Final Project Presentation

* 10-15 min video
* Organization
* Communication
* Visuals Aids

Final Project Report

* Introduction
  + Problem Statement
  + Context
  + Clearly Defined Question
  + Rationale
  + Importance of this topic
  + COPY PASTE FROM PROPOSAL
* Analysis:
  + Description of the Methods to Gather data
  + What did you do and why
  + Steps of the Algorithms
  + Reference the topics from the course
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* Conclusion
  + Answer the question based on the analysis
  + Weaknesses and limitations
  + Areas of future research

# Introduction

One of the most famous events that takes place in the city of Boston is the annual Boston Marathon that attracts runners from around the world to participate in a challenging 26-mile jog. Although professional runners from across the global participate in this event, many locals in the Boston area do as well. Similarly to many other dense and vibrant cities such as Boston, one of the biggest challenges is finding appropriate training routes to practice within. The purpose of this project, and our main goal, is to utilize many of the algorithms we covered within the confines of this course to help optimize the running experience. Within this project, we will evaluate the use of several algorithms, in a proof-of-concept (POC) fashion, to address a number of short comings that runners in dense cities tend to experience.

Many of these short-comings can be grouped into three main categories: (1) finding an interesting route to run long distances within a smaller dense neighborhood, (2) navigating a dense city by finding the shortest path to a destination you want to run to, (3) being able to optimize a route to visit certain interesting sites along your run. In order to address these, we decided to implement a number of algorithms covered in this course, but altered slightly to suit our use cases here.

## Importance – Saleh:

One of the most famous events that takes place in the city of Boston is the annual Boston Marathon. Although runners from around the globe participate in the event, many locals in the Boston area do as well. One of the biggest challenges for runners in vibrant cities such as Boston is finding appropriate training routes to practice for the marathon. The purpose of this project is to develop a proof-of-concept model utilizing various algorithms to help optimize a runner’s training path. This project is personally relevant to me for two main reasons: First, I am a runner, and live in Boston, and have always found it challenging to find new and interesting routes to keep my run both motivating and optimal in length. The second motivating factor on my end is that I focus many aspects of my life on optimization. I run a medium-sized data science team, and we spend a considerable about of time optimizing machine learning models, but one area I am not as well versed in is optimizing graph networks. That said, I would like to use this opportunity to explore a new and novel area for me when it comes to graphs.

## Importance – Gabriel:

Health issues, especially those around eating disorders like being overweight, can develop into multiple and very impactful diseases such as diabetes and coronary issues. One of the main ways to combat this rising epidemy, is exercising and cardiovascular exercise, has a very beneficial effect on overall health and particularly the increased release of endorphins, helps with taking back control on what we eat. In my family there’s a history of heart disease, so managing my food intake and exercise routine is crucial for me. One of the best cardiovascular exercises that works for me is running in a beautiful environment where I can just relax and enjoy the scenery. Since I’m now moving to Boston, it would be of great help to find training routes that would optimize the “beautifulness” given the distance that I intend to run.

## Importance – Nile:

Distance training is already a difficult task, trying to find space to train does not need to be part of the problem. There exists equipment on the market like treadmills and indoor bikes that allow the user to exercise indoors. The problem with those is the cost and also space. Living in the city there is a tradeoff of less space for convenience. A solution to this problem is to exercise outside. A method to training is keeping track of progress, this is done by recording the amount of time to complete a certain amount of distance. From this project I hope to explore finding the

best route for a certain distance and avoid areas of construction or other factors that would make training less ideal. This algorithm would also benefit people who are traveling and are not familiar with the area to keep up with their training. I look forward to finding an efficient solution to this problem.

# Analysis

For the purposes of the analysis section, we divided this into the four main capabilities this application enables. First, we will examine the idea of longest limited distance. Second, we will

