Data Science – Project IoT using GPS, Data Visualization, and Anomaly Detection

Observed Anomalies

The Arduino sometimes burps, and writes two GPS sentences to the same line of the data file. You must detect and ignore these anomalies.

Example:

$GPGGA,154556.800,4308.2213,N,07727.8859,W,2,10,0.91,148.4,M,-34.4,M,0000,0000\*59

$GPRMC,154556.800,A,4308.2213,N,07727.8859,W,0.00,168.10,200319$GPGGA,154557.000,4308.2213,N,07727.8859,W,2,10,0.91,148.4,M,-34.4,M,0000,0000\*50

lng=-77.464759, lat=43.137020, altitude=148.40, speed=0.01, satellites=10, angle=168.1000, fixquality=2

If the vehicle is traveling in a straight line, you could ignore some points. This means the angle is the same

If the vehicle is parked, you do not need multiple data points at that same location. This means the speed is 0. So just take the first data point with a speed of 0.00

The “heading” or “direction” information from the GPS is only valid if the car is moving. If the car stops at a stop sign or a traffic light, the “direction” is meaningless. So, you can only use this information if the speed of the vehicle is above a minimum speed. (What is this minimum speed)

$GPRMC, Coordinated Universal Time (UTC), A/V, (Latitude, Latitude Direction), (Longitude, Longitude Direction)

Coordinated Universal Time (UTC) – 194530.000, 19:45:30 UTC Time

A/V – Signal is Active (A) or Void (V)

(Latitude, Latitude Direction) – 3051.8007,N : 30 Degrees, 51.007 minutes in the Northern Hemisphere

(Longitude, Longitude Direction) – 10035.9989,W: 100 Degrees, 35.9989 minutes, in the Western Hemisphere

X\*[NN.N\*] – N is minutes

N = Positive Latitude

S = Negative Latitude

E = Positive Longitude

W = Negative Longitude

**KML Representation:**

(Longitude, Latitude)

$GPRMC,142641.400,A,4308.3008,N,07726.2669,W,0.01,28.18,120319,,,D\*48

4308.3008,N,07726.2669,W

43 8.3008N 077 26.2669W

43.1383, 77.4378