**Fuzzy logic based expert system to manage traffic lights**

In the world of automation where every thing can be implemented by using IOT or AI, traffic lights can also be programmed for dynamic working.

**IDEA**

Most of the traffic lights are statically programmed before setting them up. So this idea works on traffic light by checking the live status of the lanes. More the density of traffic, More time for Green signal it takes compared to other lane.

In this era, Its not too complicated to get the the live density of lanes. ML can easily do that. Following comes the main step of altering times of the lights based on all the situations.

There can be many states and Fuzzy logic does the work here where it gives the output for different states that occur. These are very helpful in controlling traffics in the larger cities.

**Design assumed for the project.**

* It is a four way junctions with roads moving in the direction N-S and E-W.
* When vehicles move from N-S then there is no movement in the E-W direction and vice-versa.
* The minimum time in any lane can be 10s and maximum can be 50s.

**Working of the model.**

In the main system there will be a system to calculate the density of the lane. Next comes the work of fuzzy.

Whenever a green signal is on, system will stay still. Seconds before the green signal of a lane is going to end the system will calculate the density and the time for next iteration will be changed accordingly.

There can be many possible states to feed in the the fuzzy logic. The different membership functions output are:

|  |  |  |
| --- | --- | --- |
| **Arrival** | **Queue** | **Extension** |
| Almost | Very small | Zero |
| Few | Small | Short |
| Many | Medium | Medium |
| Too many | Large | Larger. |

The different extension membership functions have different degree of membership based on which the time will be change.

**Example State possible:**

It the traffic from the north lane is heavy and traffic from the west is less, then the movement of traffic from morth is extended.

If the traffic from north and west is average, the there is no change.

There are many such conditions that can be formed.

**Programing language and APIs used:**

* **Python**
* **Scikit-fuzzy**
* **Tkinter**

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