Prolog Implementation Report: Traffic Light Agent

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1 Introduction

This report explains the implementation of a Prolog program designed to simulate an agent's response to traffic light colors. The program uses facts and rules to determine the appropriate action based on the perceived traffic light color. The report includes the Prolog code, explanations of the logic, and test cases demonstrating the agent's behavior.

2 Prolog Code

The Prolog code consists of two parts: **facts** and **rules**. The facts define the relationship between traffic light colors and actions, while the rules determine the agent's response based on the perceived color.

2.1 Facts

The facts describe the relationship between traffic light colors and the corresponding actions.

```
% Facts: Define percepts for traffic light colors
percept(red, stop).         % Red light means stop
percept(yellow, slow_down). % Yellow light means slow down
percept(green, go).         % Green light means go
```

2.2 Rules

The rule defines how the agent determines the appropriate action based on the perceived traffic light color.

```
% Rules: Determine action based on traffic light color
action(Color, Action) :- percept(Color, Action).
% The action is determined by looking up the percept for the given color.
```

3 Explanation of the Logic

The program works as follows: 1. The **facts** define the relationship between traffic light colors (‘red‘, ‘yellow‘, ‘green‘) and the corresponding actions (‘stop‘, ‘slow$_d$own‘, ‘go‘).2.$The**rule**‘action/2‘usesthe‘percept/2‘factstodeterminetheappropriateactionforagiven$
$Forexample, ifthecoloris‘red‘, theactionis‘stop‘.3.Theagent'sbehaviorisdeterminedbyqueryingthe‘action/2‘r$

4 Test Cases

The following test cases demonstrate how the agent responds to different traffic light colors.

4.1 Test Case 1: Red Light

```
?- action(red, Action).
% Expected Output: Action = stop.
```

Explanation: The agent perceives a red light and responds by stopping.

4.2 Test Case 2: Yellow Light

```
?- action(yellow, Action).
% Expected Output: Action = slow_down.
```

Explanation: The agent perceives a yellow light and responds by slowing down.

4.3 Test Case 3: Green Light

```
?- action(green, Action).
% Expected Output: Action = go.
```

Explanation: The agent perceives a green light and responds by going.

5 Conclusion

The Prolog program successfully simulates an agent's response to traffic light colors using a set of facts and rules. The test cases demonstrate the agent's ability to determine the appropriate action based on the perceived color. This implementation can be extended to include more complex behaviors or additional traffic light states.