# LAB-1 Assessment

Here we have collected two sets of data, for our experiment.

First set of data is when the entity was stationary, and the second set of data was when the entity was moving. The data was collected for a total of 10 minutes and 2 minutes respectively. First let's talk about the outputs of different sets of data and then we can do a comparison followed by a conclusion.

**OUTPUTS of UTM-X and UTM-Y**

**Case 1: Stationary**

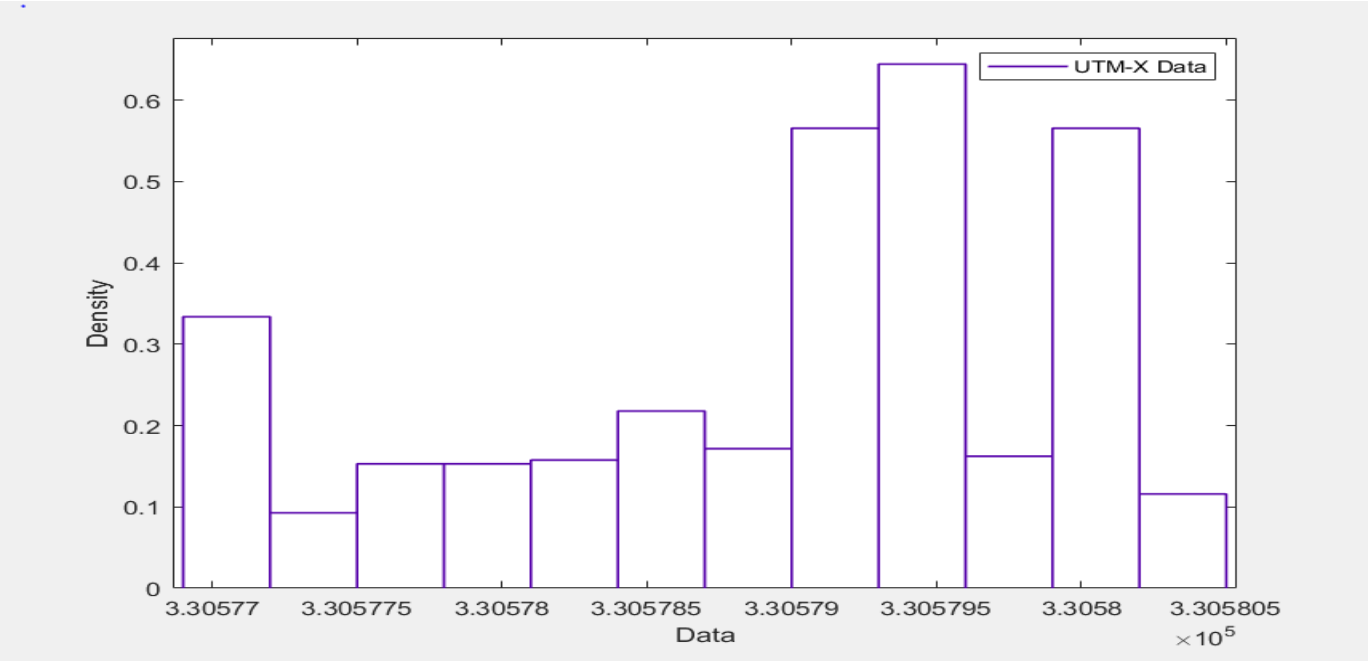


Fig 1: PDF of UTM-X Data when stationary

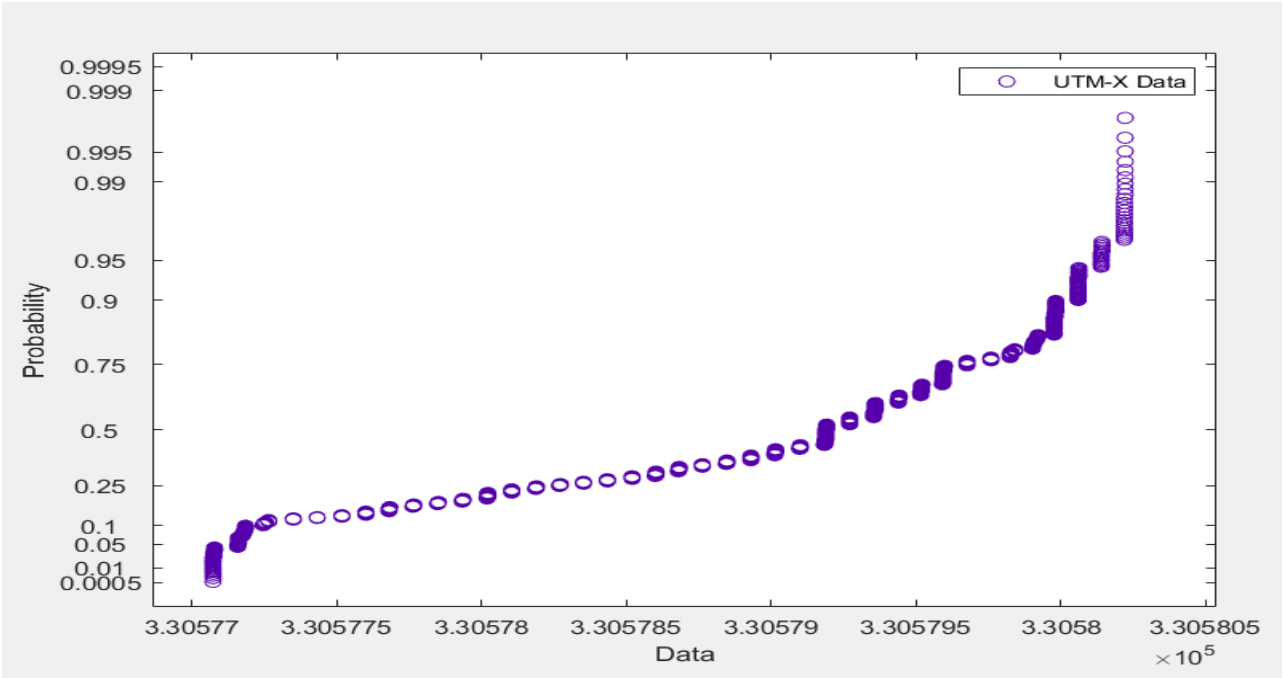


Fig 2: Probability of UTM-X Data when stationary

In the first plot, we have plotted the UTM-X data, which is column number 5, in the text file which we collected, against the probability density function. For that, we had to calculate the variance and standard deviation of the data. These results are something like this:

Variance of UTM-X and UTM-Y (meters):

0.9115  0.4371

Standard Deviation of UTM-X and UTM-Y (meters):

0.9547  0.6611

Mean of UTM-X and UTM-Y (meters):

3.306  46.743

From these three parameters, we can conclude that the mean of the data lies around the 3 meters mark for the UTM-X, and from the mean, it varies around 0.9 meters in the set of data we recorded. Also, for UTM-Y the mean lies around the 46 meters mark, and the standard deviation varies around the mean by around 0.66 meters. The variance is around 0.4 meters for every input of data.

Here next, we have plotted the probability density function and probability split of UTM-Y. We can get more information about the data.

