Project Proposal

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To demonstrate an understanding of the course material, this project will cover a hypothetical traveling salesperson scenario in the form of a student travelling to Europe for vacation. The main objectives of the trip will be trying to minimize travelling distance while attempting to minimizing the cost of the trip.

The reason for choosing this problem is due to its rate of occurrence. Many students choose to vacation in Europe after graduation. Students who travel to Europe choose multiple countries to visit in one vacation. The ability to travel relatively easily within Europe makes this scenario a perfect fit to solve as a mixed integer linear program.

In this scenario, the student will be leaving for Europe from Halifax and the trip will end once the student has returned to Halifax. The student has thirty days to travel, and the trips to and from Halifax will count from the 30 days. The travel days will be from 15/06/2018 to 15/07/2018. The student plants to visit Iceland, England, France, Spain, Italy and Germany. For the sake of simplicity, the student will only travel using airplanes and will travel to the capital cities. The reason for this constraint is that the cost of the trips will be pulled from travelling websites. Another constraint the student will set is that once they have visited a country, they will not return to it during the trip. This means the student will be returning to Halifax from the last country they visit and will need to plan accordingly.

During the planning phase, it has come to the student's attention that there is a music festival that will be hosted in Belgium the weekend of 06/29/2018 in which the student would like to attend. However, to attend the festival the student must remain in Belgium for the entire weekend taking up at least 3 days of the vacation and must sacrifice days spent in other countries for this festival. One of student's childhood friends has heard of the trip the student is taking and insisted on the student attending her wedding. The wedding is to be hosted on 07/07/2018. Finally, the student has realized the best way to travel home from Europe to Halifax is to leave from London. The student is convinced that this is the best way to leave Europe and would like to make it the final stop. The student would like to also spend a week in the UK to travel around the country.

By adding Belgium to the list of countries, the student fears rushing themselves and missing out on fully experiencing each country. To solve this, the student decides the best course of action to take is to limit the list of countries visited to six. If the student chooses to attend the music festival in Belgium, the student must opt out of visiting Iceland and plan to visit it in another trip.

To solve this problem, the simulated annealing problem will be applied to the scenario. The solver that will be used for this problem will be GLPK and will be solved using Python. The shortest path algorithm will be applied to the problem to get the result and compare it to the optimal solution which is to minimize cost.