Lab 1 report
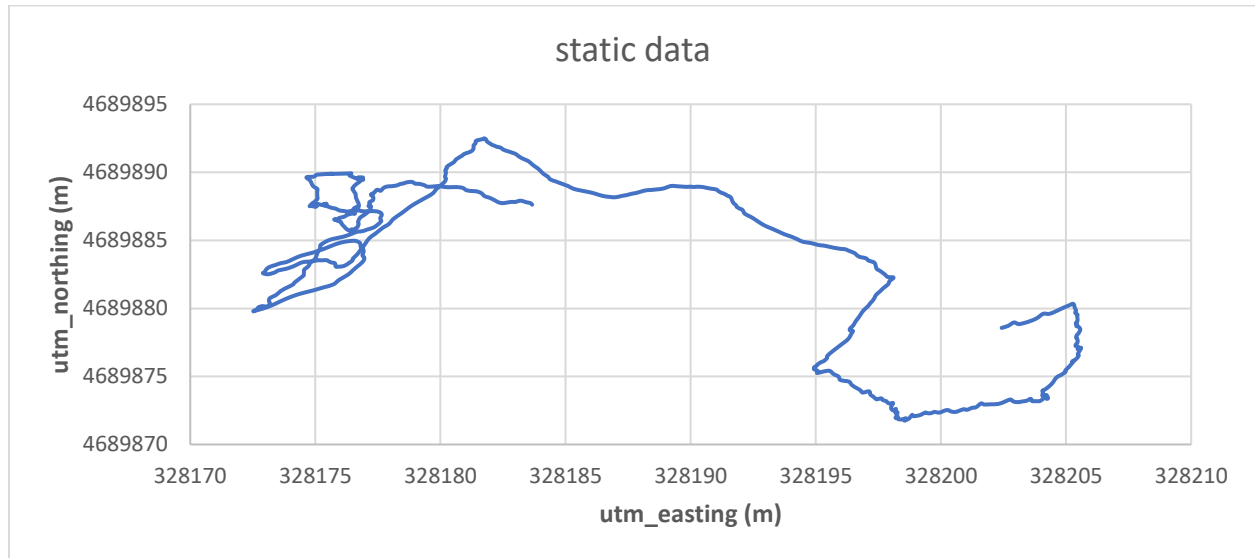
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Static data: recorded the GPS for 10 mins and collected 591 messages

data_type	max	min	mean	stdev
utm_northing	4689892.502	4689871.757	4689883.335	6.0400592
utm_easting	328205.6045	328172.5208	328186.2254	10.967228

From the chart, the error range for utm_northing is about 21 meters and the error range for the utm-easting is 33 meters. The standard deviation of the northing and the easting is 6 and 10, respectively.

utm_easting
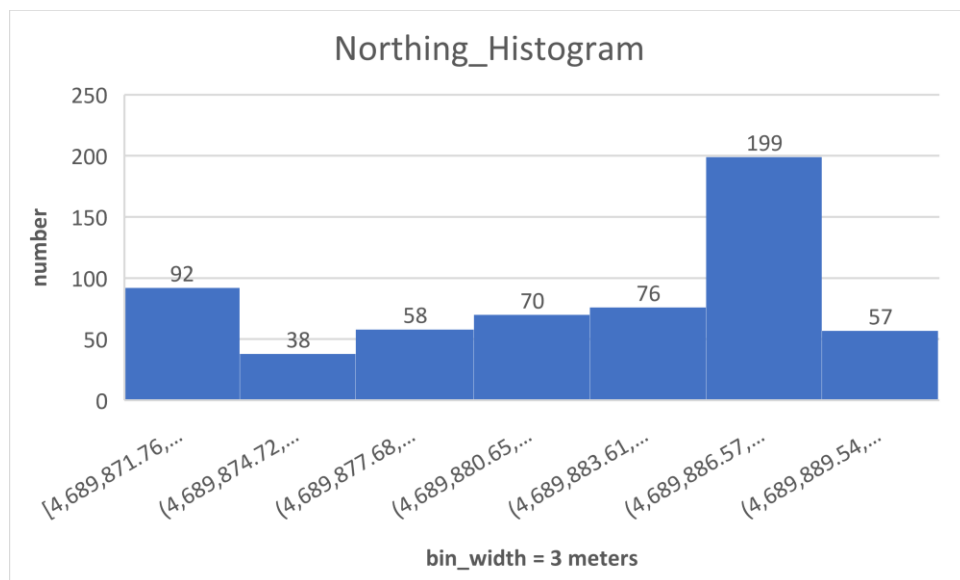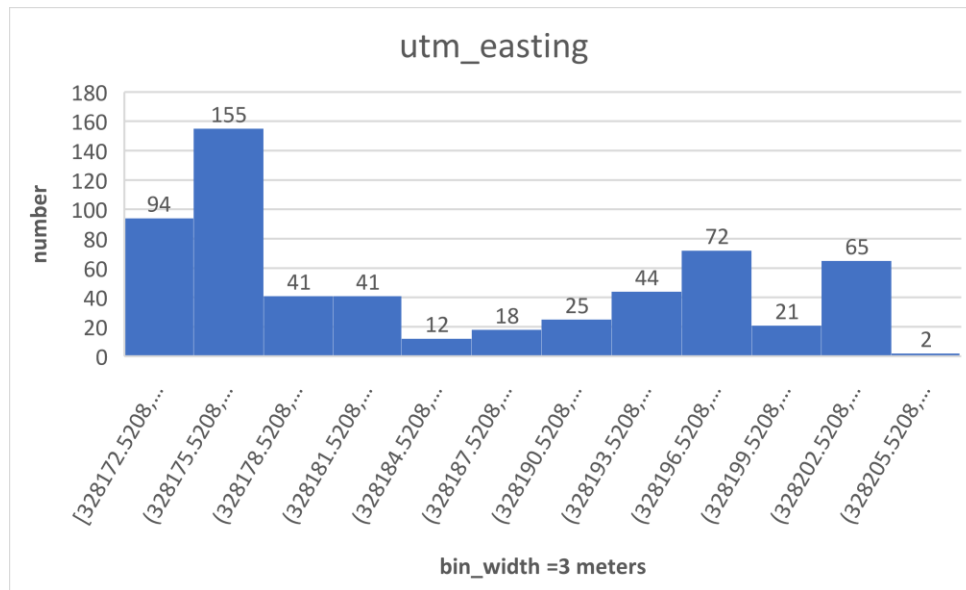
The error distribution is random due to several reasons.

