Semester Project

Problem Statement:

The traveling salesman problem (TSP), or, in recent years, the traveling salesperson problem, asks the following question: "Given a list of cities and the distances between each pair of cities, what is the shortest possible route that visits each city exactly once and returns to the origin city?" It is an NP-hard problem in combinatorial optimization, important in operations research and theoretical computer science.[1]

Based on what you've learned during *Advanced Algorithms* course and using your favorite programming language, **analyze** and **implement** <u>one exact</u> and <u>one approximate</u> algorithms for solving TSP problem on the <u>cities of Egypt</u>.[2]

Deliverables (in electronic form**):**

1. A detailed report about the selected algorithms covering:
    a) *Mathematical analysis*
    b) *Empirical analysis*
    c) Justification of the *empirical analysis* in the light of the *mathematical analysis*
    d) Comparison
2. Complete source code (in a ready to work state) of the selected algorithms
3. Presentation Slides

Due Date:

On the same day as the final exam.

Grading:

The project is worth **20 points** distributed as follows:

*   Analysis   (**10** points)
*   Implementation   (**06** points)
*   Presentation   (**04** points)

Groups:

Groups of **not more than two** students are allowed.

Good Luck
Dr. Islam ElShaarawy

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1   https://en.wikipedia.org/wiki/Travelling_salesman_problem
2   A freely available database of world cities can be found here:
    http://download.geonames.org/export/dump/EG.zip