

Scuola Superiore di Catania

Corso Specialistico

a.a. 2018-2019

Understanding the World of Deep Learning: Theory, Applications and Practice

An introductory and practical course on deep learning methods with applications to image classification, machine translation, game playing, image/video generation and more. Each topic will be complemented by lab exercises in Pytorch. Students' talks and poster sessions are foreseen at the end of course.

The topics of the course are:

- Neural Network Basis: Mathematics of Backpropagation
- Convolution Neural Networks and their Training: activation functions, initialization, dropout, batch normalization, data augmentation, fine-tuning, transfer learning
- CNN architectures: AlexNet, GoogleNet, ResNet, DenseNet
- Recurrent Neural Networks: RNN, LSTM, GRU – 3h (2h theory and 2h practice)
- Generative models and adversarial learning: GAN, VAE, VAEGAN
- Deep Reinforcement Learning and applications: policy gradients, hard attention, Qlearning
- Unsupervised Learning: CNN, zero-shot learning, Autoencoders, GAN trained unsupervisedly
- Applications: Semantic Segmentation, Object Detection, Image Synthesis, Image Captioning, Visual Question Answering
- Student spotlight talks and posters