GPS signal collected = The actual location's coordinate + time clock error + ionosphere error + multipath error + ……

Error	VALUE (Approx)
Ionosphere	4.0 meters
Clock	2.1 meters
Orbit	2.1 meters
Troposphere	0.7 meters
Receiver	0.5 meters
Multipath	1.0 meter

For my GPS signals were collected in Five guys, Huntington Avenue where there are many tall buildings, the multipath error would be large.

Moving data: recorded for 2 mins and obtained 150 messages along the Huntington Avenue.

moving straight
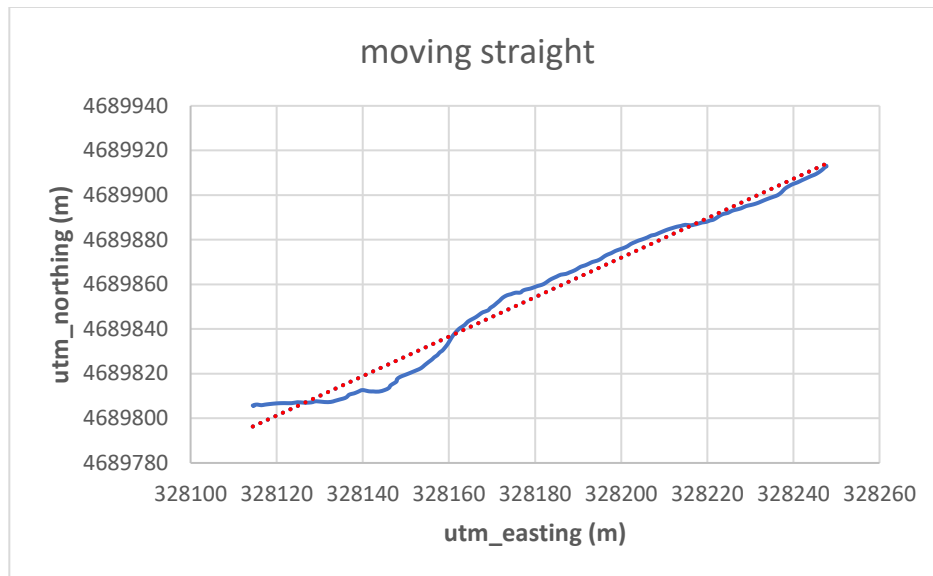
In the chart, the blue solid line is the GPS signal and the red dash line is the linear trendline which could represent the real moving path in some degree.

The error sources are the same as the static errors mentioned above and for this lab, the moving error could also be categorized as 2 different types:

- Bias
- Variance

Reference:

https://www.e-education.psu.edu/geog160/node/1924

http://wiki.ros.org/cn/ROS/Tutorials

Professor and TA's help