Self-Driving Car - Deep Q Learning

Abstract **-** In our project a simple self-driving car is implemented. The idea of making a self-driving car for our mini project came from the recent surge in the autonomous car industry. To implement the self - driving car we used the deep Q learning algorithm. Our car has three sensors from which it can sense if there is any block in its way. The car memorises it's way and finds a way to avoid those blocks. There are still many small faults in our car but our car is capable of avoiding as much as blocks from its way.

Introduction:

Engineers have been endeavoring models of self-driving cars for quite a long time. The thought behind it is truly basic: Outfit a vehicle with cameras that can follow every one of the items around it and have the vehicle respond in case it's going to guide into one. Instruct in-vehicle PCs the standards of the street and let them free to explore to their own objective. Self-driving car is a car that can analyze its surroundings and drive without any help from human interactions. There are sensors in the car that are used to identify its path and to sense if there are any blocks on the road. Self - driving cars have increased the safety of humans. The accidents that are occured on the road more than 90% of those accidents occured because of human error. But through self - driving cars the number of accidents occurring on the road should be reduced.

Self-driving cars are basically robo-car that perceives the surroundings with different sensors such as radar, sonar, GPS, camera etc. The concept of self-driving cars is to reduce human effort and increase safety more than ever. A self-driving car is a vehicle that can sense its environment. The car can move from one place to another without any human effort. Safety is very important when the concept of self-driving cars comes to mind. The user only needs to set the location and the rest will be done by the car itself.

As safety comes first, these self-driving cars must ensure full safety of the passengers before getting on the road. These machines need years of testing and regulatory approval in order to get onto the road. By doing so,

affordability is a very important factor. These self-driving cars must become affordable and attractive. Moreover, when considering full safety on the roads, it must be regularly monitored. Autonomous driving can create many problems. As there are different sensors mounted in the car, a failure in any of those sensors can be devastating. However, the car must maintain its safety even if any of the system fails.

Basic Concept of Self-driving cars

This basic depiction omits a ton of intricacy. Driving is one of the more common exercises people regularly do. And surprisingly the basic pieces of driving like following the items around a vehicle out and about — are in reality a lot trickier than they sound. Google's organization Waymo, the business chief in self-driving cars. Waymo's cars, which are genuinely common from other self-driving cars, utilize high-goal cameras and lidar (light recognition and going), a method of assessing distances to objects by ricocheting light and sound off things.

Another example of self-driving cars can be found from another giant company Tesla. Tesla has auto-pilot which helps the car move itself guided by a GPS and multiple body cameras. Today Tesla cars are well known all over the world because these cars managed to avoid accidents where a human could not have avoided it. It has various sensors all around the car to ensure safety of the passengers.

Method

In this project, we have implemented deep Q learning to build the AI for self-driving cars. Deep Q learning is a method that replaces the regular Q-table with a neural network rather than mapping a state-action pair to a q-value. Moreover, we have also used experience replay in order to help the agent learn about the environment so it can perform better when it finds a familiar environment. It will keep the experience and update it when necessary. Whenever it finds a new situation, it learns from it by keeping the experience for some time. When it learns the situation, it updates itself to better perform next time in the same situation. The benefit of experience replay is that it can learn several times from the same situation.
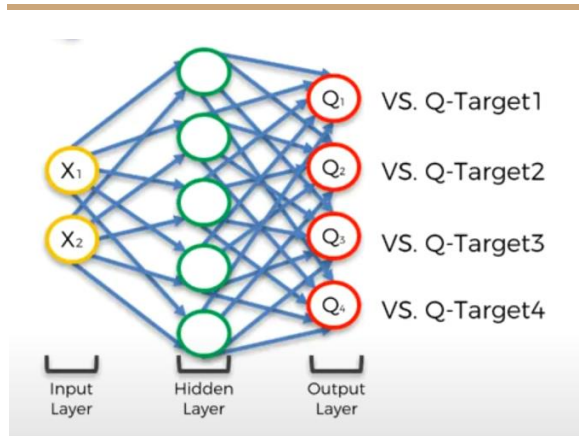
Future of Self-driving cars

Many optimists have predicted that soon self-driving cars will replace the other public vehicles. There are some reports from some statistics that found that by 2030, 95% of all U.S passenger miles will be served by autonomous vehicles. Moreover, private vehicles are decreasing day by day. As a result, it is a matter of time that autonomous vehicles take over other transportation.

Conclusions

We have seen that many optimists predict that autonomous vehicles will oneday take over the human-driving vehicles. On the other hand, some others wonder if it is even possible for the machines to fully take over human effort transportation. Nowadays, autonomous vehicles are very reliable,

affordable and common. The companies developing the self-driving cars are testing the machines for years to make sure that safety is first. Hopefully, In the future they will be able to provide the full safety of people riding the self-driving car.It can be predicted that in the upcoming years self-driving cars will be more reliable and affordable for most human beings. This will surely minimize the problems and maximize people's total benefit.

Reference:

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