UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Machine learning for High Energy Physics

86R-XXXVI-ML

Aims

Contents

The course introduces general aspects of Machine Learning and Deep Learning and discusses the most common architectures used, e.g., for Computing Vision and Natural Language Processing. These lectures are complemented by hands-on sessions, where different architectures are used to solve a real-life classification problem typical of Physics data analysis. The hands-on session is based on examples of LHC data analysis coded in Keras/TensorFlow and Pytorch, running on Jupiter notebooks via Colab.

Detailed program

DAY 1 [2h]:
Lecture 1: Introduction to Deep Learning
Hands-on tutorial: Fully connected network for jet classification at the LHC

Day 2 [2h]:
Lecture 2: Computing vision with Convolutional Neural Networks
Hands-on tutorial: CNN for jet classification at the LHC

Day 3 [2h]:
Lecture 3: Recurrent Neural Networks
Hands-on tutorial: RNN for jet classification at the LHC

Day 4 [2h]:
Lecture 4: Graph Neural Networks

Hands-on tutorial: Jet classification at the LHC with Graph Networks

Day 5 [2h]:
Lecture 5: Unsupervised Learning and Anomaly Detection
Hands-on tutorial: Anomalous jet detection at the LHC

Prerequisites

Teaching form

1 CFU, 10 hours.

Textbook and teaching resource

Semester

May 3, 4, 5, 6, 7 2021 h. 14:00-16:00.

Assessment method

Office hours