

Maddy:

1. View a map/data of where bike stations are already placed in greater Boston
2. Analyze the time frame that it takes people to get to the bike station,
3. Then how far the time is from the bike station to some means of transportation(ie. A train station that many people us)
4. From that transportation to a specific location in Boston (ideally a location where many people work)
5. Reconfigure/move the location of the bike station (if need be) to meet with in a 30 minute window
  - a. This would mean that more bike stations would need to be placed so that people living in a certain communities can get to the bike station faster
  - b. By placing the bike station closer would allow people to be able to get to the train station at a faster rate as well.

Jose:

#### Methods

1. primary data collection - boston website bike stations and boston train stations data
2. analysis - will figure out using distance measures which areas of boston are within a 30 minute window to make it to the busiest station in boston, assuming that such station is the goal place for people to commute to
3. mathematical foundation - find 3 units - walking minutes, biking minutes and train minutes, and find 2 areas: area around bike stations already installed in the 30 minute window and area around train stations in the 30 minute window. Also, find area for future projected goal of 3 minutes to a bike station.
4. Procedure: take plots, make vectors, perform distance calculations
5. Justification of choices: cite 30 minute window, cite why chose busiest station, say it is to find which areas are the least serviced and should have more access to public transportation
6. Bias: 30 minute window is a metric used to quantify accessibility, but not all people within the 30 minute window may have the right accessibility, and some people outside of the 30 minute window might have adequate accessibility e.g go to a different station.

Suhani:

Primary data collection tool- existing bike sharing stations data from massachusetts government Analysis

- creating maps with timed radius, to see existing coverage
- Predicting

Mathematical formula

- Describe the algorithm used to calculate distance
- Distance and time relation
- Algorithm used to conduct predictive modelling

#### Procedures followed

- I don't think we use this a lot in our way of investigation, probably wouldn't be needed

#### Justification

- One thing though, we need to make a note to justify why we set a station as target station (busiest)

#### **METHODS:**

- 1) Primary Data Collection
  - a) Exact position of subway stations
  - b) Exact position of bike stations
  - c) Data on busiest station
- 2) Analysis - of current bike stations
  - a) Calculate distance from a bike station cycling to a subway station
  - b) Subtract this value from the 30-minute window
  - c) From the original location of the bike station view how many homes are fit within a radius that will not exceed the 30-minute window
- 3) Predictive: if Boston mayor reached his goal of putting 100% of people in 3 min radius of a bike station
  - a) How many people are then covered to reach the destination station within 30 mins
  - b) Biking time to station + subway time to destination  $\leq 27$ mins
  - c) See finally who is still left who doesn't have access to transit within the 30-minute window and has adverse health affects
  - d) A possible overlap with income distribution graph to see if bias exists

#### Methods Explainer Guidelines (~750-1000 words)

This section provides the methods you will use to investigate your research question/s. It should explain to the reader how you will appropriately collect / analyze the relevant data. It should not be a boring step by step numbered list. But it should follow a logical order and provide enough detail that a person knowledgeable in this field could repeat your experiment / study. In terms of telling a story, this section is somewhat less creative than the others. Yet there is still room to keep it engaging.

#### Some questions to consider:

- How will you collect your data? Is it publicly available in a database (U.S. Census, MBTA records, somewhere else...)? Will you do a survey? Will you interview people? Do you need a mapping tool like GIS or Google Maps / Google Earth? suhani
- What is an appropriate sample size? suhani

- Are there any restrictions on sharing this data publicly (say at a Museum of Science exhibit)? If filming interviews will you need to acquire written or verbal permission to include the interview in your research / video? Jose

Given that all of the data is publicly available, there should be no restrictions on who this data can be shared with, or how it can be shared.

- How will you analyze your data? Will you collect it in a spreadsheet? Will you run statistics on it?jose

To analyze our data, first we will collect it in a spreadsheet. Once we have the necessary data, we will transform all of our data points into vectors. To find which people are in the 30 minute window, we will find the most transited station in the Boston subway system and set that as our goal. Then, we will find the estimated travel distance over every line to that station using the V3 API provided by the MBTA. That will give each station a given “target time”, which is the time that people that use that station have to commute to that station before they exceed the 30 minute window. From that, we will draw a circle with radius equal to the distance the average person bikes in the remaining time. We will then identify all of the bike stations within that circle, and measure the time it would take to bike from the bike rack to the station by dividing the distance by the average biking speed. From there, each bike station will have its own “time rating”, and we will draw circles around each bike station with radius equal to the distance the average person travels in the time remaining to still be in the 30 minute window. Finally, we will draw a circle around each station with a radius equal to the amount of time people walk in the time remaining in the 30 minute window after taking the trip to the central station. This process will be done once for each station, and we will thus obtain all of the areas of Boston within the 30 minute window.

- Why? You can also provide some background on why you made the decisions you made. For example, if you select certain neighborhoods to study or certain places within a neighborhood to interview people, why did you select those areas? Was it random? Are there certain characteristics of those places that made you select them?maddy

*Tip: When you do your first draft of the methods you will be proposing them, so you will use future tense. When you submit your final paper, you will have done this research, so the tense should change to past tense. In addition, you may not have actually done everything you initially proposed. In the final paper you must update your methods to accurately describe what you actually did (not what you planned to do).*