Deep Learning

Course syllabus, Spring 2020

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LIÈGE université

AI at ULiège

This course is part of the many other courses available at ULiège and related to AI, including:

- INFO8006: Introduction to Artificial Intelligence
- ELEN0062: Introduction to Machine Learning
- INFO8010: Deep Learning ← you are there
- INFO8003: Optimal decision making for complex problems
- INFO8004: Advanced Machine Learning
- INFO0948: Introduction to Intelligent Robotics
- INFO0049: Knowledge representation
- ELEN0016: Computer vision
- DROI8031: Introduction to the law of robots

Logistics

This course is given by:

- Theory: Prof. Gilles Louppe (g.louppe@uliege.be)
- Projects and guidance: Matthia Sabatelli (m.sabatelli@uliege.be), Antoine Wehenkel (antoine.wehenkel@uliege.be)

Feel free to contact us for help!



Lectures

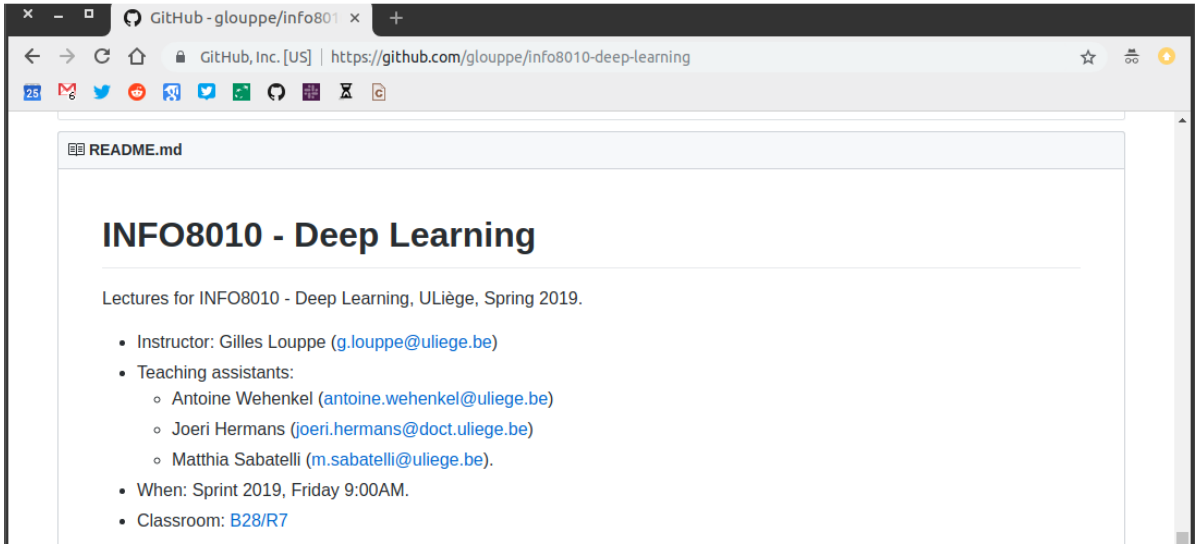
- Theoretical lectures
- Programming tutorials
- (No exercise sessions)

Materials

Slides are available at github.com/glouppe/info8010-deep-learning.

- In HTML and in PDFs.
- Posted online the day before the lesson (hopefully).

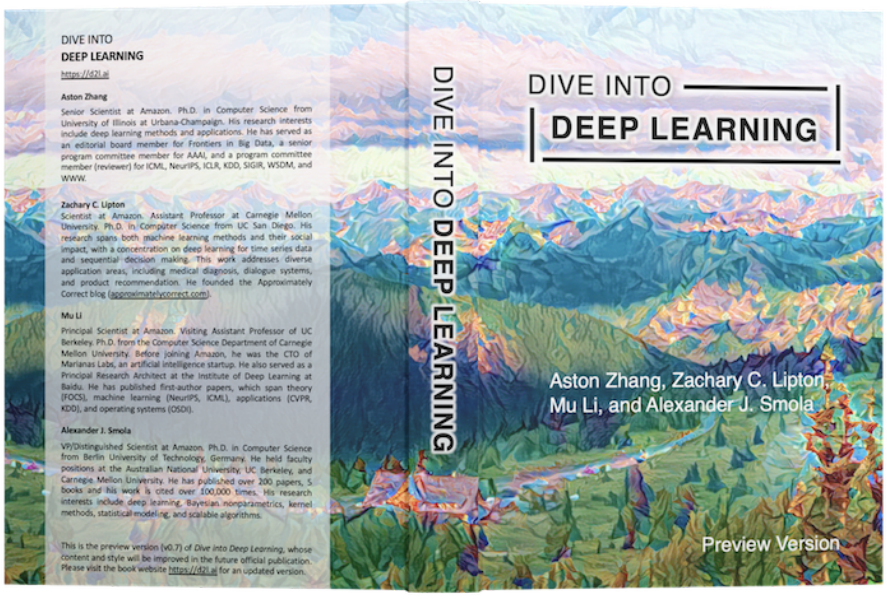
Some lessons are partially adapted from "EE-559 Deep Learning" by Francois Fleuret at EPFL.



Textbook

None!

But we would recommend "Dive into Deep Learning" (d2l.ai) for a comprehensive and practical introduction to the field.



Philosophy

Thorough and detailed

- Understand the foundations and the landscape of deep learning.
- Be able to write from scratch, debug and run (some) deep learning algorithms.

State-of-the-art

- Introduction to materials new from research ($\leq$ 5 years old).
- Understand some of the open questions and challenges in the field.

Practical

- Fun and challenging course project.

Outline

- Lecture 0: Introduction
- Lecture 1: Fundamentals of machine learning
- Lecture 2: Neural networks
- Lecture 3: Convolutional neural networks
- Lecture 4: Computer vision
- Lecture 5: Training neural networks
- Lecture 6: Recurrent neural networks
- Lecture 7: Attention and transformer networks
- Lecture 8: Auto-encoders and generative models
- Lecture 9: Generative adversarial networks
- Lecture 10: Uncertainty
- Lecture 11: Theory of deep learning
- Lecture 12: Deep reinforcement learning

Projects

Reading assignment

Read, summarize and criticize a major scientific paper in deep learning.

Pick one of the following three papers:

- J. Redmon, A. Farhadi, "YOLO9000: Better, Faster, Stronger", 2017. [pdf]
- A. Vaswani et al, "Attention is all you need", 2017. [pdf]
- M. Geiger et al, "Scaling description of generalization with number of parameters in deep learning", 2019. [pdf]

Deadline: April 3, 2020 at 23:59.

Project

Project of your choosing. Details to be announced soon.

Evaluation

- Exam (50%)
- Reading assignment (10%)
- Project (40%)

The reading assignment and the project are mandatory for presenting the exam.

Let's start!