

The data source I plan to use is this NGSIM Vehicle and Trajectory Data:

<https://datahub.transportation.gov/Automobiles/Next-Generation-Simulation-NGSIM-Vehicle-Trajectory/8ect-6jqj>

This is a CSV. dataset with 25 columns. The attributes I am going to use is: Vehicle_ID, global_x, global_y, global_time, v_class, v_vel, v_acc, lane_ID

GIS skills and strategies: As this dataset is huge with 11.8M rows, I plan to filter the data three times. I will firstly import this dataset into pgAdmin, select v_class = "auto" because we want to focus on auto data. Then, in ArcGIS Pro, I will select by location to narrow down the trips to be within Downtown Los Angeles. Next, in Jupyter Notebook, I may limit each trip to be 300 second long so the visualization won't be overcrowded on the basemap, and it will be easier for users to visually compare these trips.

Process/steps in this project:

1. clean/preprocess the data:
 - a. retrieve the data (read.csv()),
 - b. Convert csv to geopandas table (gpd.GeoDataFrame())
 - c. format the data(.split(), .reshape()),
 - d. deal with Null(.fillna()),
 - e. deal with outliers(.drop()), etc.
2. Analyze/visualize data:
 - a. Set up a basemap (Folium library includes multiple basemaps; use Mapbox API if necessary)
 - b. Plot the points of location along the trip for each second (Folium.Marker(), Folium.Circle(), etc.)
 - c. Visualize vector attributes: velocity and acceleration (consider both direction and magnitude). Direction can be visualized using arrows (quiver() function in Mpleaflet library). Magnitude can be visualized in color-coded lines (Folium.ColorLine(), etc.)
 - d. May need to write customized functions to, for example, calculate the great circle distance between each two immediate points of location.

Challenge:

1. It is difficult to reformat the time: This vehicle trajectory data provided the precise location of each vehicle within the study area every one-tenth of a second, but I need to find a way to convert it to 1 second between each two immediate points along the trip.
2. I need the heading angle in each second so I can visualize acceleration/velocity's direction. I need to find a way to calculate the heading angle.

Next step:

1. Clean the data and produce some basic visualizations.
2. Solve the above challenge