Introduction to Digital Nonvisual Maps

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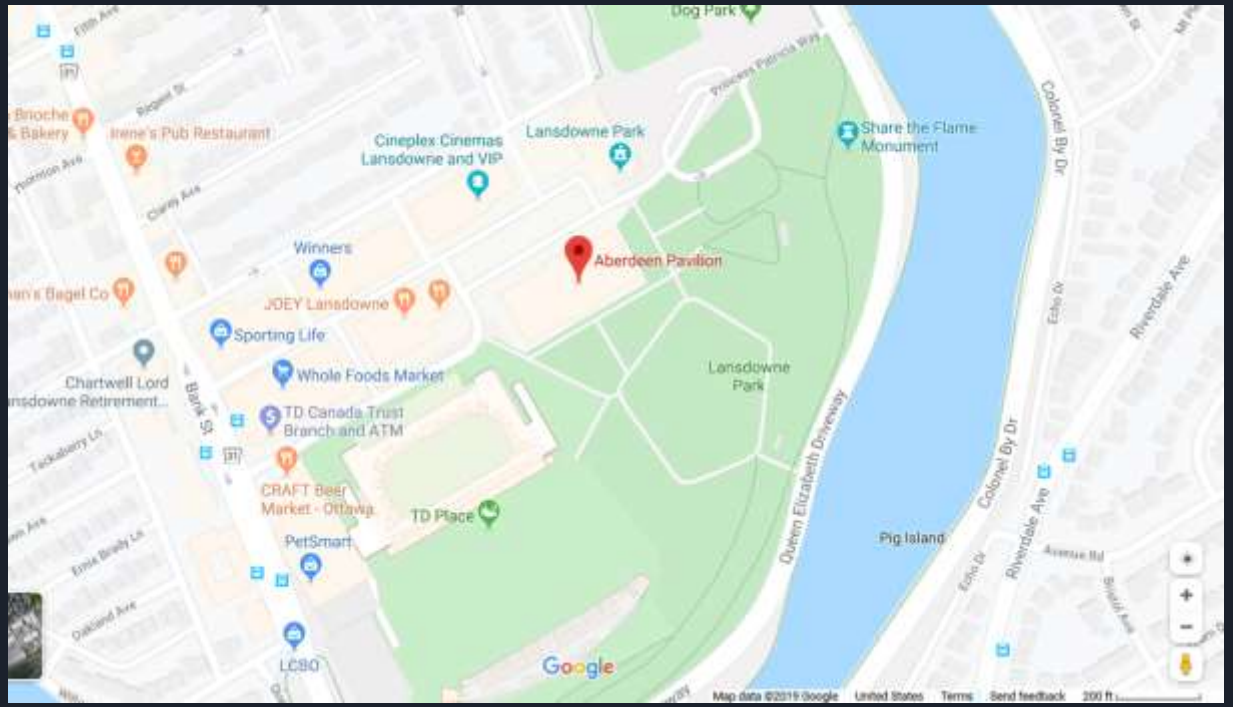
Most Web Maps Today…



Problem

- Digital maps from Google, ESRI, Leaflet, and other places have always been made completely visual
- Text descriptions are the "accessible" alternative to visual maps, but why have a map if text is the same?
- Text does not give critical spatial information present in the visual map
- There are at least 285 million nonvisual users in the world

Commonalities Between Nonvisual Maps

- All features in a dataset have a "name" attribute
- All systems use collision detection
- No system works with only a point to label an empty space with walls (use a polygon instead)

Vibro-audio maps (VAMs)

- Use vibration and text to speech to represent geometries
- Are used on a touchscreen
- Vibrate when the user touches a line on the tablet
- Announce when the user enters a polygon

Vibro Haptic Map References

Giudice, N. A., Palani, H. P., Brenner, E., & Kramer, K. M. (2012, October). Learning non-visual graphical information using a touch-based vibro-audio interface. In Proceedings of the 14th international ACM SIGACCESS conference on Computers and accessibility (pp. 103-110).

Poppinga, B., Magnusson, C., Pielot, M., & Rassmus-Gröhn, K. (2011, August). TouchOver map: audio-tactile exploration of interactive maps. In Proceedings of the 13th International Conference on Human Computer Interaction with Mobile Devices and Services (pp. 545-550).

Digital Auditory Maps

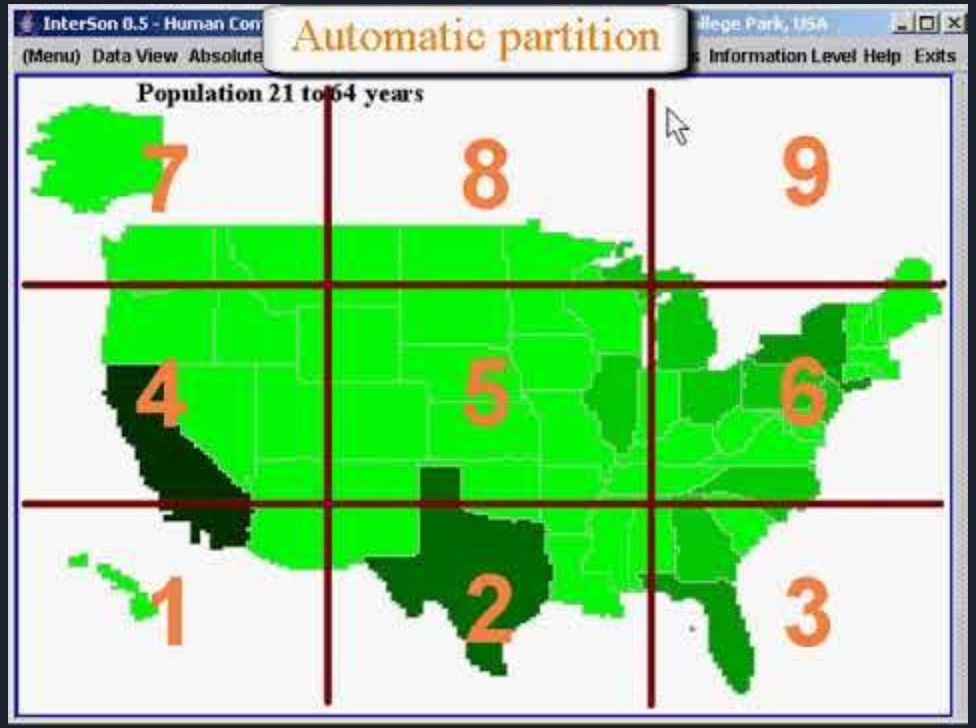
- Use binaural audio (and other auditory properties) along with sounds, and text to speech to represent data
- Are Interactive and controlled through keyboard and touch screen

City Map Example

City Map References

1. Loeliger, E., & Stockman, T. (2014). Wayfinding without visual cues: Evaluation of an interactive audio map system. Interacting with Computers, 26(5), 403-416.
2. http://team.sourceforge.net/

Heatmap Example



Heatmap References

1. Zhao, H., Plaisant, C., Shneiderman, B., & Lazar, J. (2008). Data sonification for users with visual impairment: a case study with georeferenced data. ACM Transactions on Computer-Human Interaction (TOCHI), 15(1), 1-28.

2. http://www.cs.umd.edu/hcil/iSonic/

Enclosed Space Map
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Enclosed Space Map References

1. Biggs, B., Coughlan, J. M., & Coppin, P. (2019). Design and evaluation of an audio game-inspired auditory map interface. In Proceedings of the... International Conference on Auditory Display. International Conference on Auditory Display (Vol. 2019, p. 20). NIH Public Access.

2. https://xrnavigation.io/audio-map-examples

Thank you!

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