Real Time Optimum Route Guidance System

Prof. Amita Meshram, Project Guide, Department of Computer Technology, Yeshwantrao Chavan College of Engineering Nagpur, India
Shubham Mendhe, Student, Department of Computer Technology, Yeshwantrao Chavan College of Engineering Nagpur, India
Vivek Darekar, Student, Department of Computer Technology, Yeshwantrao Chavan College of Engineering, Nagpur, India
Prashant Bansod, Student, Department of Computer Technology, Yeshwantrao Chavan College of Engineering Nagpur, India
Rahul Mandhalkar, Student, Department of Computer Technology, Yeshwantrao Chavan College of Engineering, Nagpur, India

ABSTRACT

A route guidance system is a routing system that provides instructions to drivers based upon “optimum” route solutions. Dynamic route guidance (DRG) system would route drivers using the current traffic conditions such as congestion and maintenance of road. This system can provide actual routing advice to the driver in the real-time traffic conditions and incidents of the traffic network. A DIJKSTRA algorithm is used in this, which use to replace the crisp ratios to present the weights of pair wise comparison which reduces complexity in network. DIJKSTRA algorithm can handle the vagueness and uncertainty of the attributes and adaptively generate the weights. Based on the DIJKSTRA algorithm, a system is implemented on the route guidance system and process is analyzed.

I. INTRODUCTION

Dynamic route guidance (DRG) system [6], [8] would route drivers using the current traffic conditions such as congestion and maintenance of road. This system can provide actual routing advice to the driver in the real-time traffic conditions and incidents of the traffic network.

It presents and analyses an efficient solution to the vehicle routing problem based on real-time information [10]. This approach consists of solving a sequence of optimization problems, where it takes into account different parameter like cost, traffic density, and current intersection timing. Based on the detailed analyses of characteristic of the optimum path and real-time limitation of traditional algorithm, in this DIJKSTRA algorithm is used to overcome this problem. The main work is to realize optimum route guidance system based on analytical hierarchy processing using DIJKSTRA algorithm for real time traffic information.

Such a system would be particularly useful when accidents and construction or maintenance occurred on roads. Also, the system is highly beneficial to the driver when driving in unfamiliar areas. Dynamic route guidance (DRG) [9], [11] system using model would act as the driver’s assistant and try to reduce his tension.

The System aims towards modifying the conventional navigational systems, and develop a newer, more efficient, optimum route calculation system using an algorithm that utilizes various real time parameters while generating this result. Thus, the most optimum route at that particular instance, considering parameters like Traffic density and Traffic Clearance Rate is computed, which is much more accurate and optimum as compared to those generated by existing systems.

II. LITERATURE SURVEY

In 2014, Caixia Li, et. al Ray introduced analytical hierarchy process (AHP) using a fuzzy inference technique based on the traffic information for dynamic route guidance system, but it only consider two parameters cost and traffic density. It reduces complexity and timing delays to an extent as compare to traditional methods. It uses Rule-based fuzzy systems which are based on fuzzy theory, with expert knowledge represented explicitly using a set of fuzzy if-then rules [1].

In 2013, T.Shanmuga priyal, Mr.N.Kamalraj2 proposed a Balanced Path Routing and Detection Mechanism for Wireless Sensor Network. It suggested the capabilities of Enhanced Dijkstra algorithm as a comprehensive tool for decision-making. a new form of Balanced Path Routing technique is used in which the data send from source node is being transferred to the alternate node and then pass through the nodes to reach the destination. This prevents cuts in between the nodes and gives prior estimation of the shortest route path from source to destination [2].

In 2014, N. Pushpalatha1, Dr.B.Anuradha2 gives the Shortest Path Position Estimation between Source and Destination nodes in Wireless Sensor Networks with Low
Cost. a Dijkstra’s algorithm which uses the connectivity of information, the estimated distance information among the sensor nodes and find out the Shortest Path Position Estimation between Source and Destination nodes in Wireless Sensor Networks with Low Cost[3].

In 2011, Feng Zeng, Lan Yao, Zhigang Chen, Huamei Qi propose A Distributed and Shortest-Path-Based Algorithm for Maximum Cover Sets Problem in Wireless Sensor Networks[4].

III. PROPOSED SYSTEM

The proposed systems detects the traffic density and traffic clearance rate parameters and are monitored at each road via sensors and send to the microcontroller which it sends to the route guidance system, then the system generate the optimum path for the given destination. Possible development of an intelligent traffic re-routing system via traffic signal manipulation based on Real Time Traffic Density Analysis via OUR DEVELOPED SENSOR NETWORK. Thus, Traffic can be INTELLIGENTLY CLEARED, and with further enhancements, can be RE-ROUTED. The system can also provide Advances in detection, Monitoring and control systems, Multiple uses of detection, Open data systems covering the road, control centers and control software, Surveillance systems, System architecture and system integration, Use of probe vehicle data, computer vision, Video tracking.

