

Trajectory-based POI recommendations for mobile maps

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Introduction: Providing mobile map users with relevant information about their surroundings based on their current trajectory is a necessary next step in providing them with the information they need or want without requiring direct interaction with the map, which can be dangerous or distracting, as well as time-consuming and annoying. Providing these recommendations requires integrating spatial information from the mobile device's GPS chip with attributes about the underlying map and point of interest (POI) data, as well as the preferences and goals of the user. The Flyover Country app provides a relatively contained test case for the development of predictive software for recommending current and upcoming POIs during travel.

The app: The Flyover Country mobile app provides users with information about the landscapes they're passing as they fly, drive, or even hike across our planet. It sources information, maps, and data about the natural world from scientific databases, and visualizes that content in a map-based interface. Funded by the National Science Foundation of the United States, the app has gained a broad user base with over 280,000 downloads as of December 2019. Traditionally, users of the app explore the map interface and select items as they travel, with no hierarchy or recommendation about which of the many features displayed are the most interesting or relevant. To provide recommendations for users, and to better surface the most valuable content on the map, a spatial algorithm taking into account the location, speed, altitude, and heading of the user, in concert with attributes associated with the content is being developed to rank nearby and upcoming POI and present them to the user.

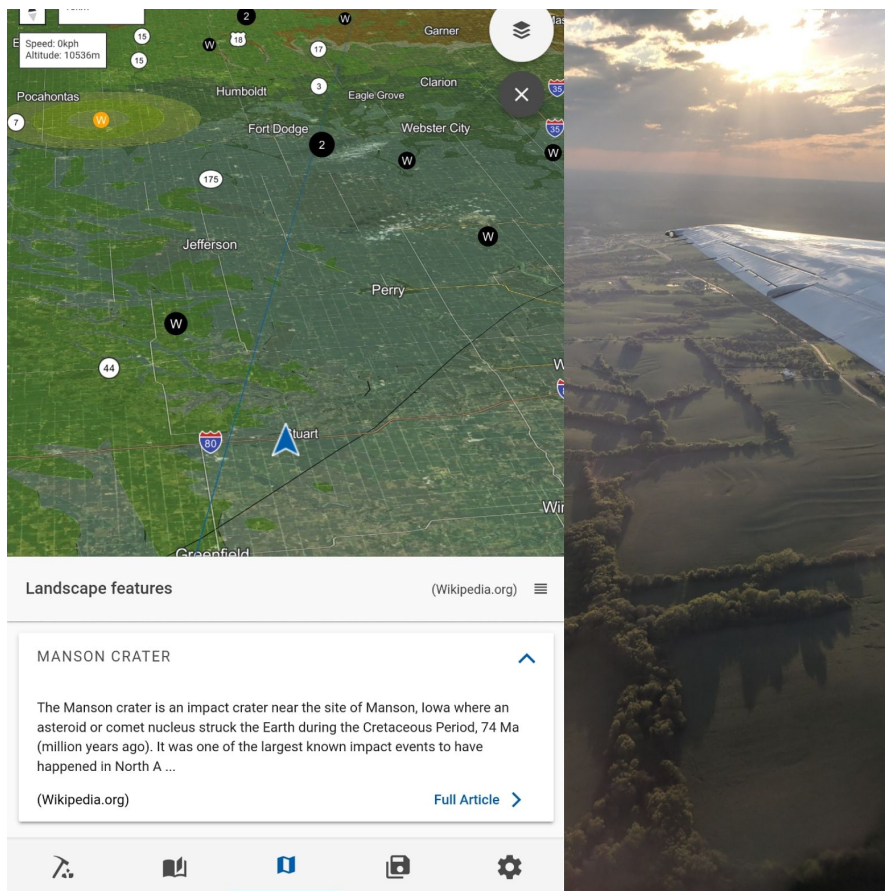


Figure 1. Screenshot of the Flyover Country mobile app showing an upcoming feature.

Methods: The extent of the current map view can be calculated and this extent can then be used to isolate the currently visible map features. Once this extent has been calculated, the speed, heading, and location of the user are used to further rank the relevant features. Features are categorized as relevant that are calculated to be immediately visible, either coincident with the user's current location, or within the use case of an airplane window seat, visible directly outside the window which the user is currently sitting (left or right side of the aircraft). Finally, a list of prominent upcoming features are distilled from the overall group based on their position relative to the current direction of travel of the aircraft, vehicle, or hiker (future work may tackle predictive recommendation based on road or trail routing).

Incorporating attributes of the available POI data into the calculations is an ongoing challenge. For example, a POI that is most relevant based on spatial considerations may not be the POI most interesting to the user (e.g. when flying past Yellowstone National Park, it is likely that it should be ranked the highest for relevancy, even if others are more immediately spatially correlated based on the user's trajectory). Accomplishing this requires a flexible input to the recommendation algorithm, allowing for different attributes to be used for different types of data. Currently, we are using article length as a proxy for 'interestingness' in this capacity, but are exploring other attributes and the potential for integrating user feedback systems.

Conclusion: POI recommendations are an important part of many mobile mapping applications and a clear next step is incorporating user trajectory data into the recommendations. Flyover Country provides a straight forward test case of an early implementation of trajectory-based POI recommendation for mobile maps.