COMPUTER ENGINEERING (LM55)

(Lecce - Università degli Studi)

Teaching HIGH PERFORMANCE COMPUTING

GenCod A003136

Owner professor GABRIELE ACCARINO

Teaching in italian HIGH PERFORMANCE COMPUTING

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SSD code ING-INF/05

Reference course COMPUTER ENGINEERING

Course type Laurea Magistrale

Credits 9.0

Teaching hours Ore-Attivita-frontale: 81.0

For enrolled in 2020/2021

Taught in 2021/2022

Course year 2

Language INGLESE

Curriculum PERCORSO COMUNE

Location Lecce

Semester Secondo-Semestre

Exam type Orale

Assessment Voto-Finale

Course timetable https://easyroom.unisalento.it/Orario

BRIEF COURSE DESCRIPTION

The course provides a broad introduction to Machine Learning theory and practice for supervised learning applications.
Main topics:

- Linear regression (univariate/multivariate)
- Normal equation
- Gradient descent algorithm
- Polinomial regression
- Regularization techniques (Ridge/Lasso)
- Trade-off between high bias and high variance
- Logistic regression (univariate/multivariate; single class/multi class)
- Artificial Neural Networks and back-propagation
- Design and implementation of an Artificial Neural Network in the Keras Deep Learning framework

Hands-on are also organized to provide students the capacity to develop specific use cases, using the Python programming language and the Jupiter Notebook environment.

REQUIREMENTS

Basic requirements

- Linear Algebra calculus
- Knowledge of basic computer science principles and skills, at a level sufficient to write a reasonably non-trivial computer program
- Programming skills (any programming language and paradigm)

Preferred requirements

- Statistics
- Python programming skills
- Data handling and preparation techniques
- Knowledge of data science and visualization Python libraries (numpy, sklearn, pandas, scipy, matplotlib)

COURSE AIMS

KNOWLEDGE AND UNDERSTANDING:
By the end of the course, students will gain knowledge of the key theoretical and practical in the context of Machine Learning.

APPLYING KNOWLEDGE AND UNDERSTANDING:
By the end of the course, students will know how to use the acquired notions for the efficient use to design and implement Machine Learning algorithms for both regression and classification tasks.

MAKING JUDGEMENTS
By the end of the course, students will be able to critically assess the different Machine Learning approaches depending on the specific problem, being also able to assess their goodness.

COMMUNICATION SKILLS:
By the end of the course, students will be able to use a clear language and an adequate scientific terminology to argue on the topics dealt with in the course.

LEARNING SKILLS:
Students will be able to classify, schematize, summarize and process the acquired knowledge. By the end of the course, students will have the appropriate skills to develop and widen their knowledge of Machine Learning, with particular regard to the use of reference documentation and other information available online.

TEACHING METHODOLOGY

The credits of this course are obtained by means of an oral exam, that will assess the overall learning results achieved by the student.
Students (both attending and non-attending) will be asked three questions, one of which is aimed at checking problem solving skills and the student's ability to use the theoretical and practical notions acquired.
The final score will consider:

- The level of theoretical/practical notions acquired (50%);
- The ability to use the theoretical/practical notions acquired (30%);
- The ability to make autonomous assessments (10%);
- The communication skills (10%).

Honours are awarded to students mastering the topics covered in the course.
It is important to notice that, students interactions throughout the course will be also taken into consideration in the final evaluation process.

ASSESSMENT TYPE

The oral exam is aimed at verifying to what extent the student has gained knowledge and understanding of the selected topics of the course and is able to communicate about his understanding. Students, divided into small groups, will also get hands-on experience, developing small projects on specific topics of the course. The max final vote is expressed as 30/30 with the possibility to get the laude.

REFERENCE TEXT BOOKS

- Machine Learning course by Andrew Ng (Stanford)
- Goodfellow, I. et al., 2016. *Deep Learning*