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INTEGRATING USER-CONTRIBUTED GEOSPATIAL DATA WITH ASSISTIVE GEOTECHNOLOGY USING A LOCALIZED GAZETTEER

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We present a methodology for using cartographic-based processes to alert the vision-impaired as they navigate through areas with transitory hazards. The focus of this methodology is the use of gazetteer-based georeferencing to integrate existing local cartographic resources with user-contributed geospatial data. User-contributed geospatial data is of high interest because it leverages local geographic expertise and offers significant advantages in dealing with hazard information in real-time. For blind and vision-impaired people, information about transitory hazards encountered while navigating through a public environment can be contributed by end-users in the same public environment, and quickly integrated into existing cartographic resources. For this project, we build collections of user-contributed geospatial updates from email, voice communication, text messages, and social networks. Other necessary technologies for this project include text-to-voice software, global positioning devices, and the wireless Internet. The methodology described in this paper can deliver usable, cautionary reports of hazards, obstacles, or other time-variable concerns along a pedestrian network. Using the George Mason University campus as a study area, this paper describes how transitory events can be presented in usable form to a vision-impaired pedestrian within a usably short period of time after the event is reported. Buildings and other destinations of interest can be registered in a robust, eXtensible Markup Language (XML)-based, localized gazetteer. Walking networks, parking lots, roads, and landmarks are mapped as vector-based digital information. Any events or changes to the base map, whether planned and disseminated through official channels or reported by end-users, can be linked to a location in the network as established by the attributes cataloged in the localized gazetteer, and presented on an existing base map or in an assistive technology environment. For mobile applications, a vision-impaired pedestrian with a Geographic Information System (GIS) and a Global Positioning System (GPS)-enabled assistive device can receive an alert or warning about proximity to reported obstacles. This warning might include other information, such as alternative paths and relative directions to proceed, also referenced through the localized gazetteer. This research provides insight into challenges associated with integrating user-contributed geospatial information into a comprehensive system for use by the blind or vision-impaired.