Introduction to the course Optimization Methods and Game Theory

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Optimization Methods and Game Theory
Master of Science in Artificial Intelligence and Data Engineering
University of Pisa – A.Y. 2020/21

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Office hours: Wednesday 10:00–12:00 on Course Teams channel:

https://teams.microsoft.com/l/team/19%3ac86b8ef8530c41e8b035a07b71fa4cc0%40thread.tacv2/conversations?groupId=ac8558b3-f794-4aed-b722-19e7797d8207&tenantId=c7456b31-a220-47f5-be52-473828670aa1

Course Information

- Tuesday 10:30-13:30 Teams
- Thursday 13:30-15:30 Teams

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8:30/9:30	Gest. dell innovaz. F07 Internet of things ADI1	Cloud computing SI 5	Internet of things C31 Basi di dati F09	Internet of things ADI1	Cloud computing A22	
9:30/10:30	Gest. dell innovaz. F07 Internet of things ADI1	Cloud computing SI 5	Internet of things C31 Basi di dati F09	Internet of things ADI1	Cloud computing A22	
10:30/11:30	Business and project mgt. C41	Optimiz. method and game theory ADI1	Basi di dati F09 Fondations of cybersecurity SI 7	Gest. dell innovaz. B25 Fondations of cybersecurity ADI1	Cloud computing A22	
11:30/12:30	Business and project mgt. C41	Optimiz. method and game theory ADI1	Fondations of cybersecurity SI 7	Gest. dell innovaz. B25 Fondations of cybersecurity ADI1	Internet of things ADI1 Basi di dati F09	
12:30/13:30	Business and project mgt. C41	Optimiz. method and game theory ADI1	Fondations of cybersecurity SI 7	Gest. dell innovaz. B25	Internet of things ADI1 Basi di dati F09	
13:30/14:30	Fondations of cybersecurity ADI1	Mobile and social sensing system ADI1 Robotica e macch. int. SI 5	Mobile and social sensing system ADI1 Robotica e macch. int. SI 5	Optimiz. method and game theory A13		
14:30/15:30	Fondations of cybersecurity ADI1	Mobile and social sensing system ADI1 Robotica e macch. int. SI 5	Mobile and social sensing system ADI1 Robotica e macch. int. SI 5	Optimiz. method and game theory A13	Basi di dati B11	
15:30/16:30	Fondations of cybersecurity ADI1	Cloud computing A21	Mobile and social sensing system ADI1 Robotica e macch. int. SI 5	Business and project mgt. A13	Basi di dati B11	
16:30/17:30	Business and project mgt. ADI1	Cloud computing A21		Business and project mgt. A13		
17:30/18:30	Business and project mgt. ADI1	Cloud computing A21		Business and project mgt. A13		

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Web page

`https://people.unipi.it/mauro_passacantando/teaching-2/omgt/`

Exam

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Syllabus

- Preliminaries of convex analysis
- Existence of optima, optimality conditions, Lagrangian duality
- Applications to machine learning:
  - Supervised machine learning: Data fitting problems, Support Vector Machines for classification and regression problems
  - Unsupervised machine learning: clustering problems
- Solution methods for optimization problems:
  - gradient and conjugate gradient method
  - Newton and quasi-Newton methods, derivative-free methods
  - active-set, penalty, logarithmic barrier methods
  - global optimization techniques
- Multiobjective optimization problems:
  - Pareto and weak Pareto optimal solutions
  - existence, optimality conditions, scalarization approach, goal method
- Noncooperative game theory:
  - zero-sum finite games: Nash equilibrium, existence, min-max theorem
  - non zero-sum finite games: existence, optimality conditions, algorithms
  - convex games: existence of NE, optimality conditions, merit functions
- Exercise sessions with MATLAB software

MATLAB

You can download and install MATLAB on your laptop using the Campus License paid by Univ. Pisa, see:

`https://start.unipi.it/personale-t-a/strumenti-di-lavoro/strumenti-informatici/software-e-servizi-cloud/software-matlab/`

Bibliography

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- N. Nisan, T. Roughgarden, E. Tardos, V.V. Vazirani, Algorithmic Game Theory, Cambridge University Press, 2007

And you?

Where are you from?

What is your background?