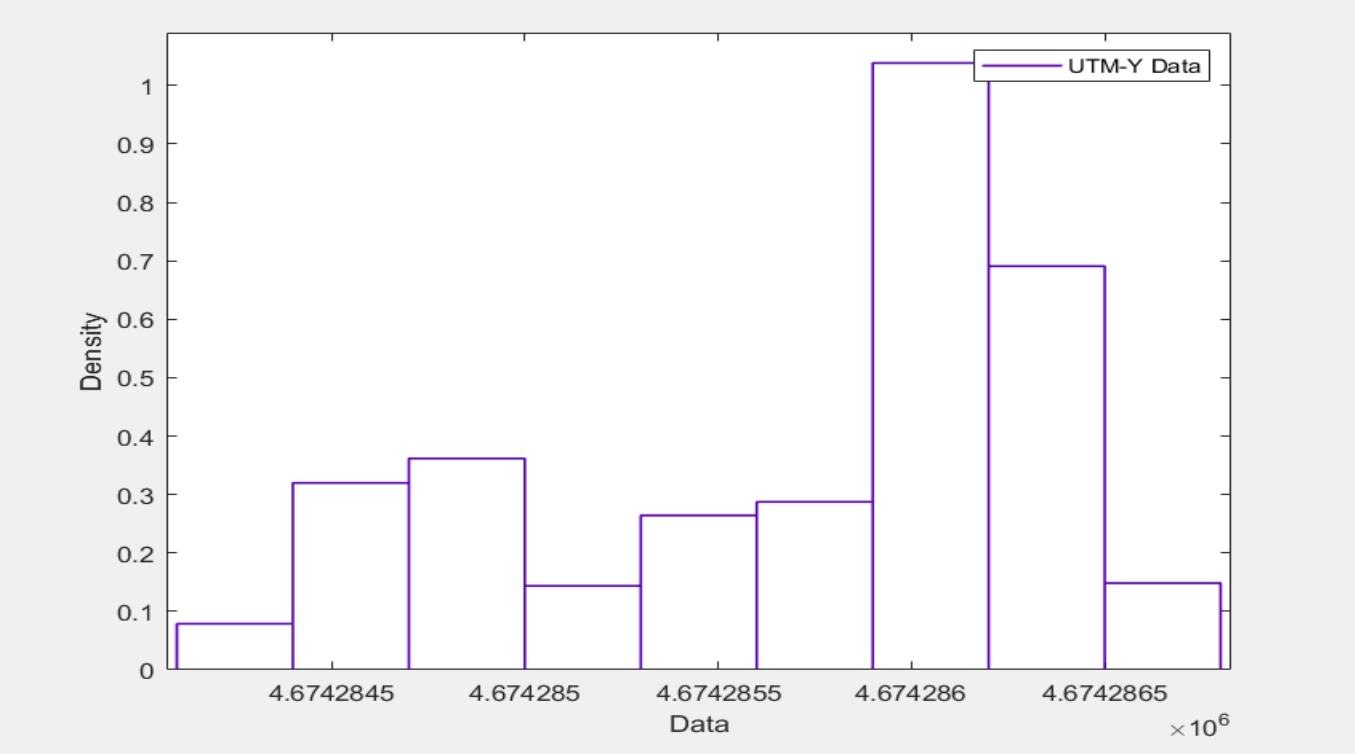


Fig 3: PDF of UTM-Y Data when stationary

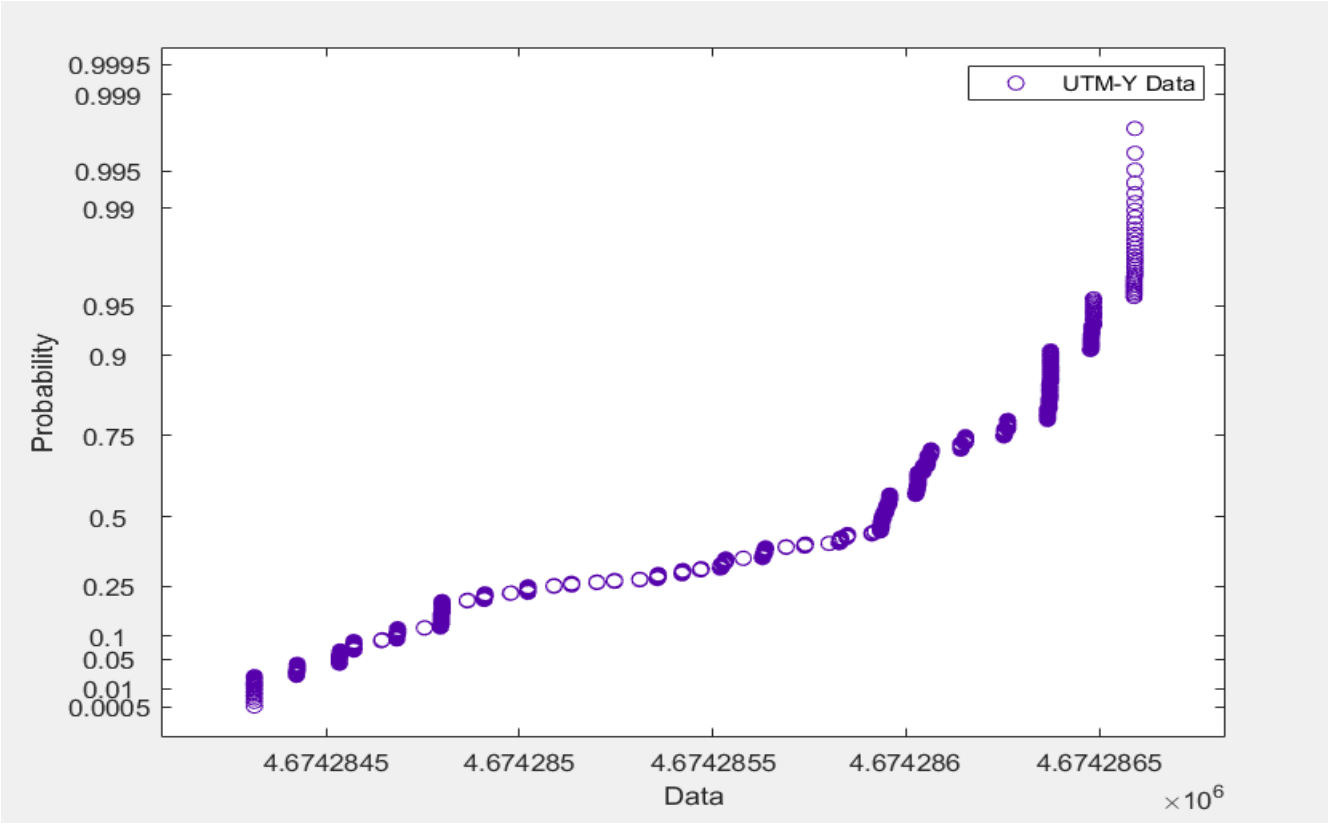


