Factors Influencing Map-Checking In Pedestrian Navigation and Checking Points Prediction

Zhengfang Xu

1 Concept

Pedestrian navigation is indispensable for promoting safety, efficiency, and accessibility in urban environments. Mobile maps play a vital role in pedestrian navigation by providing users with dynamic, real-time information and guidance. Studying how to enhance pedestrian navigation in mobile maps is therefore highly meaningful.

Recent years have seen increased research in optimizing pedestrian navigation on mobile maps. In terms of interface design and human-computer interaction, Semi-Automatic Zooming has been proposed and proven to outperform existing multi-touch and Speed-Dependent Automatic Zooming methods [1]. In navigation information needs, landmarks have been proven to be the primary information elements used to provide direction and route guidance to pedestrians during the navigation process [2]. The method of embedding salient landmarks into Pedestrian Navigation Systems has been proposed and successfully applied in indoor environments [3]. In various pedestrian navigation systems, information prompts are highly useful for helping pedestrians confirm they are on the correct route, thereby enhancing confidence in wayfinding [2]. However, in today's pedestrian navigation systems, such information prompts are often set according to fixed parameters (such as providing a turn prompt when a certain distance from the turn). Due to differences in individuals' spatial cognition and route memorization abilities, these fixed prompts cannot meet the needs of different map users. This leads to individuals with weaker spatial cognition having to frequently check the map, while route prompts are unnecessary for those with stronger route memorization abilities. Therefore, understanding the map-checking points people use during wayfinding is significant, as it provides an important foundation for the design of pedestrian navigation prompts. Moreover, in the era of big data, exploring how mobile maps can offer customized navigation alert settings based on individual user data is one of the key future directions for mobile map development.

Based on this research gap, this study formulated three research questions:

1. What are the trajectory factors that influence when and where pedestrians check the mobile map during walking navigation?

2. What are the differences in map-checking behavior between high and low traffic density environments?

This study will utilize experimental data from virtual reality, where virtual reality experiments can significantly contribute to map research [4][5]. For this study, designing virtual reality experiments can better capture participants' map-checking behaviors, while also enabling control over variables such as traffic density in the environment (which is difficult to control in the real world). This data includes participants' interactions with mobile maps during navigation, route trajectories, and other important parameters.

References

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