CIVIL-557

Decision-aid methodologies in transportation

Dougui Nourelhouda, Hillel Tim

Cursus	Sem.	Type
Civil Engineering	MA2, MA4	Opt.
Digital Humanities	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Oral
Workload	120h
Weeks	14
Hours	**4 weekly**
Courses	2 weekly
Exercises	2 weekly
Number of positions	

Remark

The course is given by various lecturers.

Summary

Introduction to operations research, data mining and machine learning algorithms for decision support in transportation systems.

Content

The course is case-study based, it will be divided into modules associated to concrete case studies. Each module will contain the following parts:
1. Presentation of the problem, outline of the process, analysis of major difficulties.
2. Formulation of the optimization/data mining/machine learning problem.
3. Introduction to optimization/data mining/machine learning methods.
4. Implementation using software tools.
5. Solution of a concrete problem by the lecturer, using real data.
6. Solution of similar problems by the students, using also real data.

Emphasis will be put on enhancing students' abilities to model and implement decision support methods in transportation systems. During the course the students CPLEX and OPL language for mathematical optimization and Matlab for data mining and machine learning algorithms. Basic programming skills are required for the successful participation to the course.

Learning Prerequisites

Required courses

Recherche opérationnelle

Learning Outcomes

By the end of the course, the student must be able to:

- Model decision processes in transportation systems as optimization problems.
- Implement and sold optimization problems using state-of-the-art solvers.
- Know aand understand various optimization approaches.
- Implement and sold optimization/data mining/machine learning problems using state-of-the-art tools and algorithms.
- Know and understand various optimization/data mining/machine learning approaches.

Teaching methods

Case-based Teaching and Problem-based Learning

Assessment methods

- At the end of each module, each group would be required to submit a short report on a series of exercises.
- At the end of the course, both an oral and a written exams will take place:
  - At the last part of the course, each group of students will be assigned with a final project, in which they will be required to implement approaches learned during the course. Each group have to submit a report and present the project at the end of the course. The oral exam will take place during the presentation and accounts for 80% of the final grade. Assessment would be based on the quality of the report, the quality of the presentation and the answers to the questions.
  - The written exam (multiple choice questions + short answer questions) accounts for 20% of the final grade.

Resources

Ressources en bibliothèque

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