How Do Drivers Change Their Routes When Using Navigation Apps?

(STRIDE Project A: Impact of Smartphone Applications on Trip Routing and Congestion Management)

PROJECT OVERVIEW

Smartphone navigation applications (apps) such as Google Maps and Waze provide drivers with options to make informed decisions about their route. It is important to understand how these apps affect drivers' behavior as governments invest in variable message signs (VMS) and other Active Transportation and Demand Management (ATDM) strategies. In addition, several communities have attributed disruptions to typical traffic patterns and increased local cut-through traffic to the use of navigation apps.

RESEARCH GOALS

The goal of the study was to understand how smartphone navigation apps impact users' trip routing. Objectives were to evaluate (1) trip re-routing potential of route guidance apps, (2) how drivers utilize the information provided, and (3) the impact of traffic re-routing on roadway facility usage, congestion, and prevailing speeds.

Researchers conducted an interview-administered questionnaire (N=237) about preferences and behaviors related to using navigation apps and collected drivers' location data (N=27) that provided empirical evidence of smartphone routing app usage. The location data consisted of four months of Google Location History (GLH) data, collected before and after the shutdown of a bridge on I-85 in Atlanta, GA as well as one year after the incident for a control period.

FINDINGS

- Users do not use navigation apps uniformly. App users have distinct travel. patterns and app usage preferences which may lead to the unequal distribution of road and navigation app usage.
- First time trips (78%) and infrequent trips (74%) are the two most common types of trips for which drivers use apps for directions.
- A 3 to 5-minute time savings was required for users to accept a routing change.
- 46% of respondents used navigation apps for regular commute trips.
- 46% of smartphone app users follow the suggested route for at least 80% to 99% of trips and another 25% of users follow the suggested route for 100% of trips.
- The data collection process resulted in a small sample size of GLH data. Future research could include larger GLH datasets.

PRODUCT

Code for creating a website to receive Google Location History (GLH) data from participants.

IMPACT

This study is one of the first attempts to objectively quantify how drivers respond to navigation apps and rerouting information. Transportation Management Agencies can use this information to determine strategies for active travel demand management and operations to reduce congestion.
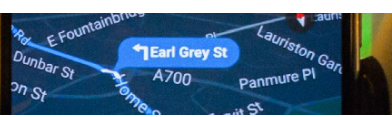
WHO BENEFITS?

Researchers and practitioners who need detailed trip location data to study travel behavior and trip routing.

RESEARCH TEAM

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PRODUCT

Code for Receiving Google Location History (GLH) Data

Google Location History (GLH) data is stored in individuals' Google accounts (if they opt in). GLH can provide large sets of historical data in a non-intrusive fashion at a fraction of the cost as compared to instrumenting individual vehicles with dedicated GPS devices.

Researchers developed code for creating a website to receive GLH data from participants. The code provides an interface that obtains informed consent from the participants, provides an easy way for the participants to obtain the necessary data from their Google accounts restricted to the period required by the survey, and a way to securely upload the data to the survey database.

The use of this tool requires participation from volunteers like any other study that involves collection of vehicle trace data. There are potential selection bias issues in obtaining data in this fashion, since the data is available primarily from users of Android smartphones. However, such issues can be resolved by obtaining a large sample of users and using subsequent screening of the data to balance the sample for demographic and other biases.

The code can be accessed on GitHub. (*navigation apps* repository by GTI-Gatech at https://github.com/gti-gatech/navigation_apps)

For more information on Project A (Impact of Smartphone Applications on Trip Routing and Congestion Management), visit the STRIDE project page.