

# SAFEST AND SHORTEST ROUTE

*Team MCA*

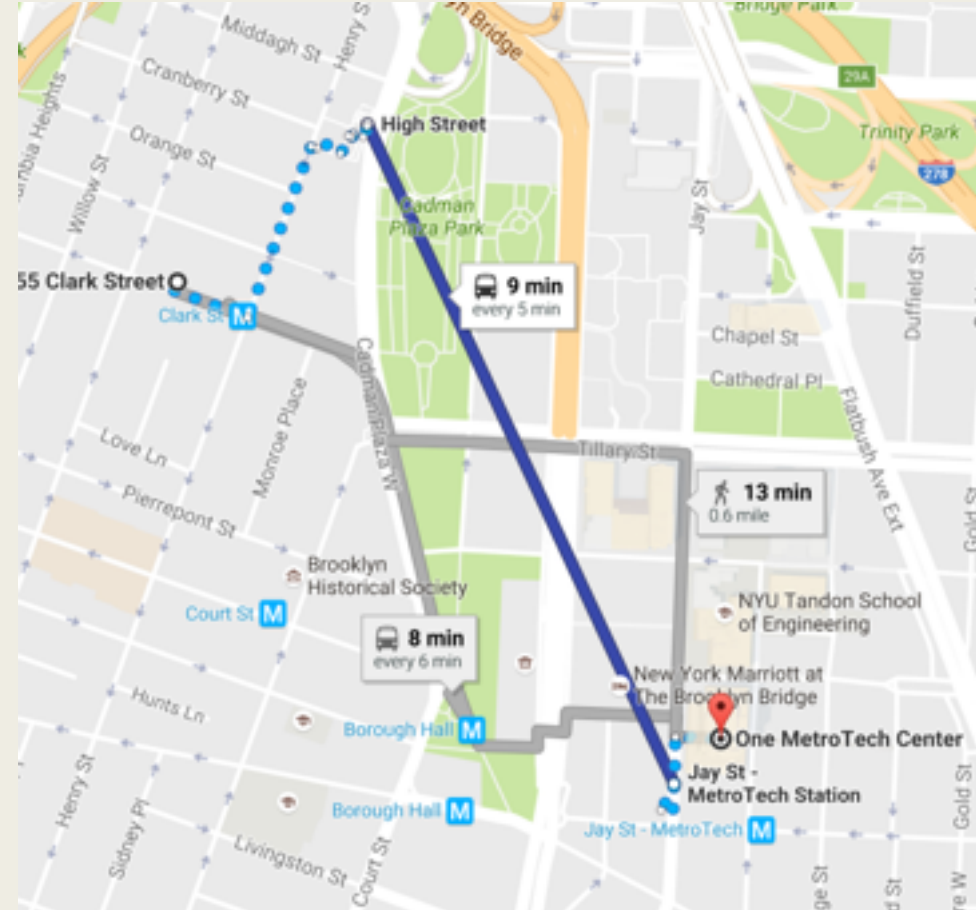
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# Idea Formulation and Procedural Overview

- The idea formulated here is to calculate the safest and shortest route(SSR) from any said start point A to another destination B.
- The SSR calculated has to be formulated on mainly two features:
  - Shortest Distance from point A to point B
  - *The shortest distance is taken as an additional concern when looking at the SSR*
  - *Only having the shortest route does not automatically indicate the route being the safest*
  - Safest Route based on an aggregate score calculated on the route itself
  - *The Safety Scores – from the MIT Media Lab*
  - *Number of Nodes – every turn on the route is considered a node*
  - *Distance between the Nodes itself (Turns on the Route)*

# Shortest Distance from Point A to Point B

- The shortest distance is calculated from all the options that we can possibly have.
- One of the main concerns of safety in today's world is that people do not want to travel further than what is necessary.
- If there is a shorter path to your destination available – it is safer and better to choose that route only due to the fact that it will get you there quicker.
- That is why the shortest route is only part of the solution to finding the shortest and safest route.



# Safest Route based on an Aggregate Score

- The SSR calculated has been calculated based on the formula:
  - *The Safety Index of each street is taken from the MIT Media Lab Safety\_Scores*
  - *Each node taken is considered to be a turn on the route itself*

