NEAT For Speed

Honours Project

Dynamic route finding for self-driving cars

Background (What is Artificial Intelligence, how does it Work and how is it used in this project)

Artificial Intelligence is the simulation of human intelligence processes performed on machines such as computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision

In general, AI works by in-taking large sums of labelled training data, analysing the data for correlations and patterns, and using these patterns to make predictions about future states. In this project We focus on the application of AI in Self-Driving vehicles

Self-driving cars in terms of AI is broken into two parts, which are the Perception and Decision making components. The Perception deals with car vision and Decision deals with decision making and rout planning. Route planning uses A* algorithm to find the shortest path between various nodes.

Problem

A problem arises that the A* algorithm can only be used in static or unchanging environment, but in reality, road networks change often.

There are dynamic path finding algorithms, although these require lots of pre-processing to be performed. This means that large amounts of information and data about the roads and intersection has to be stored before the algorithm can be implemented.

Plan

The plan is to follow the main path or the shortest route until a better path is found and the system decides to change course. The changes can occur due to traffic, blocked roads and more. Once a change is found the idea is to switch to the next best route and the goal is to keep changing routes if there's a more efficient route calculated, without having to store too much information about the road networks.

The A* algorithm was used in this program to find the shortest path between two nodes and the program was programmed in Java programming language.

The system essentially focuses on route finding or path calculations for vehicles within a dynamic environment of road networks— without having to pre-process massive amounts of data before actually taking the route but rather learning and adapting according to situations presented at a specific moment in real time.