Transit Trails: visualizing public transit congestion

We will use historical Seattle public transit congestion data from OneBusAway (Ferris 2010) to power an interactive visualization of bus effectiveness across city of Seattle, compared between different times of day and days of week.

Historical OneBusAway Data

We have available several years of historical OneBusAway data, with congestion and route information over time. This will enables us to display real data and ask a variety of questions as part of both the design and the evaluation process. For example, because we have access to historical data, we can support questions comparing weekend to weekday; various hours during the day; and, furthermore, the effect of cuts, such as the 17% transit cuts which took place last November (Seattle Transit Blog 2013).

It is beyond the scope of this project but a possible follow-up to make available comparisons between historical and real-time congestion data, or even to put in other data sources (eg, census data) to enable the display of transit effectiveness relative to socioeconomic distributions across the city. It could even be possible to compile and present congestion data for snow days and game days (i.e., any day where congestion affects regularly-planned schedule times), when OneBusAway is notoriously ineffective and misleading, as a way of addressing a major pain point for OneBusAway users. While all these possibilities are certainly exciting, we will focus this project on the core visualization challenge described below.

Visualization Goals and Challenges

The goal of the final visualization is to support understanding of congestion patterns, especially how they change throughout the course of a day; week; or in response to bus route changes. This problem is two-fold: (1) display congestion of many bus routes in an understandable manner; and (2) present this congestion information in a way that enables comparison.

Our current sketches focus on various kinds of trail overlays over a map A trail for an individual bus encodes congestion in either color (option A: map hue onto lateness; option B: map hue onto *relative* lateness, so if a bus has delayed by 5 minutes to a particular stop but continued without trouble, only that part would be red) or a textured dot animation. We are envisioning supporting comparison by showing multiple maps (weekend; weekday-rush; weekday-nonrush), subject to brushing and linking highlighting interaction, as well as searching for and highlighting individual busses. Interactivity would be used here to reduce the amount of trails shown for more accessibility to the congestion data displayed.

Existing traffic visualization

There are many related projects in the space of communicating transit accessibility. The urban data (urban-data.herokuapp.com) visualization displays an animated visualization of bus routes and demands (denoted by passenges-in and passengers-out) for a given route and a given day.

Our work, in contrast, will aim to display routes more compactly for a more effective overview, and enable comparison.

In order to better evaluate the convenience of living in a specific place, Brandon Martin-Anderson et al computed transit scores (bmander.com/portofolio), besides walk scores (Carr et al 2010) and bike scores. By taking into account of the distance to the nearby public transit stops, the frequency and type (rail, bus, etc.) of transit routes, they calculated a normalized transit score for each specific location on the maps of five U.S. cities, where public transit data is available. While transit score can help real estate agencies and normal people find places and neighbourhoods they love, it fails to consider a finer-grained traversability of multiple locations through focusing on one specific point on the map. On the daily basis, people need to commute from their homes to workplaces and other places to have fun. As it is, for Seattle, very little distinction is made between neighborhoods, as the analysis is too coarse ("do busses go here?") - we will focus on highlighting actual traversability of Seattle by making transit trails visible ("where else can I get from here?").

Team Roles and Milestones

We will collaborate on all parts of the process, but each of us will particularly focus on the following areas: Caitlin: data wrangling; Camille: design; Yi: evaluation; Katie: communication

- 2/27 - literature review + design/storyboarding round #1 done
- 2/28 - get feedback on storyboards/design sketches from ~5 users, do round #2
- 3/6 - implementation done
- 3/10 - finish a comparative evaluation of different means of visually encoding bus routes overlaid with congestion data over time peaks
- 3/13 - presentation

References

B. Ferris, K. Watkins, and A. Borning, "OneBusAway: results from providing real-time arrival information for public transit," in Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2010, pp. 1807–1816.

B. Ferris, K. Watkins, and A. Borning, "OneBusAway: A Transit Traveler Information System," in Mobile Computing, Applications, and Services, Springer, 2010, pp. 92–106.

Seattle Transit Blog. "A Closer Look At Metro's Cuts: Seattle and North King County." Nov, 2013. Accessed Feb 2014. http://seattletransitblog.com/2013/11/08/a-closer-look-at-metros-cuts-seattle-and-north-king-county/

L. J. Carr, S. I. Dunsiger, and B. H. Marcus, "Walk score™ as a global estimate of neighborhood walkability," American journal of preventive medicine, vol. 39, no. 5, pp. 460–463, 2010.