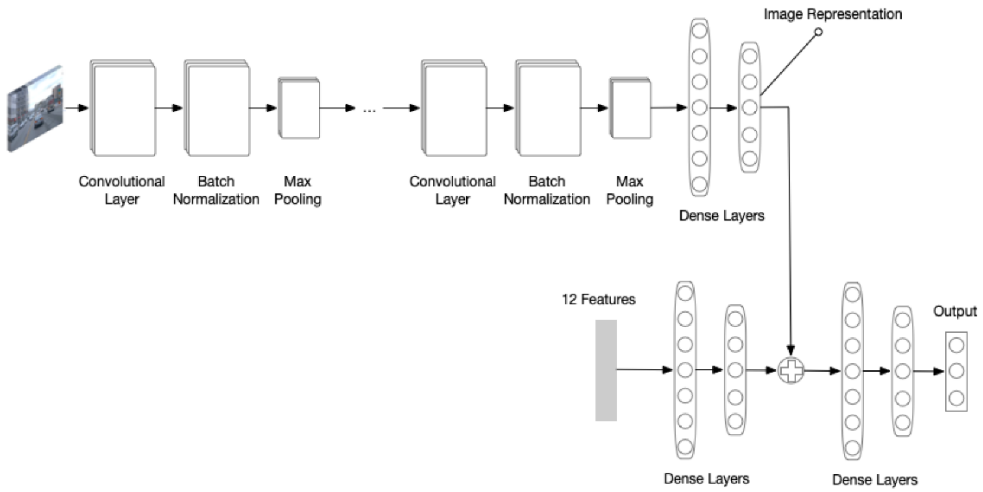
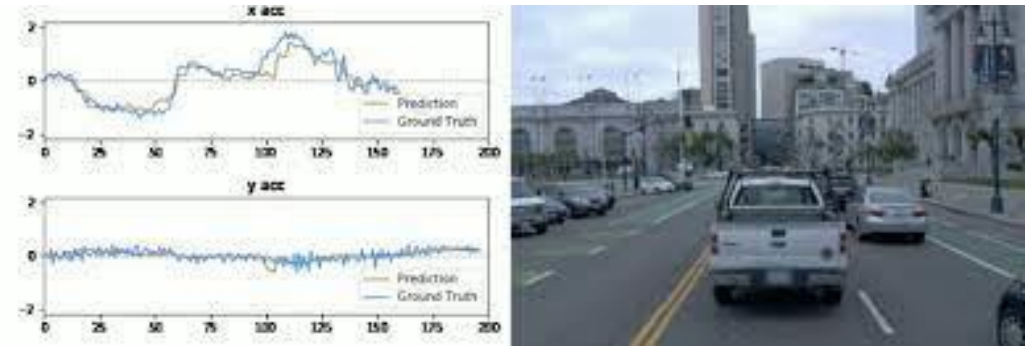
HOW RECCURENT NEURAL NETWORK SUCH AS LSTMs AND GSUs BASED MODELS CAN BE UTILIZED IN AUTOMATED VEHICLES

A recurrent neural network (RNN) is a Neural network where connections between nodes that can be treated as in input or output when plotted in a graph sequentially . These nodes carry certain weights and known as perceptrons, and are plotted after forward and backward propagating against gradient descendent the term “recurrent neural network” is used indiscriminately to refer to two broad classes of networks with a similar general structure, where one is finite and the other is infinite. these classes posses dynamic behaviour and differentiated on the basis of cyclic and non cylic properties .Both finite impulse and infinite impulse recurrent networks can have additional stored states, and the storage can be under direct control by the neural network. The storage can also be replaced by another network or graph, if that incorporates time delays or has feedback loops. Such controlled states are referred to as gated state or gated memory, and are LSTMs and GRU . This is also called Feedback Neural Network (FNN).



THIS IS THE ALGORITHM THAT CAN BE USED WHILE MAKING AUTOMONOUS VEHICLES.



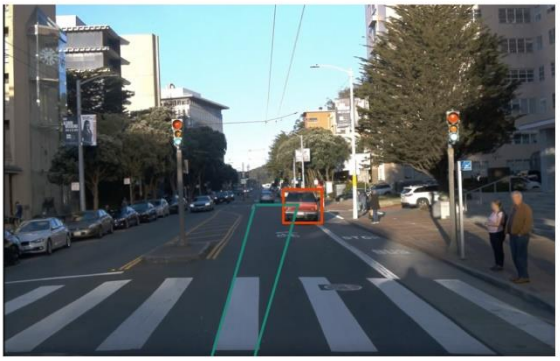
HERE THE LSTM MODEL IS BEING USED TO CONTINOUSLY LEARN FROM THE ENVIRONMENT AND PREDICT THE FUTURE ENVIRONMENT

As LSTMs and GRUs interacts with a previously unknown environment trying to maximize a defined reward function through feedbacking they NN can maximize the function that the “agent” (the brain of the car) utilizes to choose its actions at each state or to approximate the model of the system which the agent uses to predict future states and rewards. As the agent interacts with the environment, it gains knowledge about the behaviour of the environment which allows the agent to improve its performance over time.

ALGORITHM:

we use a simple algorithm to detect the existence of the front car, the algorithm checks if a hypothetical rectangular area starting from the position of the current car intersects with the front car. And therefore calculate its defect tolerance
As a result, the velocity of current car is checked w.r.t the acceleration of the front car and the relative distance to the front car
Additionally, enlarging the tolerance range may lead to detection mistakes when there are multiple vehicles ahead, thus the number of vehicles is also included to describe the complexity of the scenario, when the front car is not detected, the previously mentioned quantities are set to 0 if it is detected the algorithm will use the previous analyses and calculate the MAE between all the constraints and assign one to the car such that the car doesn’t hit the front car or any other vehicle

(**a**) Detection tolerance = 0



(**b**) Detection tolerance = 1