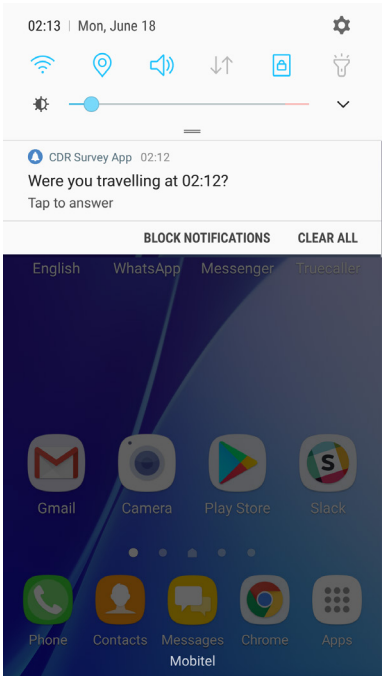
Research Feature https://doi.org/10.31705/BPRM.v2.2021.13

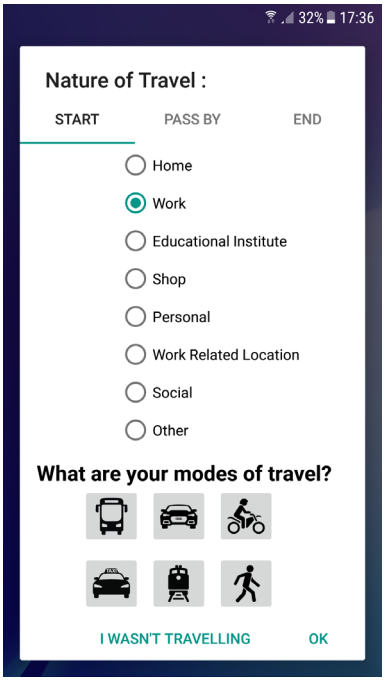
INTRODUCING A SMART PHONE-BASED TRAVEL SURVEY APPLICATION

Travel demand models, which are simplified representations of the real-world trip decision making processes, involve a series of steps that attempt to simulate complex human behaviour [1]. The travel simulation process starts by identifying the nature and location of a trip generating, captures its movement through a network of links and nodes up to the location of the trip attractor or destination [2]. The growing number of smartphone users assists in accumulating an enormous amount of individual location tracking data, which is customarily helpful for travel demand modelling. The introduction of a mobile application-based application for data collection supports in minimizing the embedded drawbacks associated with traditional data collection (Household surveys/ Roadside interviews) like higher cost, lesser frequency of conduct and most importantly, in household surveys, the accuracy of the study depends on the memory of the participant. This article aims to discuss a smartphone-based location tracking application to gather details of trip attributes made by mobile phone users such that the traditional data collection methods can be replicated.

A mobile application running on android and iPhone platforms had been developed to monitor user behaviour through cell phone localization and activity. The app is available for Android versions above API level 17, where the performance is above 94%. The app will consume only 3MB for the installation and15 MB per month during the app's running. Considering the battery consumption, only 1% of the battery will be used by the app when the mobile device is fully charged.

CDR and GPS data are voluntarily collected in a pseudonymized manner from an unbiased sample of mobile users. The application runs in the background of the phone and collects data without user intervention based on the consent given in the initial installation. This non-intrusiveness aims to reduce the app's impact on participants within their daily routine. Users can download the mobile app from the Google play store. After installing the app, users can open the app and select the preferred language where the future functioning of the app will be based. Next, the registration window will appear so that users are required to fill up the general questions. Income is marked as an optional question, as it is a highly confidential matter. After that, a notification will popup (figure 1) if the user-initiated a travel by indicating the time. Since





the GPS mechanism identifies the travel initiation, there can be instances where notifications will pop up even without an actual moment. This is due to the GPS error in specific locations. The user can provide the answer by swiping the notification. If the user were not travelling, he would select the "I wasn't" button in the window. If the user is travelling, he can fill up the other questions on origin, destination, pass by destinations and the mode of travel. Users are allowed to select multiple pass by destinations and modes of travel, as shown in figure 2.

Since GPS locations will be collected from every user with a frequency of 10 minutes, it is mandatory to switch on GPS for the proper functioning of the app. If the GPS mode is not activated in a user, initially, a notification will pop up after 10 min of app installation to activate GPS. If the GPS mode is still inactive, the notifications will be sent repeatedly at previously defined times.

Replicating manual travel surveys with a smartphone-based mobile app is the primary objective discussed above, and GPS data collection supports that with accurate location and time stamp recognition. The manual data filling of the users provides the other trip attributes. Therefore it can be concluded that this travel survey app design and implementation provide a realistic, helpful vision into the development of similar platforms and approaches for travel and activity surveys. The main drawback is the reluctance of the users to participate in the survey. The study's success is based upon the level of user involvement during the process, which is required to be motivated by awarding data or any other monetary incentive. One additional proposed benefit for the users is displaying a travel summary at the end of the day so that users can review their own travel activities.

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