Implementation Project Midpoint Report

Andrew Stevenson

UPDATES TO PROJECT OBJECTIVE, PROJECT APPROACH, AND TEAM STRUCTURE

I have no updates to make to my project objective, approach, or team structure. My milestone schedule is slipping only very slightly; see 'MILESTONES' below for more information.

REVIEW YOUR OBJECTIVE, APPROACH, TEAM STRUCTURE

The following information is reproduced from my project description document.

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.

REVIEW YOUR MILESTONES

The following is reproduced from my project description document.

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.

The first milestone was successfully reached on time—the code exploring the data can be found in explore.py under the src directory.

The second milestone goes hand-in-hand with the first. (Milestone #2 is arguably not a milestone at all, since we do not actually have a way to pin down what "understand" means in this project's context.

The third milestone is not yet complete, and it is already week 5. I expect it will be complete by the end of the week, so it is fair to say as of this point we are one week behind schedule. Fortunately, there is plenty of padding planned into the delivery schedule, so I do not expect the final delivery date to slip.

Note that the third milestone requires me to have devised an algorithm, which will subsequently be implemented. The algorithm itself is written up and available through the readme file on the github website.

The fourth milestone will take place during weeks 6 & 7, as a result of the single week of schedule slippage.

The fifth, stretch, milestone may not take place at all during the term—that's perfectly acceptable as it is a stretch goal and not at all anchored to the other milestones.

CONCLUSION

Overall, I am one week behind where I'd hoped to be, but it is no significant problem at this time because I have extra days planned into the schedule as padding. No other changes to the plan have emerged during the exploration phase, and I expect to make a great deal of milestone progress over the next two weeks.