Functional Specification

How Is uber changing Taxis in new york city

Background

In the age of Internet and technology, the way most people live their lives has been changed significantly. With the rapid development of smart phones and mobile web in recent years, there are plenty of things in life can be done by downloading an app onto a smartphone, such as shopping, paying bills, video chat. Uber, a location-based app, connects drivers and passengers and provides ride-sharing service with a fair rate. As this new riding mode accepted by more and more people, Uber has begun compete with traditional taxis. Uber definitely is adding fresh air to the traditional transit system, and it would be very interesting to explore the new dynamics of transportation system. Thus, our project mainly focus on how Uber's popularity influenced on taxis in New York city. By analyzing on both geographical and temporal data, we hope to extract and visualize some correlations between Uber and Taxi regarding various aspects of transit system by using both static diagrams and dynamic visualization. Based on our discoveries, we want to make a visualization system that can inform users of the geographical distributions and trends of two riding service.

Goals:

1. Generate an interactive heatmap that shows the information of Uber and taxis pick-up and drop-off locations in New York city
2. Generate an animated graphs to show the trend in volume of Uber and taxi with time in New York city in 2014
3. Develop a visualization system that integrates the trend graphs and heatmaps
4. Optimize the functionality and interpretability of our system
5. Improve usability of our visualization system to make sure it is easy to use for users with different backgrounds

Why these goals:

Since the majority of our data contains geo-coordinates, map is the best candidate to do the visualization. Also, all of our data have time signatures, so trend diagrams probably will provide

us some valuable information. In the end, we will find a way to integrate maps and trends so that the interpretability and usability of our visualization will be maximized. In other words, we will provide users more controls and options to retrieve the desired information.

BENEFITS:

- Users can better understand the dynamics between Uber and taxi
- Users can make decisions and change strategies based on the geographical information and trend information they retrieved.

AUDIENCE

WHO WILL USE YOUR SYSTEM?

Our potential target users are variety. For example, a driver who is thinking about become an Uber driver might be interested in our system. When someone uses our system, he'll be able to find which locations have most customers to use uber services from dataset. Our system will help him to see whether his current residential location will benefit his business or not when he becomes an Uber driver. Also, the system will provide information for Uber drivers to help them locate popular pick-up locations. On the other hand, the government might be also interested to see how Uber changes people use the taxi service. Moreover, researchers who focus on Uber, Lyft and other similar companies will also be interested in using our system.

WHAT LEVEL OF COMPUTER EXPERIENCE DO THEY REQUIRE:

Technically, our users don't need have too much computer experience. Intuitively, they do require how to use the mouse to click on the map. Moreover, they are able to know how to zoom in and zoom out by clicking the "plus" and "minus" buttons located on the upper left of the map would be helpful. After some clicking interactions, users might get confused, they are able to find the reset button and set everything back to original. We don't expect our users understand how we design and create this interactive system and we don't expect them have any technology background. However, we'd like to hear some feedbacks from our users, if they have some experience of using Python packages related to create interactive visualizations. It will help us improve our system in the future.

WHAT DOMAIN KNOWLEDGE MUST THEY HAVE:

For those users who want to become a driver for Uber, we don't expect they need to have the specific domain knowledge. Because the purpose for our system is not trying to challenge our

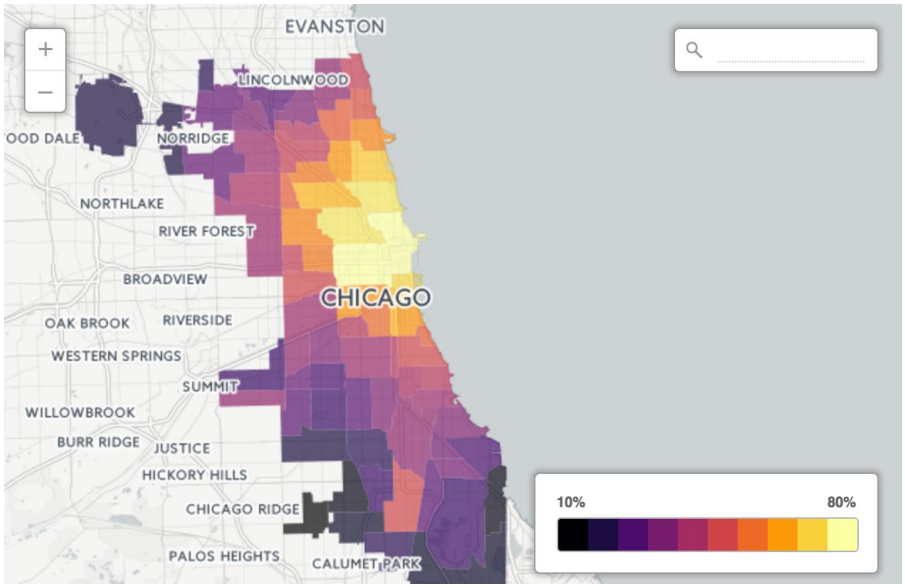
users. We want our users can obtain the information they'd like to know by interacting with the heatmap. To be more specifically, it would be better if they know some knowledge of the heatmap. Identifying the popularity of Uber pick up amounts by the different of colors.

USE CASES

USE CASE 1: COMPARISON OF UBER AND TAXI

The user can select from a drop-down menu to show the data of Uber, taxi, and both. Data of Uber and taxi would be represented by two different colors, black and yellow, in according to the theme color of Uber and NYC yellow taxi.

USE CASE 2: ANALYSIS OF TRAFFIC AND LOCATION DATA



User will look at a heat map of New York City. Traffic will be represented by color. A color closer to red will represent a more crowded area and a color closer to white will represent a less popular area.

At the first, user will see an overlook of the whole city. Gray lines are used to divide the city into five boroughs. The names of boroughs will be marked. If the user click “+” button, the visualization will zoom in and present a focused view. Locations will be divided into smaller blocks and name of landmarks will be shown by text. Color of head map will be updated as the scale change.

A user can use the visualization to see the uber and/or taxi traffic in different neighbors. The visualization can help answer questions like: is it more uber taxi near Times Square or on the Wall Street? When is the most crowded time at John F. Kennedy International Airport? Are their more Uber or taxi near the airport?

USE CASE 3: ANALYSIS OF TIME SERIES DATA - THE RISE OF UBER

User can use a slider to change the date of data from April 2014 to June 2015. When a mouse hover over the timeline slider, the date of current data will be shown large and the user can slide left and right to compare. Users can use the visualization to see the trend of Uber and/or taxi data over time. It will help user to research on the development of Uber in 2014-2015. At the time, it also show how taxi is affected during the period. It answers the question of our study: how is uber changing of taxi in new york city.