Capstone Project
Project Description

Professor: Claudio Silva
Team name: SightWalk
Team Members: Felipe Ducau, María Elena Villalobos Ponte, Sebastian Brarda
NetIds: fnd212, mvp192, sb5518
Date: 09/29/2016

0. Motivation

Efficiency has become a cult in our society. We are always striving to do things faster, quicker, and with less cost. This is even more pronounced within the engineering and scientific community.

In this context, GPS and map systems such as Google Maps, Apple maps and Waze, are not the exception. When providing directions to a place, these systems suggest the shortest route in terms of distance and/or time. However, the fastest route is not always the most enjoyable, or the one that maximizes utility for users. The shortest path is not always the one that connects us with nature, makes us meet new people, or help us discover new places.

The goal of this project is to create a system to automatically suggest alternative routes which might take marginally more time but go through more attractive spots for the user. The main application (although not the only one) would be for tourists visiting the city. Visitors, when exploring the city, eventually need to go from point A to point B, but they do not necessarily want this trip to be optimized with respect to time, they probably want to maximize their experience while walking.

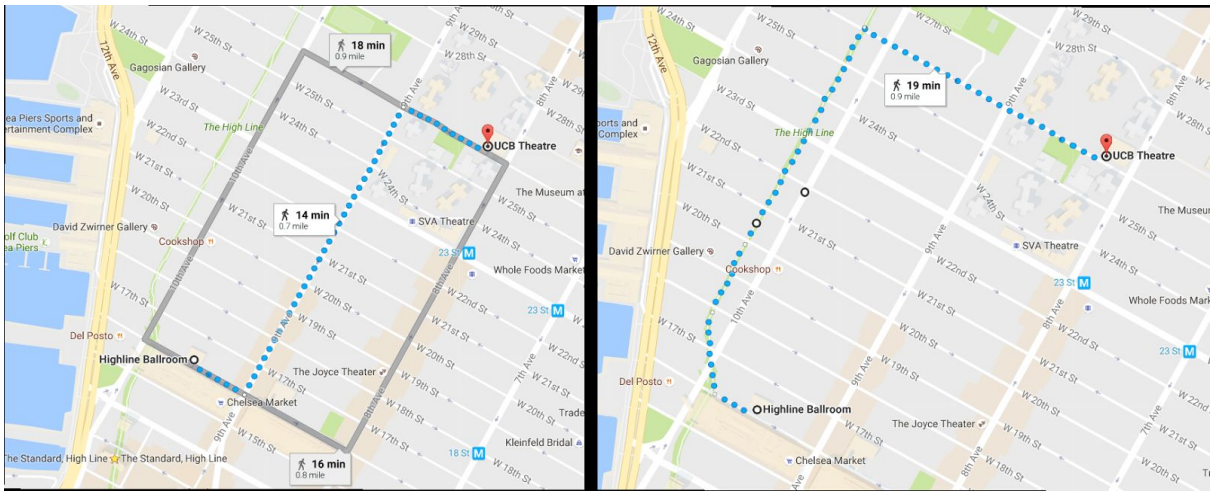

Figure 1: On the left we look at the recommended routes by GMaps to go from A to B in which the fastest route is 14 minutes (0.7 miles). On the right, an example of what we expect our algorithm to produce: go through the High Line instead which takes 19 minutes and 0.9 miles. This is a considerably more interesting path for someone wanting to maximize their experience in NYC.

1. Data

As proxy to measure how attractive a route or a spot is, we propose to use Instagram and/or Flickr geo-tagged pictures and metadata under the assumption that people are more

likely to take pictures of interesting places, such as historical buildings and distinctive spots instead of uninteresting ones.

By analyzing the amount of pictures in a place, the pictures itself as well as their metadata, we expect these to identify a mix of spots that include both touristic attractions and hidden marvels of the city. Combining this knowledge with map data from Google maps API and OpenStreetMap data we expect to be able to frame the route recommendation task as an optimization problem.

2. Our Approach

In terms of usability, the idea is to provide as many personalization tools as possible. User would be able to choose some variable constraints such as “additional time tolerance limit” and which places they are interested in going through from a set of recommendations. This recommendations will be offered in the form of “trade-off deals”. For example, we would show the picture of a specific spot and tell the user how many additional minutes it would add to their current route. User would have the possibility to add that spot to the route, or stick to the original plan.

In order to get an efficient route recommendation system, there are many dimensions of the data that we need to take into account:

- There might be places that are interesting only on some seasons. For example, the ice skating rink in the Central Park.
- We need to identify if the places of the photos are indoors or outdoors. There is no sense in altering a path because of an indoor place if the purpose of the user is just to walk from one point to another.
- One interesting feature to use in order to better understand the data is to determine if it was taken by a resident of the city or by a tourist.

To solve this issue we plan to use machine learning and/or other ad-hoc techniques for data normalization.

Even though this idea can be generalized to every city and even to routes by car, for this project we will restrict ourselves to walking paths in New York City.

References

[1] Quercia, Daniele and Schifanella, Rossano and Aiello, Luca Maria. The Shortest Path to Happiness: Recommending Beautiful, Quiet, and Happy Routes in the City. In *Proc. of Conference on Hypertext and Social Media (HyperText)*, 2014.
[2] Daniele Quercia, Luca Maria Aiello, Rossano Schifanella, Adam Davies. The Digital Life of Walkable Streets. In *Proc. of the 24th International Conference on World Wide Web (WWW)*, 2015