Supporting route choice via real-time visual traffic information and counterfactual arrival times

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Abstract

Mobility plays an integral role in modern lives, yet with the ever-expanding number of cars, traffic congestion poses various negative effects. As live traffic information is becoming ubiquitous, route recommendation systems are used to inform drivers about route capacities to avoid traffic congestion by providing the user with options to choose from a list of best possible route recommendations. Drivers route choice decisions are typically based on the route that minimizes their travel cost (e.g., travel time). In this dissertation, our focus is to explore three limitations. First, we presented a comparative analysis on the route recommendations given from four popular online map providers: Google Maps, HERE, MapQuest, and Bing Maps. Statistical analysis showed that the estimated travel times on identical routes were significantly different among the map providers. This in itself has the potential to create uncertainty in route choices and travel time variability, in addition to a decrease in the credibility and compliance with the map providers route recommendation. Second, to complement the deciding factors (e.g., ETA) in route decisions, we proposed a system called Social Vehicle Navigation. This system incorporates a secondary level of detail into the vehicle navigation system by providing usershared visual traffic information to assist in the decisionmaking process and also improve the efficacy in route determinations. Third, we introduced a rationale for counterfactual thinking in route choice, where drivers receive feedback information about the actual travel times on forgone alternatives (i.e., non-chosen routes), so that at the end of the day, drivers have the ability to exercise reinforced learning and self-assessments of their route choices. We proposed DoppelDriver, a system that offers a direct, actual travel time comparison among chosen and non-chosen routes, which determines the actual travel times from probe participatory vehicles on the non-chosen routes.