Road Obstacle Detection

Data

X,y,z accelerometer data collected for one vehicle during a single day

| time	acc_x	acc_y	acc_z	speed	latitude	longitude	heading	road_speed_limit	vehicle_make	vehicle_model	vehicle_type
2022-09-29 03:46:06.458	-0.030	-0.028	1.009	0.0	43.238934	-2.877811	318.0	40	MAN	TGX	truck
2022-09-29 03:46:06.558	-0.032	-0.029	1.008	0.0	43.238934	-2.877811	318.0	40	MAN	TGX	truck
2022-09-29 03:46:06.658	-0.029	-0.027	1.008	0.0	43.238934	-2.877811	318.0	40	MAN	TGX	truck

EDA

Distribution of variables

	count	mean	std	min	25%	50%	75%	max
acc_x	262443.0	-0.005591	0.037854	-0.519000	-0.025000	-0.005000	0.016000	0.267000
acc_y	262443.0	-0.001974	0.040085	-0.295000	-0.022000	-0.001000	0.019000	0.358000
acc_z	262443.0	1.012184	0.058322	0.144000	0.982000	1.011000	1.042000	2.069000
speed	262443.0	80.967359	18.806381	0.000000	82.000000	89.500000	90.200000	101.100000
latitude	262443.0	42.805124	0.287253	42.356133	42.573081	42.763565	43.044025	43.359283
longitude	262443.0	-3.529438	0.495934	-4.242803	-4.056762	-3.639542	-2.929246	-2.868893
heading	262443.0	173.051511	105.751084	0.000000	71.179503	179.566180	250.820230	359.998660
road_speed_limit	262443.0	104.127068	23.590956	30.000000	90.000000	120.000000	120.000000	120.000000

The total number of observations are 262,443. The vehicle speed was varying to 0 km/h(not moving) to 101 km/h.
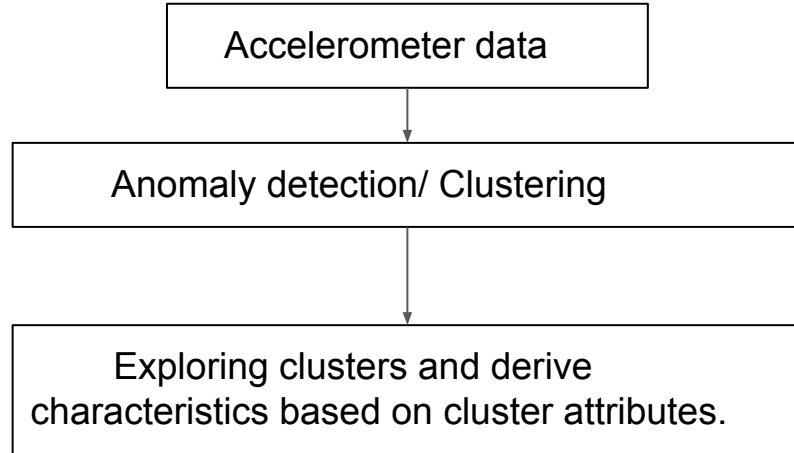There were no missing values and duplicates in the given dataset.

EDA

Variation of acceleration with time
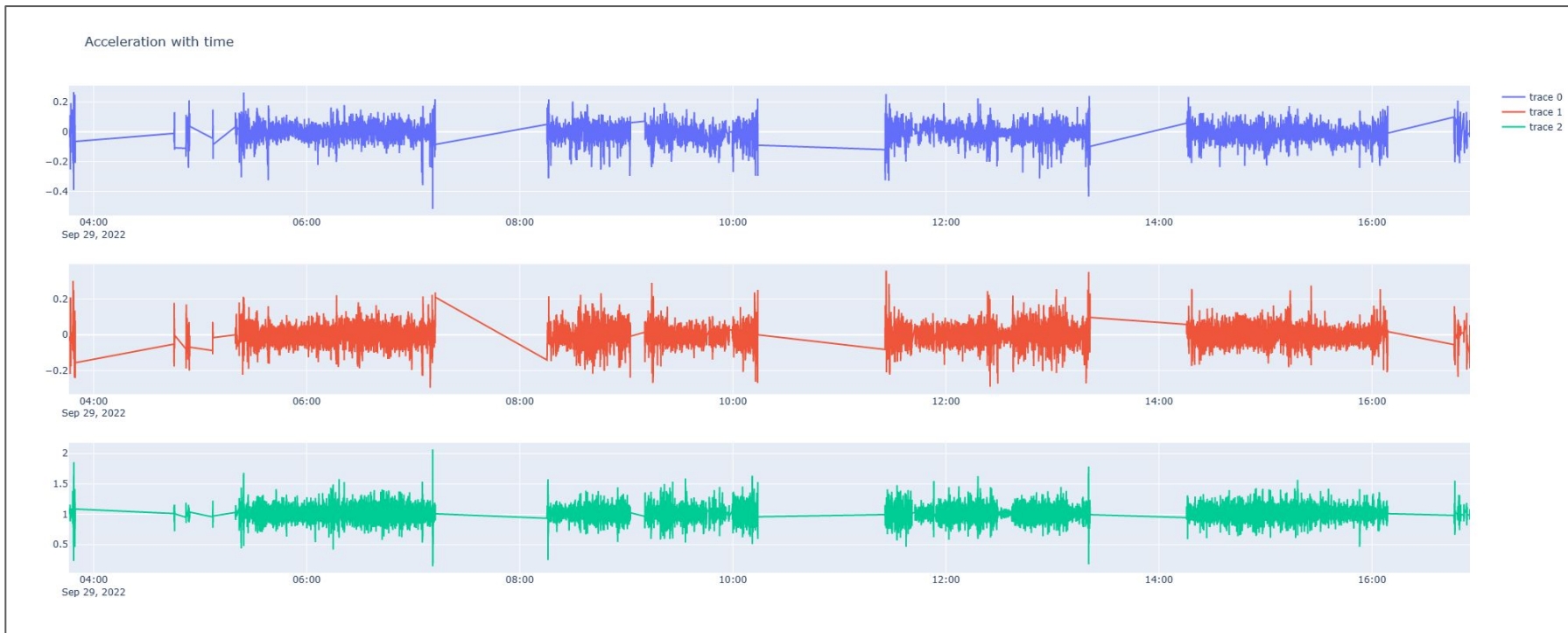
Approach

No label data set available for ex: pothole, speed bumps. Therefore we will use unsupervised technique to identify road obstacles.

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│      Accelerometer data     │
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                ▼
┌─────────────────────────────┐
│  Anomaly detection/ Clustering │
└─────────────────────────────┘
                │
                ▼
┌─────────────────────────────┐
│   Exploring clusters and derive │
│ characteristics based on cluster attributes. │
└─────────────────────────────┘
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Exploring identified clusters (Potholes)