Experiences of mobility in the Global South: Lessons from People with Visual Impairments in India

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ABSTRACT

Mainstream navigation technologies like Google Maps are playing an increasingly important role in enabling people get out and about. This includes people with visual impairments, especially those in the Global South for whom these smartphone driven apps play a central role in navigation, given their otherwise limited access to specialized assistive technologies (AT). However, in their current state, these apps do not account for context and the specific needs of people with visual impairments in the Global South which makes them difficult to use. Drawing from preliminary findings examining the ride-hailing practices of people with visual impairments in India, we begin to highlight the inability of Google Maps to adequately cater to people with Visual Impairments. Subsequently, we wish to use the workshop space to examine how these inadequacies can be better understood and factored in to building more accessible and usable mainstream navigation apps.

KEYWORDS

accessibility, navigation, global south

INTRODUCTION

Prior work in accessibility has traditionally focused on Global North settings. Recently, though, there has been an increasing interest in accessibility concerns in the Global South. However, 'navigation' - a long-standing accessibility problem - has remained mostly unexplored in this specific context. We, the Palpable Research Group at the University of Michigan School of Information, want to tackle this problem space by understanding how everyday mainstream technologies like Google Maps, which play a central role in the mobility of people with visual impairments in the Global South, can be better designed to cater to their needs and suit the specific context. In this light, we see this work extending both 1) prior work investigating technology use by people with disabilities in the Global South, for instance [3, 7] and 2) recent work examining social concerns of people with disabilities and their use of mainstream technologies (as opposed to AT), for instance, [6]. Specifically, the research questions that we consider are:

(1) RQ1: What are the inadequacies of mainstream technologies like Google Maps in relation to their use by people with visual impairments in the Global South?
(2) RQ2: How can the same technologies be better designed by taking into consideration these inadequacies and some of the unique contextual factors that shape Global South settings?

METHODS

Our research questions are informed by a qualitative study examining the ride-hailing practices of people with visual impairments in metropolitan India [2]. Primarily used in the context of hailing

cabs, Google Maps is central to the daily functioning of people with VI. Participants spoke at length about how these maps, both in the context of ride-hailing and elsewhere, were inaccessible and mostly unusable. These observations inform our preliminary findings (see below) and provide a partial answer to RQ1. We think that answering both research questions outlined above will warrant a combination of qualitative, quantitative and design research methods. Qualitative insights will help us gather rich, in-depth narratives that will answer RQ1, quantitative data will provide broader and more generalizable results (informed by qualitative insights or vice-versa) that can ultimately guide the design and subsequent evaluation of technology interventions which will help answer RQ2.

PRELIMINARY FINDINGS

Technology Infrastructures

Technology infrastructures in the Global South, characterized by weak GPS signals and inaccessible maps, are barriers to navigation for people with visual impairments in these settings. Here, GPS signals are relatively weak and are often intermittent. This poses challenges to people with visual impairments for whom precision of navigation information is important for enabling them to reach the desired destination. In a recent ride-hailing study, we noted that weak and inaccurate GPS signals often resulted in cabs being parked a few meters away from the actual pick up location and in cab drivers dropping people off at incorrect destinations [2]. Thus, there is a need to explore ways which can take into account GPS in its current state in countries like India and to design in order to cater better to people with visual impairments. Google Maps are also inaccessible to screen readers. This inaccessibility is exacerbated by the relative lack of addressing of maps in India which makes picking precise residential locations difficult as they are unavailable and similar addresses are often hard to distinguish. The question then becomes: how can these limitations be factored into designs of future versions of Google Maps to make them more accessible and usable by people with visual impairments?

Urban Spaces

Navigation technologies like Google Maps attempt to offer a visual representation of urban environments, which are structured and organized differently in the Global South than elsewhere. For instance, the grid layout around which much of the urban landscape is organized in the Global North does not necessarily apply to the Global South. Further, cities and towns in the Global South, including in India, are significantly more crowded than those in the Global North, making navigation and mobility a challenge for people with visual impairments. This is exacerbated by the lack of accessible sidewalks, which are often unavailable or broken. In addition, in many locations, sidewalks are crowded by street vendors and their customers. Additional physical obstacles may include stray animals, house windows opening on the streets, trees and stray branches, and etc. Further, these obstacles are transient in

Figure 1: A crowded sidewalk in Delhi, India

nature, and their presence may change on a daily basis. The busy, overcrowded and obstacle-laden nature of Indian urban spaces therefore pose additional challenges for blind and visually impaired pedestrians. Crowds are also a problem for public transportation, which is critical to the mobility of people with visual impairments. In large parts of the Global South, including in India, public transportation can be chaotic. In many locations, buses and trains far exceed their intended capacities, making them inaccessible [4]. In their current states, maps and navigation apps do not take into account these accessibility issues, thereby leaving out vital cues for people with VI navigating urban environments.

Socio-cultural factors

It is understood that design must account for unique socio-cultural factors which shape and define the contexts in which technologies exist. This prescription should apply to apps like Gooogle Maps. Here, one must understand the cultures of disability unique to the Global South, and how culture shapes people in their daily lives and their interactions with technology. For instance, prior work has identified independence and safety as two important features for navigation technologies intended for people with disabilities, including those with visual impairments [1]. Ideas of independence have long been equated to 'self-reliance' - the ability to do things on one's own without external help [5]. Recent work, though, has begun to challenge this notion and to uncover how these ideas of independence are complex, nuanced, and situated, shaped by larger socio-cultural factors. In our ride-hailing study we found that people with VI were mostly willing to accept help from others, especially cab drivers, to accomplish their transportation goals. Furthermore, we found that accepting help did not impinge upon their idea of 'independence' [2]. Likewise, we believe notions of safety, too, are subjective and set in context, shaped by aspects of the urban environment and socio-cultural factors including attitudes towards people with disabilities. There is a need to understand how these two values can be factored into the design of apps like Google Maps, especially given their centrality to navigation.

WORKSHOP GOALS

We want to use the workshop space to better understand the current state of research at the intersection of navigation, accessibility and Human-Computer Interaction. Further, we hope to brainstorm ideas pertaining to research, obtain feedback about our insights and research questions, and seek guidance from senior researchers about ways forward. Potential areas of focus include methods we can apply to gather relevant data and ways to translate research findings into designs that can positively impact people with visual impairments in the Global South.

RESEARCH GROUP

Vaishnav Kameswaran is a second year Ph.D. student and is interested in understanding the relationship between technology use and independence as experienced by people with visual impairments.

Maulishree Pandey is a first year Ph.D. student interested in understanding and designing educational technologies for people with visual impairments.

Josh Guberman is a first year Ph.D. student broadly interested in the relationships between (in)accessible technologies and personal and interpersonal wellbeing, particularly within educational contexts.

Hrishikesh Rao is a first year Ph.D. student interested in accessibility of system interactions and feedback. He has previously worked on complex data visualization and manipulation applications on full page refreshable braille displays.

Sile O'Modhrain is an Associate Professor at the University of Michigan - School of Information where she leads the Palpable Research Group. Her research focuses on human-computer interaction, especially interfaces incorporating haptic and auditory feedback.

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