Computational Logic - CS6374.002

Automated Driving System

Akshay Rawat (axr162930)

What does it do (Objective)

Design a driving system which automatically provides the actions that need to be taken from the data acquired from the sensors.

How does it work (Solution)

Using the s(ASP) system and Prolog I designed the automated system which works on the data collected from the sensors, which are presented as facts in the code. There is always flexibility to expand the system by the putting new facts and constraints which makes the system more complex and specific. The input is provided by the user which denotes the current conditions around the vehicle's environment and then the system responds by the action to take. I have four main categories types – signal, sign, left lane, right lane.

Example:

```
_sensor(A,W,T,X,B,Y) :- A @=< signal, _signal(X,Z), _decide(X,B,Y), car(Y), wipers(Ws, W), headlights(Ts, T).

%---A = type, W = weather, T = Time, X = input for type, B = intersection, Y = result ---%
```

The command '_sensor' displays different car system to operate to reach the obtained result.

Example:

```
?- _sensor(signal,rain,dark,red,_,X).

{ brakes(full), car(stop), headlights(on,dark), wipers(on,rain) }

X = stop
```

Therefore from above example if the signal is red the obtained result is stop but to reach that state the brakes are to be applied (i.e. brakes(full)). Also as it is raining and dark the wipers and headlights are switched on.

Salient features

The program is highly flexible to accommodate additional rules for expansion to a more sophisticated driving system.

As I am utilizing the Answer Set Programming system the models are easier and faster to retrieve.

If a particular data is absent the system tries to return the best fitting model possible from the available resources.

What did I learn

To simulate a working system using s(ASP) and Prolog.

Basic insight in the field of automated driving cars like Tesla, Waymo.

Challenges in designing an automated vehicle.

References -

Hackai16, [online] available: https://hackai16.devpost.com/submissions

Technology – Waymo, [online] available: https://waymo.com/tech/

Autopilot | Tesla, [online] available: https://www.tesla.com/autopilot