Project Description: Andrew Stevenson's CTRAN Project

OBJECTIVE

In coordination with two other groups, I plan to develop a system to enhance C-Tran transit bread crumb sensor data by adjusting its GPS coordinates to match corresponding bus route coordinates. Using both quantitative and qualitative indicators, my objective is to flag for human readers the trips that deviate most from the assigned route.

APPROACH

C-Tran monitors its vehicles with a wireless sensor network that collects Global Positioning System (GPS) coordinates of each bus every 5 seconds yielding nearly 500K sensor readings (known as bread crumb readings) every day. The bread crumb data tends to be noisy. We will each identify and measure deviations in bread crumb readings by comparing each sequence of readings (each trip) to the static, known latitude and longitude coordinates of each bus's corresponding route.

Next I will devise an ordinal characterization scheme for describing and sorting the list for a human reader. Most likely two or more candidates will need to be explored. As a final stretch goal, we will seek to combine our individual efforts in to a web-based map that can be explored by analysts to inform future decisions.

TEAM STRUCTURE

My "team" includes only one person. In contrast, the working group consists of three teams—mine, a team working on deeper analysis separating intentional deviations from noise, and a third team calculating "enhanced" trips that attempt to calculate the actual path followed by the bus. Finally, our working group includes Bruce Irvin as an advisor.

PROJECT MILESTONES

1. Exploratory Analysis (Week 3) – Answer a list of questions about the shape, format and quality of the underlying data.
2. Understand and devise a common schema and technology stack within our working group. (Week 3)
3. Measure Breadcrumb Deviations (Week 4) Each team will compute deviations separately, then we will meet and agree on the best approach.
4. (Week 5/6) Devise one or more deviation metrics, and choose which ones go in to final production.
5. (Stretch) Host a web tool allowing us to explore the results of our working group's efforts.