Enabling Commuters to Find the Best Route: An Interface for Analyzing Driving History Logs

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Abstract: This paper describes a prototype interface design for an automobile driving history log. It allows drivers to choose the best route among several alternatives for their common trips. Recorded data includes time to complete the travel, fuel consumption, and number of stops.

Keywords: automobile interfaces, commuter log, log analysis, driving history

1 Introduction

Trucking and taxi companies equip vehicles with history keeping devices in order to keep track of the hours and mileage driven by their employees. Car mechanics can analyze automobile driving histories to facilitate the maintenance of cars. These successful histories for business professionals (Kiger et al., 1997; Sanquist et al. 1993) led us to explore uses of history information for commuters.

In this paper we focus on the design of a system to help drivers select the best route for their common commutes. Daily traffic congestion during rush hour in many big cities is a growing problem and drivers have to choose the most desirable start time and route. Every day their experience helps them plan their commute to and from work, as well as regular trips to airport, train station, shopping, friends, family, etc. However, most people rely on trial-and-error and have difficulty keeping track of the day-of-the-week or time-of-day variations among trips. Finally, people have different criteria for the best route: the fastest, the fewest stops, the best fuel savings, or lowest average speed.

Our positive experience with history systems in learning environments (Plaisant et al., 1999) encouraged us to apply them to other domains. Driving history records could also help novice drivers review their driving technique and compare their speed and trajectory with those of experienced drivers.

2 Description of the Interface

We define a commute as any regularly traveled pair of origin-destination locations (e.g. home to work, home to parents' house, work to airport, etc.). We assume an onboard navigation system with a date-time clock. Each time the car travels one of the previously specified commutes, the system records the history of that trip and updates the summary information. A privacy control would disable history logging or delete logs. Once a sufficient number of trips have taken place, the user can review the summary data on the car display or their home computer to spot patterns for travel time, fuel consumption, stop frequency, total stopped time, distance, and maximum speed. As the driver takes alternative routes for a given commute, the system keeps track of the data for each route separately.

We designed the prototype display for a touchscreen monitor with 640 x 480 pixels, a likely resolution for the next generation of car instrument panels. It has a graph (Fig. 1), map (Fig. 2), table, and change criteria display. A simple tab system allows users to change displays with one touch. Each display allows users to select the commute and the day/hours for the trip. The default initial display is a graph

showing all the recorded data necessary to choose a route for a given departure time range. The users can see the best route at the top of the list, as well as the fastest route, lowest fuel consumption route, etc.

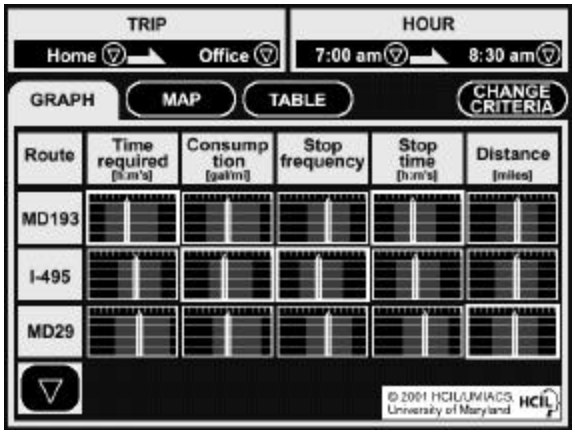

Figure 1: Comparison of routes for a commute. For each parameter, the indicators are stacked to facilitate comparison. The best route in each column is highlighted with a brighter border.

When users specify new commutes to be recorded they are asked to choose or type names for the end points of the commute (e.g. work, airport etc.). Since the location is tracked by GPS (Global Positioning System) users will most likely recognize the shapes of the routes on the map display (Fig. 2) but of course users can enter the names of the routes themselves or confirm names picked automatically from GISs (Geographical Information Systems).

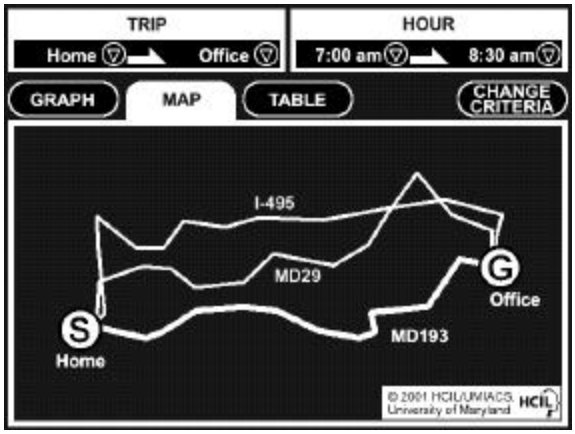

Figure 2: Map showing the three alternate routes

A third display shows the numerical values in a table. These numerical values include average, minimum and maximum values of the trips recorded till then. A click on an average value brings a table with the detail log.

3 Discussion

Since comparing repetitive events over weeks or months is difficult for most people, this system could help users in optimizing their daily commutes. Once a sufficient number of trips have been logged, users will have the data to make thoughtful comparisons and better decisions. They can choose to save time, reduce frustrating waits, conserve fuel, or reduce mileage.

Potentially, a service could accept data from multiple drivers and produce a database for all users to share, while preserving privacy. New ITSs (Intelligent Transportation Systems) can supply information from outside of the car, and accidents or road work information could be used to update the route comparison. Our prototype provides the information to choose the best route given a known start time window, but providing the best route and start time for a given commute might be possible for users with flexible work hours.

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