

Open House Route Planner

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Abstract: Consectetur sit aliquip pariatur anim et proident nisi mollit labore exercitation sunt exercitation fugiat.

1 Introduction

1.1 Motivation

I have been looking for houses. When I add open houses to my Google Calendar, I am able to request direction to whatever house is open next in time, but I was thinking

Over the last year, I had been looking for a house and was trying to visit as many open houses as I could. So the question became, *“What if two houses are significantly far apart, open at similar times, and there are other houses in each of their respective neighborhoods that open at different times? Is there a way I can plan my day of house hunting so that I can attend all of the open houses?”* The answer to this question is, “yes, within reason.”

1.2 Objective

Given a series of open houses the application should find routes that will allow the user to visit the maximum number of open houses given the constraints of *travel time* and *when the open houses are open*.

After phrasing stating the problem, the problem was divided up into several part:

- where the houses were with respect to each other,
- when the open houses were,
- and try to determine the path I needed to take to visit as many open houses as possible.

I will describe how each of these tasks were accomplished and what other work needed to be done to facilitate that work.

2 Requirements

As with most projects, a bit of legwork is involved before even starting the main problem. Before routes can be derived from the data, we need to know

- what kind of data the system will accept,
- what kind of ETL (Extraction, Transformation, and Loading) processes will need to occur,
- if/how there data will be cached,
- and how might we will we compute routes?

2.1 ETL

As for the first three points, the following describe what kind of data the program accepts, its transformation, and how there data is cached.

2.1.1 Extraction

Data extraction was performed manually as it seems that many realestate sites did not want to hand over data programatically; or if they did the purchase of an API key was required. The data used for this project was sourced from Trulia[8] in the form of ICS files[4].

2.1.2 Transformation

Open House data is typically provided with in a human readable format with an address written like “100 Seymour Ave, Utica, NY 13502” and times provided in the form "10AM to 12PM." These forms of data need to be handled somehow. Luckily, when downloading calendar data the time data comes in ISO 8601 Notation (*i.e.*, `yyyymmddThhmmssZ`).

That just leaves the address to be *geocoded*; the process of converting addresses to a coordinate system. The ArcGIS Developer API provides an easy way to geocode address data. This process will be described in the section 3.1 along with all the other transformations required to consistently gather and use data.

2.1.3 Loading

To avoid having to query the ArcGIS API repeated and spending the credits that was required[3], the data is stored in a MongoDB instance. This not only helps the program be more economically efficient, but cuts down on latency during testing and future delivery.

2.2 Computation

When the project was started, it was thought that Spark could be used to perform graph processing[7]. Later on, it was decided that the graphs were not going to be large enough to have to worry about optimizing the processing. A graph data structure was still used for handing the data when the time came to computing routes[1]. The vertices were given IDs,

3 Preprocessing

3.1 Geocoding

Assuming the user has found houses they wish to visit, there is some information we already have

References

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