A NOVEL APPROACH USING FUZZY LOGIC TO DETECT TRAFFIC CONTROL SYSTEMS

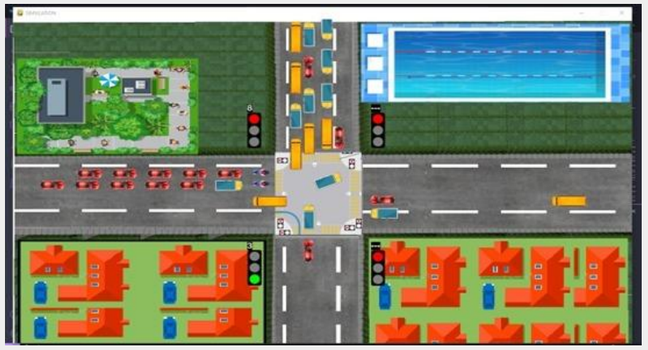
ABSTRACT

This project report proposes a fuzzy traffic control system based on fuzzy logic theory. This suggested system may effectively manage traffic junctions' congestion by regulating the time length of the green phase interval. The primary objectives are to improve traffic safety at the junction, maximize capacity at the intersection, and minimize delays. The growing number of automobiles and road shortages cause traffic congestion in many places, affecting efficiency, productivity, and energy losses. The traffic signal controller operating approach at road junctions is a key contributor to this congestion.

INTRODUCTION

Most major cities across the globe have experienced traffic congestion. A large city's traffic problems may be caused by a variety of factors. Among these include an increase in the number of cars, a lack of adequate roads and highways, and the conventional traffic signal system. All of these elements may contribute to traffic congestion at the junction, but the classic traffic signal system is one of the most influential. Traffic lights are ubiquitous characteristics of metropolitan areas worldwide, limiting the quantity of automobiles. The primary objectives are to improve traffic safety at the junction, maximize capacity at the intersection, and minimize delays. In order to govern signal timings, a fuzzy logic controller may utilize linguistic and imprecise traffic data. The manual control system demands a significant amount of labour. We cannot have traffic cops manually manage traffic in all sections of a city due to insufficient manpower. Therefore, a better traffic control system is required.

RESULTS



METHODOLOGY

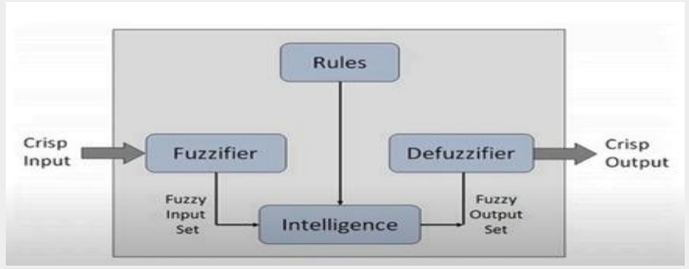
This traffic congestion may have an impact on the economy and slow down development. It also diminishes output, raises costs, and interferes with people's everyday lives. Using certain mathematical models, fuzzy technology may translate the human thought process into an algorithm for controlling the traffic flow system. In this scenario, sensors are assumed to exist at the intersection to be more realistic. Sensors are used to track the quantity of cars. In this case, our system applies fuzzy logic. Fuzzy if-then rules may be used to implement genuine regulations that are comparable to the way that traffic officers would regulate traffic signal lights.The controllers of traffic signals are required to alter the cycle period of the green light signal based on the number of arriving cars in order to optimize traffic flow and limit the average waiting time. It can regulate the lights based on the number of vehicles waiting at a red light and correspondingly adjust the timing to release or keep the vehicles. It replicates a crossroads where east-to-west and north-to-south traffic flows. There are sensors on both sides of the road. In a real-world application, these sensors would consist of embedded electromagnetic sensors.

ALGORITHM

A Fuzzy Logic-based Traffic Lights Control System is one of the possible alternative options. A reasoning strategy that matches human reasoning. Fuzzy logic imitates the manner in which people make decisions, which incorporates all intermediate possibilities between the digital values YES and NO. Fuzzy rule is a conditional statement. IF THEN statements provide the format for fuzzy rules. Below are the established Logical rules for the proposed novelty:

Rule 1: If Arrival is Few Then Extension is Zero.
Rule 2: If Arrival is Small and Queue is (Few or Small) then Extension is Short.
Rule 3: If Arrival is Small and Queue is (Medium or Many) then Extension is Zero.
Rule 4: If Arrival is Medium and Queue is (Few or Small) then Extension is Medium.
Rule 5: If Arrival is Medium and Queue is (Medium or Many) then Extension is Short.
Rule 6: If Arrival is Many and Queue is Few then Extension is Long.
Rule 7: If Arrival is Many and Queue is (Small or Medium) then Extension is Medium.
Rule 8: If Arrival is Few and Queue is Many then Extension is Short.

The Min-Max inference process and the Centroid Defuzzification approach will be used by the system to generate the crisp value for the green light period time as the outcome.



CONCLUSION & FUTURE WORK

From the foregoing project, we can infer that fuzzy logic plays a significant role in addressing large problems such as traffic jams. Fuzzy logic is superior because fuzzy systems may be developed quickly and are readily understood. We can resolve difficult challenges. The logic is solid, straightforward, and modifiable to our specifications. However, fuzzy logic could get muddled since it requires frequent logic updates. A fuzzy logic controller relies entirely on human knowledge, reasoning, and experience. These controllers are incapable of identifying deep learning or machine learning or artificial neural networks.

Based on the completed project, the difficulties include Controlling a vast number of intersections concurrently to maintain the uninterrupted flow of traffic, particularly during traffic congestion. The insertion of criteria characterizing emergency scenarios in the event of a traffic collision. The implementation of massive sensor networks using non-traditional variables (drastically changing weather, driver mood, etc.) Optimizing neural networks for traffic description and combining them with fuzzy logic. The usage of driverless robotic vehicles.

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