Fig 4: Probability of UTM-Y when stationary

**Case 2: Moving**

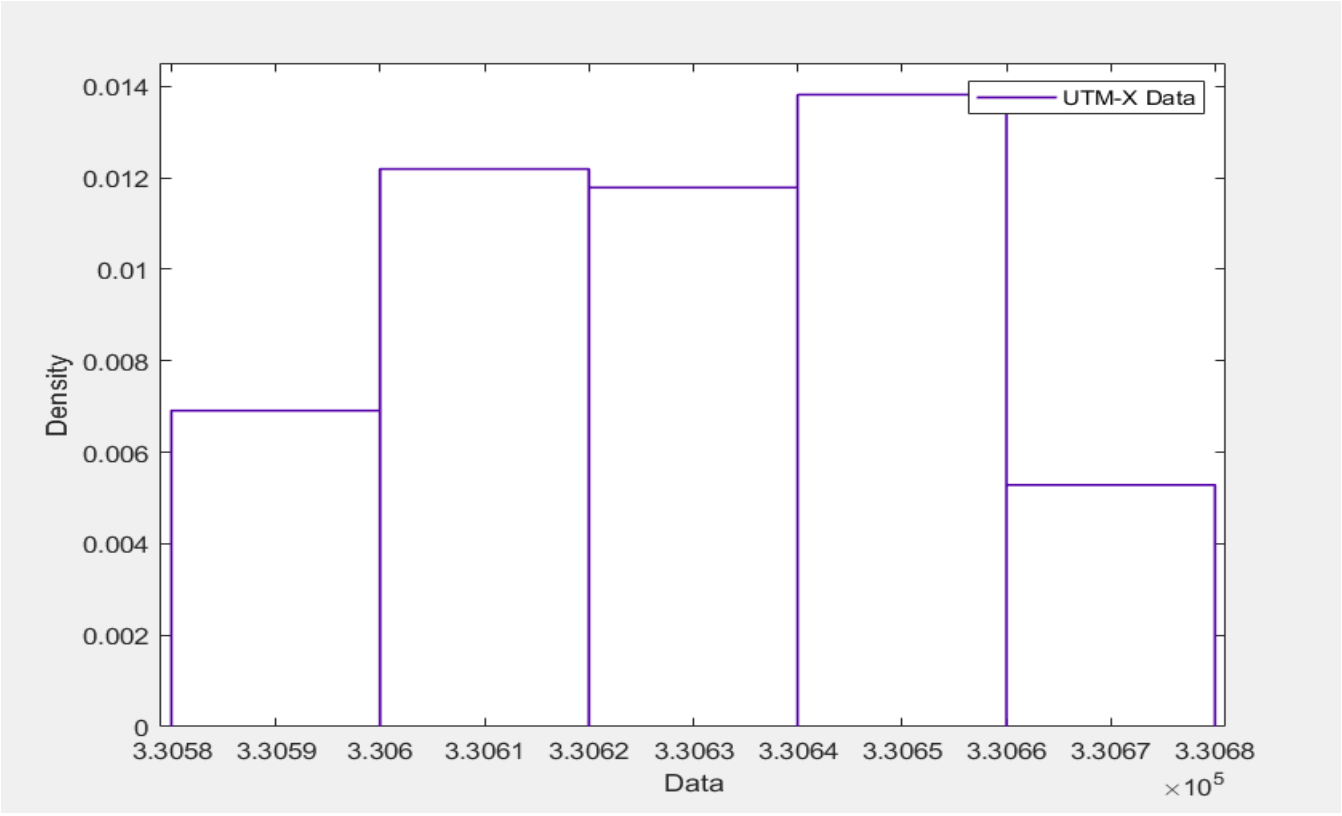


Fig 5: Plot of UTM-X data when moving