IV. WORKING

The working of this system starts with the IR sensor[7], [12] which senses the traffic parameters like traffic density and traffic clearance rate and it passes to microcontroller and the microcontroller pass this data to the navigation system i.e. the route guidance system, it generate the different paths according to ranks, the 1st rank given path is selected which is the optimum path. The block diagram of system architecture is shown in Figure 1.

V. HARDWARE WORKING

In this Creation of Dummy City Map[5] and display the traffic density and traffic clearance rate in LCD. A wheel(represent number of cars in one wheel) is connected to DC motor by which it revolves, IR sensors detect traffic and thus traffic density and traffic clearance rate are determine in Real time. power supply is given to the system, then the wheel(represent number of cars) moves and the sensor detect the each car and distance between them and this data is send to the microcontroller. The traffic density and traffic clearance rate is calculated according to code, then microcontroller send the data i.e. traffic density and traffic clearance rate with the help of transmitter which convert data into packets and send it to the navigation system i.e. route guidance system.
**TABLE 1: HARDWARE COMPONENTS**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Microcontroller</td>
<td>P89V51RD2, 4K RAM, 40 pin IC, 5V, four 8 pin I/O ports</td>
</tr>
<tr>
<td>2.</td>
<td>LCD Module</td>
<td>16x2 LCD display, 16 pins, 5V</td>
</tr>
<tr>
<td>3.</td>
<td>Serial Communication unit (MAX 232 IC)</td>
<td>12V, dual driver/receiver, used as an intermediate link between the PC and the uC</td>
</tr>
<tr>
<td>4.</td>
<td>Infrared Sensors</td>
<td>Range -3cm to 15cm</td>
</tr>
<tr>
<td>5.</td>
<td>Power Adapter</td>
<td>12V, 1 amp</td>
</tr>
<tr>
<td>6.</td>
<td>Motor</td>
<td>12V, 200rpm</td>
</tr>
<tr>
<td>7.</td>
<td>Serial Cable</td>
<td>RS232</td>
</tr>
</tbody>
</table>

**Figure 2: Microcontroller inner circuit**

**Figure 3: Microcontroller with other components**
Minimum 1 GB RAM, 80 GB memory, 32 bit Operating System.

VI. SOFTWARE WORKING

Dynamic route guidance system read the data taken from sensors and from that it will generate various paths and the ranking is given to each path, ranking is decided by giving weighted to three parameters that are TD, TCR, distance and sum up this three values for each route, the least value path is given highest ranking. And path which having highest ranking is selected as optimum route. Software parts contain as follows:

- **Ride** – For writing the code, compiling and generating HEX file.
- **Flash Magic** – For transferring the HEX file into Controller.
- **.Net** – For route guidance system which generate optimum path

VII. ADVANTAGES & DISADVANTAGES

**Advantages:**
- Provides the MOST OPTIMUM route.
- Gives updated analysis of Traffic in Real Time.
- Calculates Shortest Route to a given Destination.
- Very useful for commercial drivers on an unfamiliar route who need to avoid obstacles such as low bridges, weight-limited bridges, narrow roads etc
- For long journeys, fuel stops can be planned in and printed along with the route instructions
- Time details of journey provided, helping with planned rest stops and letting people know roughly when you will arrive
- Distance details provided - helping estimate cost of the journey.

**Disadvantages:**
- Need access to the right kind of mobile or navigation device for 'real-time' guidance
- The route may not be the best or even sensible, for instance choosing the 'shortest' route may take you through extremely difficult country lanes
- The route may take you through residential streets, making it more unsafe for residents due to the extra satellite-guided traffic
- Cannot factor in delays such as temporary road works or diversions
- Maps need to be up-to-date

VIII. ABBREVIATIONS AND ACRONYMS

- DRG as Dynamic route guidance
- AHP as Analytical hierarchy process
- TD as Traffic Density
- TCR as Traffic Clearance Rate

IX. CONCLUSION

A useful routing system should have the capability to support the driver effectively in deciding on an optimum route to user preference. In this paper, an optimum route search function in a typical in-car navigation system is developed and a fuzzy approach is used to represent the correlation of the attributes with the driver’s route selection. To overcome the problem of static data, we can conclude that this real time optimum route guidance system will definitely play the key role in improving the navigation system and with the help real time data i.e. traffic density and traffic clearance rate and send this data to optimum route generator which then provide optimum route for the required destination thus it provide the optimum route to the driver for a given input destination.

REFERENCES


