Friedrich-Alexander-Universität
Naturwissenschaftliche Fakultät

Project Seminar: Organization and overview

SS 2024

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Organization and Content

- Scope: 2SWS, 5ECTS
- Content:
  - Modeling and model analysis.
  - Development and implementation of solution methods for solving a shortest path problem.
- Methodology:
  - The project will be developed in teams of 4 students.
  - Each team will take the role of a consulting company and will aim to present the best solution for the project.
  - During the semester there will be 3 meetings to present the progress.
  - Each team will present a final written report.

Kick-off Meeting

The kick-off meeting takes place on April 25 (Thursday) at 13.00 in room Pc-Pool 1.

The Settings

Within the Project Seminar

Each team represents a consulting company, that wants to offer a solution to a problem of a fictional company (owned by the lecturers).

Within the Team

The team needs to appoint a **Representative**, who will be the direct contact between the team and the lecturers.
The distribution of tasks will be decided internally, and should be done in a way that the workload is evenly distributed.

Content of the talks

3 meetings during the semester

1st meeting: Theory and Data ($\approx$ 20 min):

- **End of May.**
- Mathematical Problem.
- Models to consider and Implementation.
- Possible solution approaches. Optimization or Neural Network?

2nd meeting: Data Collection and Test Cases ($\approx$ 20 min):

- **Middle of June.**
- How similarity will be considered?
- Results and complexity of the implementations with few test cases.
- Algorithms or heuristics to approach the problem.

3rd meeting: Results and Conclusions ($\approx$ 40 min):

- **Middle of July.**
- Presentation of the results.
- Performance analysis.
- Difficulties/complications and how it could be improved.

Written report

Form and scope

- The report should have a length of 10 - 12 pages and should contain the following:
  - Short introduction.
  - Mathematical model.
  - Solution approach.
  - Implementation.
  - Short conclusion with an outlook.
  - List of references.
- Each member has to clearly highlight his or her contributions.
- Preliminary deadline: End of August.

Grading

Grades

- The overall grade is based on equal parts of the presentation and the report.
- Teamwork will be part of the evaluation.
- The final evaluation will be individual.

It is important to remark that the evaluation of the project depends not only in the quality of the solution/algorithm but also in how it is presented (sold) by the consulting team.

Problem Overview

During this semester we will focus on a shortest path problem with a explainable optimization focus.

TSP

In a general way, the shortest path consists on finding the shortest route between an origin and end point. Meanwhile, explainable optimization focus on using solutions (not necessarily optimal) that were previously implemented in cases that are similar to the one analyzed.

Some Considerations

- How similarity can be defined between the past and present?.
- How to use the historical information to solve the problem?.
- What is the trade-off between optimality and similarity?.

Additional Information

Some Considerations

- The use of different approaches or measures and how they compare is an important part of the project.
- It is highly recommended to have coding experience and knowledge in optimization and/or neural networks.

- There will be a consultation time that will be decided at the start of the Seminar.
- Don’t forget to register your team in the table that is available in StudOn.

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