

# 1 Introduction

Our goal is to ...., using Semidefinite programming. ... we find that results ....

## 1.1 Travelling Salesman Problem

Imagine you are prospective student touring RPI. You have a list of buildings you want to visit. You have on hand the distance between each pair of buildings. Is it possible to visit each building exactly one? (can't teleport). If so, what is the shortest possible distance you will need to travel. We also have the added constraint that you start at the parking lot and will need to come back to the parking lot.

As our goal is to find an *efficient* route, we will be satisfied with an approximation. Or a series of buildings to visit that is close to the optimal.

## 1.2 Max Cut

# 2 Semidefinite Programming

# 3 Relaxation

## 3.1 Proofs

# 4 Findings

## 4.1 Visualization

- table of result - for small examples, we find the actual solution (brute force), or a solution (integer programming) and check how good our bound is

via <https://www.cs.cmu.edu/~anupamg/adv-approx/lecture14.pdf> used "randomized rounding" to find a max cut. i.e. if  $p_{ij}$  is close to -1, then we should cut it. We attempt to do something similar

# 5 Discussion

- can we prove the runtime - can we prove how good of a lower bound we have? - what are some easy things to prove?

## 5.1 Scope and limitations

# 6 References