Path planning

Objective:

The goals is to plan the car movement on high speed and let the car select the action in case there is a close car in front of it

Action will be decreasing speed or make lane change

The lane change will depend on check if there is no close car in front or behind current car S in the new lane

Input data:

Sensor fusion data contains all the information about the cars on the right-hand side of the road.

The data format for each car is: [id, x, y, vx, vy, s, d]. The id is a unique identifier for that car.

Steps:

1. Read last path data
2. Read sensor fusion data
3. Check all cars that are close to our Car S to decide which lane is safe including my lane by checking if there is near car around 30 m
4. If there is a car closer than 30 m in the front, I will decrease the speed with 0.224 then check if I can change the lane depending on the information observed from point 3 through a state machine
5. I will use the data of the previous path as a starting point and try to get the last angle of the car
6. I will select 3 points with the distance between every 2 points is 30 m
7. I will shift the car angle(heading) to 0 by multiplying it to the rotation matrix of components x and y to make the calculation easy
8. I will use then spline with the 3 apart points to generate smooth curvy points between these points
9. I will get back the previous heading by multiplying it to the rotation matrix
10. I will path all point to the simulator for movement reference