

CS6380 : Artificial Intelligence

Assignment 1

August 18, 2022

1 Problem Statement

Travelling Salesman Problem: Given a set of cities and distance between every pair of cities, find the shortest possible route that visits every city exactly once and returns to the starting point.

2 Specifications

- Input: Your script should read from *stdin* in the following format.
 - First line will contain either *euclidean* or *noneuclidean* indicating whether the distances between the cities are Euclidean or not.
 - Second line will contain the number of cities (N). E.g. 100 (Indices 0 - 99)
 - Next N lines will contain the two-dimensional coordinates (space separated) of the cities.
 - Next N lines will contain N space separated distances: distance of the nth city from each city in the order.
 - All coordinates and distances will be floating point numbers.
- Output: The output should be tours (one tour/line) as space separated indices of cities. Do not write the origin city's index in the end again. Invalid tours will be considered as no tours at all.
- Submission format:
 - You can write your script in C++, Python. It should read from *stdin* (in the input format as given above) and write to *stdout* (in the output format as given above).
 - Your submission should contain the following files in the root folder:
 - * Your script
 - * Makefile: to generate an executable (not required for a python script)
 - * a file named *run*: containing a single command to run your code. For example, If your Makefile contains the commands to generate an executable named *tsp* then this file should contain *./tsp* in a single line, or if you submitted a *python3* code named *tsp.py* then this file should contain *python3 tsp.py* in a single line.
 - * Assume that these commands will be run in the root folder. This is for keeping paths relative to it.
 - * Report: A brief report stating your methodology and iterative improvements. Name it *groupID_Report.pdf* Name your root folder as *groupID* and submit it zipped as *groupID.zip*
 - The time limit for running your code is 300s, after which your process will be terminated. Make sure to print your best tours (only) to *stdout* as soon as you find them because **only the last valid tour will be considered for evaluation**, which also means you should print at least one valid tour before timeout.

3 Evaluation

- You will be evaluated on the basis of the cost of the tours. As stated above, your script should write your best tours to *stdout*. Our script will pick the last valid tour that your script outputs before the timeout and compute its cost.
- We are providing a few sample test cases so that you can evaluate your performance and improve before the trial/final submission.
- Marks will be awarded in a relative fashion as on how good your tours are as compared to others.

4 Deadlines

- **Trial run - 23:55, August 29th, 2022**

Note: This is important as you will get a feedback on how your script is performing or/and at least you would get to know the bugs in your script, if any (remember the i/p- o/p specification?). Failing to submit here will earn you -2 points. Results and the feedback of the trial run will be published in a couple of days.

- **Final submission - 23:55, September 9th, 2022**

If your submission fails to run here, no further excuses will be entertained.