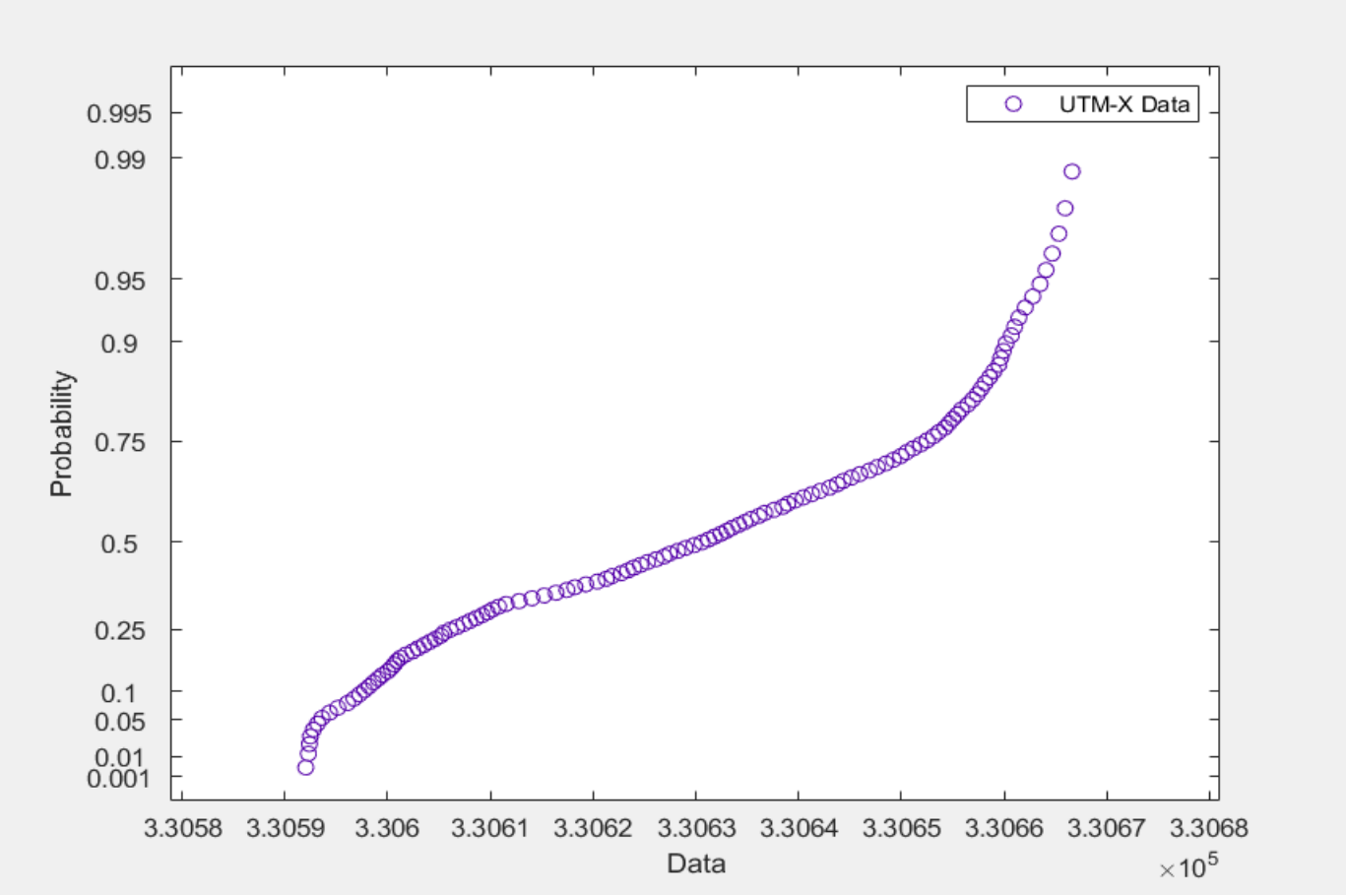


Fig 6: Plot of UTM-X probability when moving

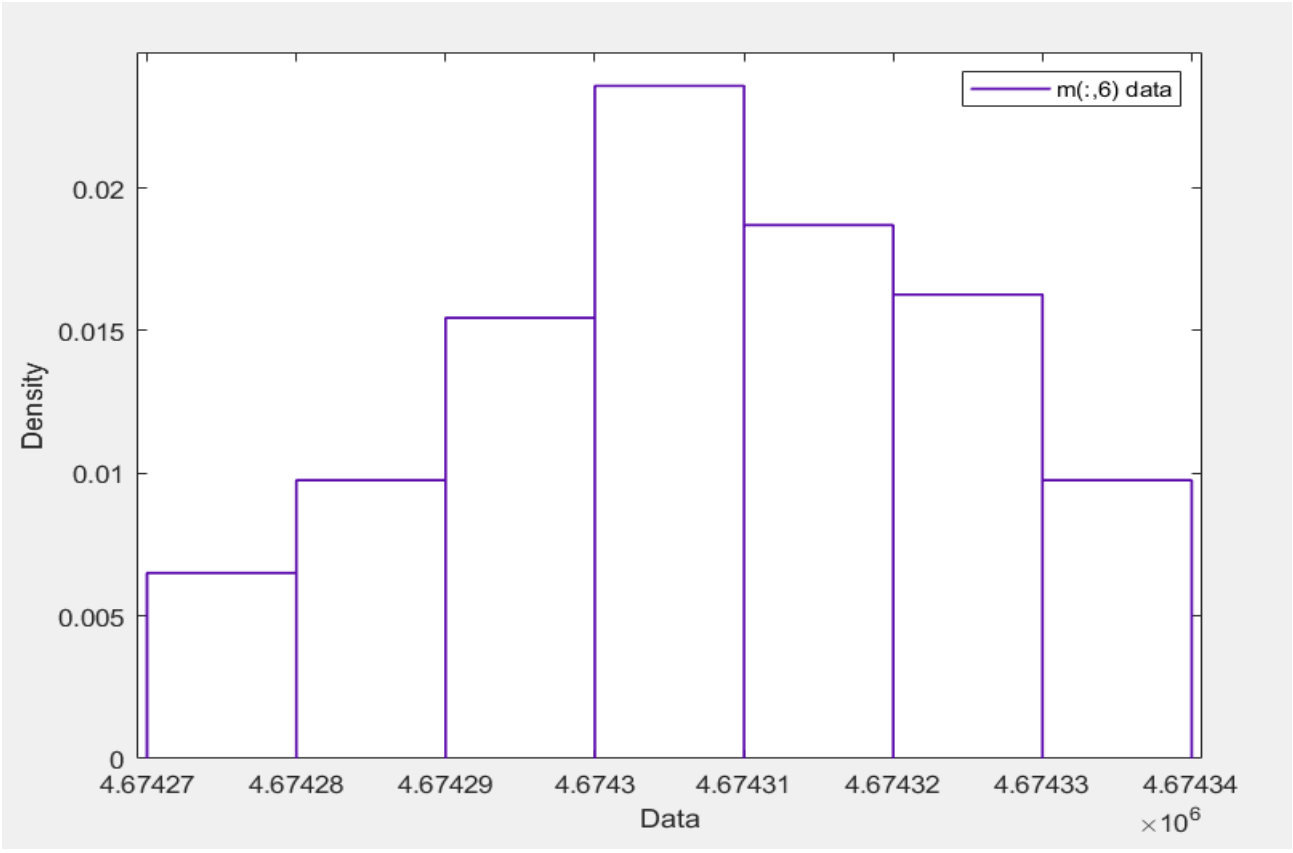


