Elements of Deep Learning

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Timetable: 24 hrs (see Class Schedule on https://phd.dei.unipd.it/course-catalogues/)

Course requirements: Basics of Machine Learning and basic Programming.

Examination and grading: Project based on the topics covered during the course or summary of scientific papers on advanced topics not covered directly during the course. Both the project and the summary will then be presented and discussed with the lecturer and the other students.

Credits: 5

Aim: The course will serve as an introduction to Deep Learning (DL) for students who already have a basic knowledge of Machine Learning. The course will move from the fundamental architectures (e.g. CNN and RNN) to hot topics in Deep Learning research.

Course contents:

- Introduction to Deep Learning: context, historical perspective, differences with respect to classic Machine Learning.
- Feedforward Neural Networks (stochastic gradient descent and optimization).
- Convolutional Neural Networks.
- Neural Networks for Sequence Learning.
- Elements of Deep Natural Language Processing.
- Elements of Deep Reinforcement Learning.
- Unsupervised Learning: Generative Adversarial Neural Networks and Autoencoders.
- Laboratory sessions in Colab.
- Hot topics in current research.

References:

- "Dive into Deep0" Learning' https://d2l.ai/
- "Deep Learning" https://www.deeplearningbook.org/
- Notebook colab and slides from the lecturer