CS 214: Artificial Intelligence Lab
Spring 2022-23, IIT Dharwad
Artificial Intelligence Lab
Assignment-3
TSP Competition

TSP Problem Description

Given a set of cities (coordinates) and distances between them, find the best (shortest) tour (visiting all cities exactly once and returning to the origin city) in a given amount of time, viz. **Traveling Salesman Problem**.

Note: You are free to implement any algorithm for this competition.

Input Format

You will be given files in the following format:

- First line will contain either *euclidean* or non euclidean 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 between cities, in order.
- All coordinates and distances will be floating point numbers.

Sample input files have been attached on moodle.

Output Format

Your output should be following:

- Each line will contain tours as space separated indices of cities. Do not write the origin city's index at last again. Rotated tours will be considered the same. Invalid tours will be considered as no tours at all.
- **The time limit for running your code is 300s**, after which your process will be terminated. Make sure to print your best tours to stdout as soon as you find them because only the last valid tour will be considered for evaluation. And also print the tour length in each round.
- **Do not use multi-threading** for this assignment.

Evaluation

- You will be evaluated on the basis of the cost of your tours.

- Refer to test cases from the previous assignment(trial) so that you can evaluate your performance and improve before the final submission.

- Judgment will be made in a relative fashion with some thresholding.

- We are also attaching results from previous batches so that you can compare your results.

- The maximum points are 100.

Evaluation Criteria: Relative (based on tour found)

- Execution of Program:80 Marks(Relative)
- Report: 20 Marks
- Formula for relative grading=(80*Best_Tour_Length)/(obtained_Tour_length)
  - ➢ Best_Tour_Length:Minimum tour length among all submissions.
  - ➢ obtained_Tour_length: Path length obtained by your code.
- Note: Each test case(6 test cases) are evaluated for 80 marks and average of all will be considered as total, these test cases are not shared with students.

Note: This assignment will have a higher weightage compared to other tasks till now.

Deadline

- **Trial run** - *23:59, 31st January 2023*. The results will be reverted back to you in a couple of days.
- **Final submission** - *23:59, 7th February 2023*. If your submission fails to run, no marks will be awarded.
- The deadlines are to be strictly followed.

NOTE:

1. Due date for Trial submission of this Assignment is ***11:59 31st January 2023.***
2. Submit the following files named with your group number.
   a. Code: ***<group_number>***.py
   b. Input file if there ***(input.txt)***
   c. Report: ***<group_number>.pdf*** (A brief report stating your methodology and iterative improvements.)
   d. ***Readme.txt*** (How to execute your program)
3. Mode of submission is moodle.
4. Viva and demonstration of your submitted code is mandatory and will be conducted on ***08th February 2023*** in lab hours, we will share the time slots for the same.