Fig 7: Plot of UTM-Y probability when moving

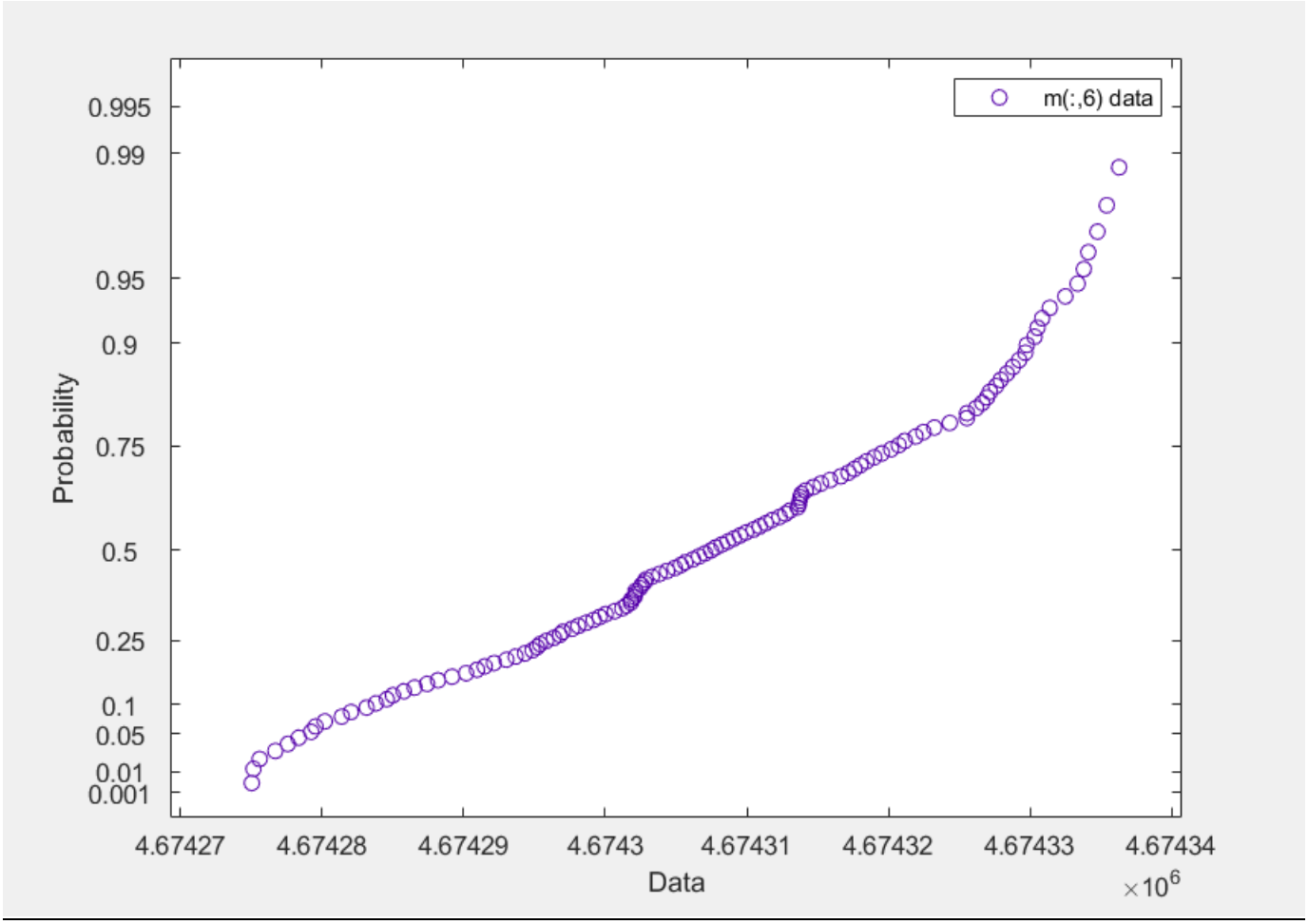


Fig 8: Plot of UTM-Y probability when moving

Variance of UTM-X and UTM-Y (meters):

0.9115 0.4371

Standard Deviation of UTM-X and UTM-Y (meters):

23.7807 16.5195

Mean of UTM-X and UTM-Y (meters):

