UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

DOTTORATO DI RICERCA / PHD PROGRAM IN
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING

Ad hoc course announcement

Title: **Using Deep Learning properly**

Lecturer: **Andrea Apicella, Ph.D.**

Università degli Studi di Napoli Federico II
Email: andrea.apicella@unina.it

***CV**: Andrea Apicella received the M.Sc. degree in Computer Science and the Ph.D. degree in Mathematics and Computer Science from Università di Napoli Federico II, Italy, in 2014 and 2019, respectively. He is currently a researcher in the Department of Information Technology and Electrical Engineering of University of Naples Federico II, and he is a research associate of the ARHeMLab (Augmented Reality for Health Monitoring Laboratory), and AIPA Lab (Laboratory of Artificial Intelligence, Privacy & Applications) sited in Naples. The current research topics of Andrea Apicella cover EEG signal processing for emotion recognition and attention monitoring using Artificial Intelligence methods, and eXplainable Artificial Intelligence (XAI) approaches for explaining the AI system's decisions.*

Credits: **4 CFU**

Overview

Designing and implementing a Deep Learning system is not an easy task. The process requires several choices regarding model design, data engineering, parameter modification and testing. This process is easily subject to errors that are not easily identifiable and, in some cases, may lead to overestimating the performance of the proposed solution.

The course aims to provide a general pipeline for designing and validating a machine learning system, avoiding the most common errors that can easily be made. To this end, it will be shown how to implement the experimental evaluation of simple classification tasks, highlighting their peculiarities and points to pay attention to. The practical part of the course is based on PyTorch, one of the best-known packages for neural networks. An introductory view of it is given.

There will be a final assessment.

Schedule

Lecture	Date	Time	Topics	Lecturer
1	10/01/2023	10:30 – 12:30	Introduction	Andrea Apicella
2	12/01/2023	10:30 – 12:30	Pytorch fundamentals	Andrea Apicella
3	17/01/2023	10:30 – 12:30	Learning in Pytorch	Andrea Apicella
4	19/01/2023	10:30 – 12:30	Data and model preparation	Andrea Apicella
5	24/01/2023	10:30 – 12:30	Training and validation	Andrea Apicella

Content details

Lesson 1 – Introduction. Common libraries for Deep Learning. Preparing the environment. Numpy fundamentals.

Lesson 2 – Pytorch fundamentals. Pytorch general description. Main modules. Tensors and basic operations.

Lesson 3 – Learning in Pytorch. Gradient Descent. The Automatic Differentiation in Pytorch.

Lesson 4 – Data and model preparation. Building a Neural Network. Validation strategies. Balancing, normalization and standardization of the data.

Lesson 5 – Training and validation. Training and validation of a Neural network. Common errors. The importance of ablation studies.

Participants are requested to send an e-mail to Andrea Apicella by January 8th, 2023, with the following information:

Student name and surname, name of the PhD course, PhD cycle.

For information: Andrea Apicella, Ph.D. (DIETI, UniNA) – andrea.apicella@unina.it