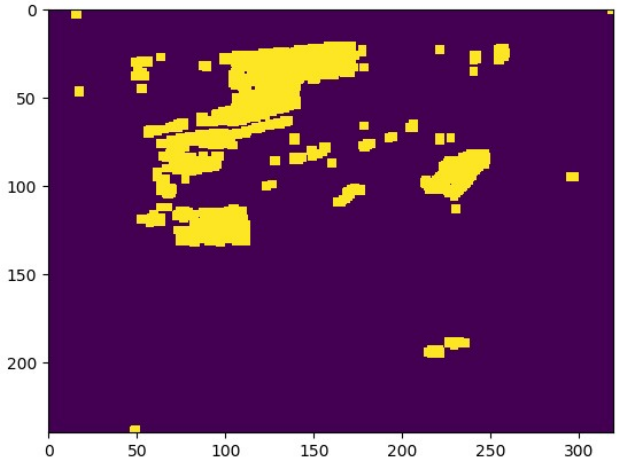
Two Images to Compare

Plot of data points and gaussian fitting



After threshold





After segmentation

Segmentation of image after a 3x3 kernel erosion + dilation of the segmentation image to remove noise and keep object less holes. Threshold is 0.7

iii. Segmentation Image

Segmentation of image after a 3x3 kernel erosion of the segmentation image to remove noise.

a. What are the parameters that influence your algorithm? Explain their effect?

The threshold is the same for all methods: higher have more precision detection, but can confidently detect big changing but not sensitive to the small changing. Lower threshold can bring more potential changing parts with more noise. So this is a trade of sensitive and noise.

b. Does one of the fitting models work better than the others. Explain?

Both the least squared and the robust estimators worked well, mainly due to the fact that images did not have a large number of differences. The gaussian fitting maintaining more noise.

c. What is the objective of this implementations? Which model works best and what are their parameters? Explain?

Both the LS and the RO estimator used a line and distance threshold to detect differences (outliers) while the gaussian used an ellipse to fit the data. For most of the cases the RO estimator worked out the best because of is successfully got robust line model than least square method and both line regression method can delete more noise than gaussian method.