56.55208 2.728954

**COMPARISION:**

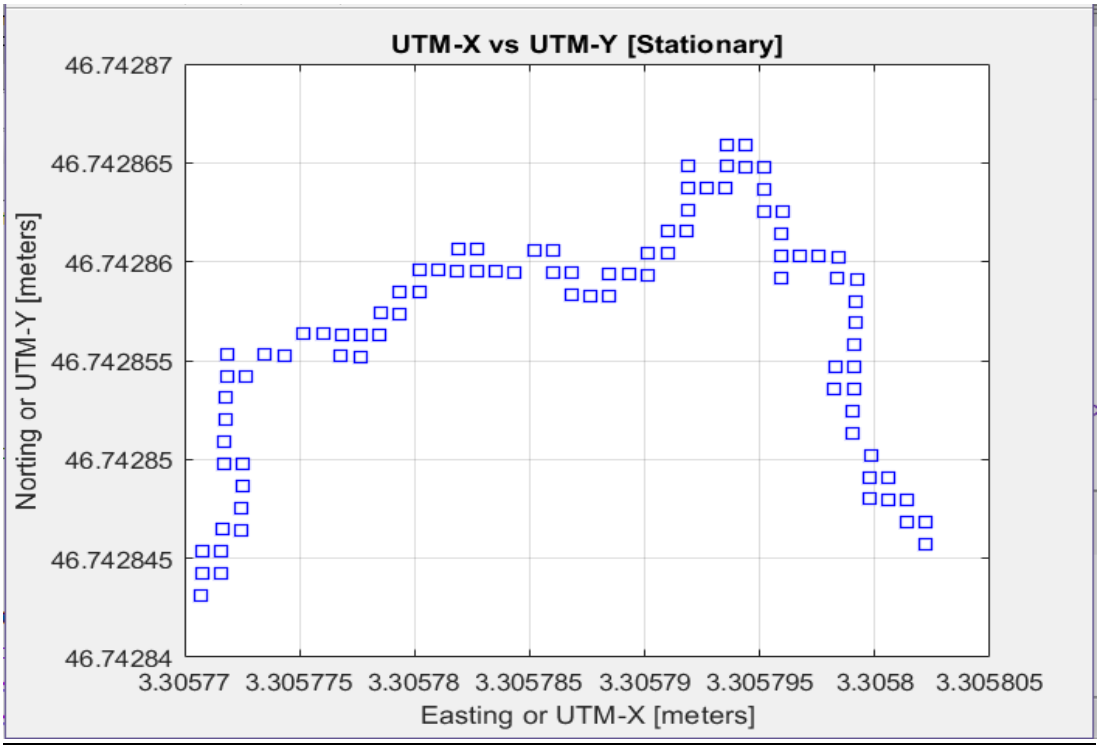


Fig 9: UTM-X vs UTM-Y when stationary

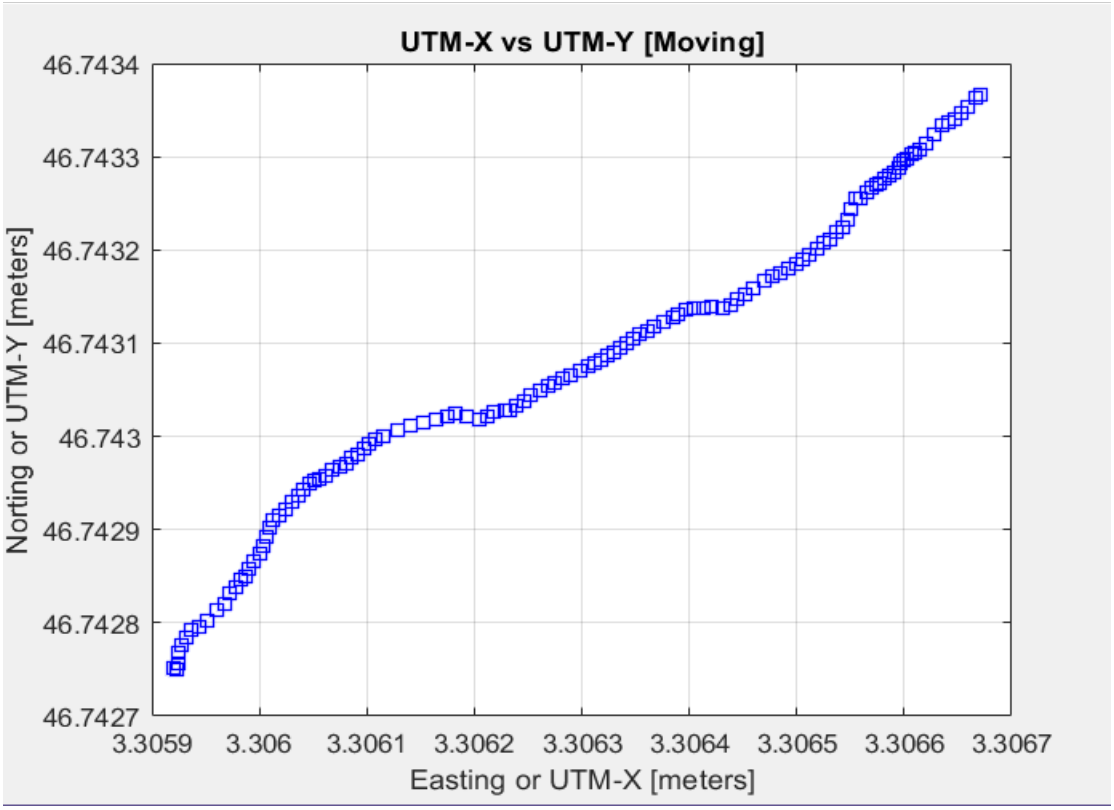


Fig 10: UTM-X vs UTM-Y when moving

**CONCLUSION AND INFERENCE**:

So, as we can see from the graphs, the variance is much less when the entity is stationary, as compared to when the GPS is moving. To interpret the graphs, we need to know how to read the UTM Data. In UTM format, there are no latitude and longitude, instead there are easting and northing along with the zone name and zone number. So, one unit in UTM will be one meter we move towards east or north.

There are two PDF plots of each UTM-X and UTM-Y, in moving and stationary cases. In the Stationary case, we can see from figure 1, the densest region was around 3.305795 meters in the easting area of UTM coordinates. Similarly, the densest region of UTM-Y, as we can see in figure 3, is when the GPS was stationary was around in the region of 4.674 meters in the north. In the case of moving, we can interpret from the figure 5 and figure 7, that the densest regions are around 3.3063 for UTM-X and 4.6743 for UTM-Y.

Figures 9 and 10 represent the data taken for 10 and 2 minutes respectively with all the points.

In both the cases, there is no electromagnetic flux involved since the GPS was held away from the laptop.