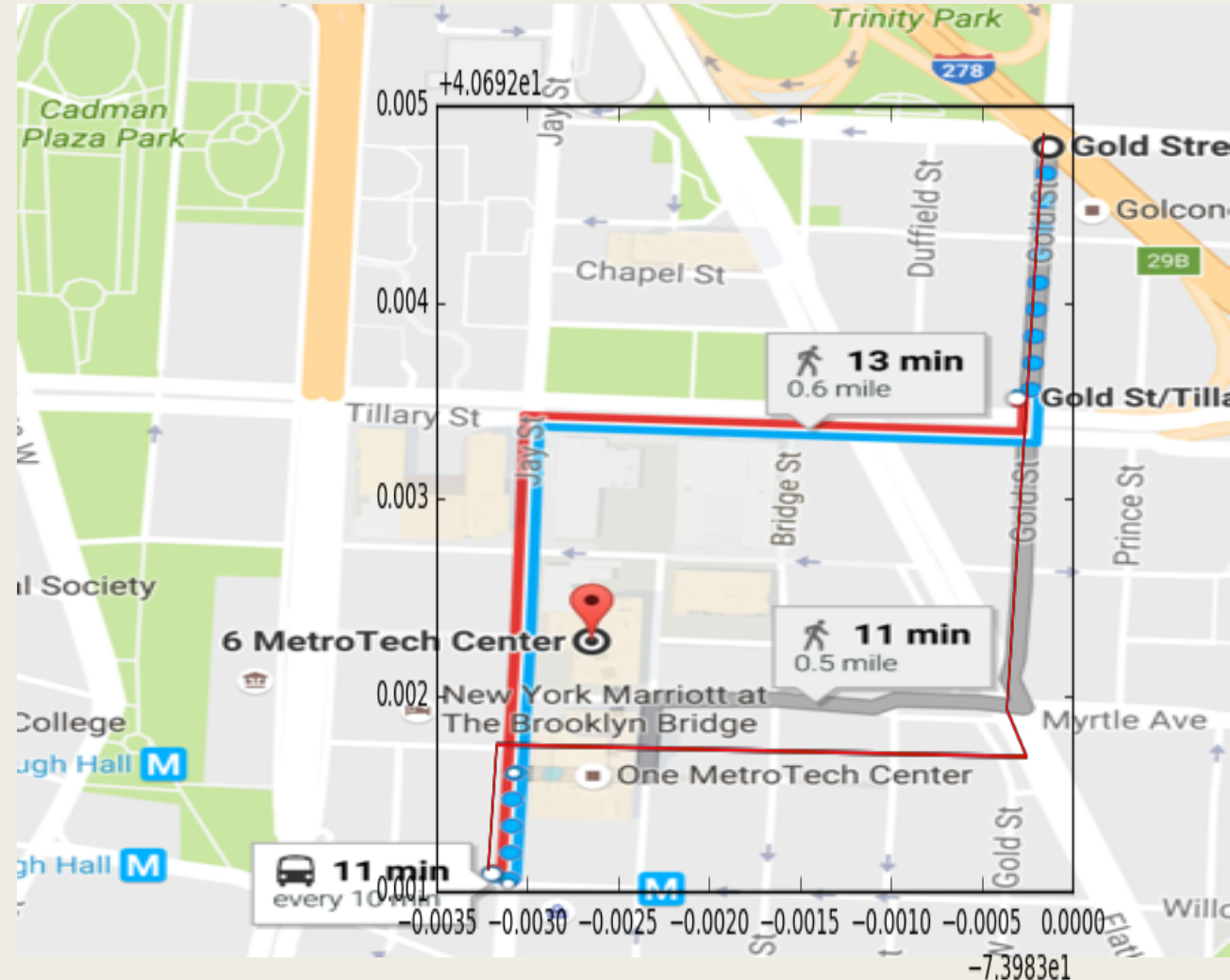
The formula taken to calculate the total aggregate safety\_score is:

- $\text{Index} = (\text{Sum of the Scores} / \text{Number of Nodes})$
- $\text{Security Index} = (\text{Index} / \text{Distance of that Route itself})$

# Safest Route based on an Aggregate Score (continued...)

Result Obtained:

- The map shown here is the route Google maps has advised to be taken.
- The graph plotted with the Jupyter Notebook is the SSR that is observed after passing the information through the SSR Algorithm formulated.



# Safest Route based on an Aggregate Score (continued...)

- Walk from West 4<sup>th</sup> Street Metro Station to Whitney Museum
- Route Suggests:
  - 6 Turns
  - *The street\_score points calculated do not measure up to the main routes shown on Google due to the massive number of turns that have yet to be accounted for*
  - *Safety Score Calculated for 6 streets and results are as shown here*



# Limitations and Future Applications

- The limitations faced were:
  - *There wasn't enough time (of course) to overlay the results found and integrate it with a base map.*
  - *The Google API key functionality is limited if one was to keep trying to check the results to see if it works well.*
- Future Applications:
  - Using the AStar algorithm to continuously reproduce and work on more training sets
  - The SSR can be implemented as a betterment to the Google Maps application to incorporate safety (which is a huge deal in the world today – especially after the elections-2016) into their mapping.

Thank You