OPTIMIZATION & DECISION 2021/2022 PROJECT

Important notes:

- A **group** is formed by a minimum of **two and a maximum of three students and need to be registered in fenix**.
- The projects (report and necessary data/software) have to be submitted in the course website no later than the **22nd April 2022, 23:59**.
- The submission should be done through a compressed file named: **OD22_<#student1>_<#student2>_<#student3>.**
- All projects must be **presented orally**, and should be based on a slideshow. Each group has **5 min** to present their work. The presentations will take place on the **8th week**, during OD class schedule.
- The **report**, with a maximum of **20 pages**, should formulate the problem to be solved, explain the methods used, and compare the results obtained using proper metrics. At least two methods should be used for each problem, and for groups with three students should be used three methods for each problem. The students must be critical on the used methods and obtained results. Relevant references must be included.
- Each group must select **one** project, which can be from the list below, and **submit its choice in the excel file available in Fenix** (first come first served). Two groups are allowed to be working in the same project if the algorithms used are different and the benchmarks are also different.

List of available projects:

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1. Dual-Resource Constraints in Classical and Flexible Job Shop Problems
2. Dynamic Scheduling
3. Vehicle Routing Problem with Soft Time Windows - Stochastic Travel Times (VRPsTW-STT)
4. Vehicle Routing Problem with Soft Time Windows in GoWizi
5. Traveling Salesman Problem (TSP)
6. Asymmetric traveling salesman problem (ATSP)
7. Sequential ordering problem (SOP)
8. Capacitated vehicle routing problem (CVRP)
9. Knapsack Problem (KP)
10. Multiple Knapsack Problem (MKP)
11. Max Cut Problem (MCP)
12. Quadratic Assignment Problem (QAP)
13. Bin Packing and Cutting Stock Problem
14. Collective Search and Rescue

6. **Asymmetric traveling salesman problem (ATSP)**

Given a set of n nodes and distances for each pair of nodes, find a roundtrip of minimal total length visiting each node exactly once. In this case, the distance from node i to node j and the distance from node j to node i may be different

The following site (TSPLIB) contains ATSP: (http://comopt.ifi.uni-heidelberg.de/software/TSPLIB95/). Choose two benchmarks of ATSP problems from the database, one with about 50 nodes and another with at least 100 nodes.

Solve the problems using two or three optimization algorithms (according to the number of students in the group) and compare the results. At least one of the algorithms must be a meta-heuristic. Please note that there are Matlab toolboxes for all metaheuristics.

Support on the project will be given by TAs: Miguel Martins and Bernardo Firme.