Large Language Models

Course introduction

Flavio Giobergia
Riccardo Coppola

Welcome to *Large Language Models*!

- *Large Language Models* (01HZNOV/01HZNSM)
- *6 CFU* course
- Optional course, mainly for:
  - MSc in Computer Engineering
  - MSc in Data Science & Engineering

Course division

- (*p1*) 3 CFU
  - Theoretical introduction to LLM
    - Intro to deep learning, Transformers, Large Language Models
  - ft. Flavio Giobergia
  - Approx. from today to early November

- (*p2*) 3 CFU
  - *Practical applications of LLM to Software Engineering*
    - Intro to software engineering, using LLM in SE processes
  - ft. Riccardo Coppola
  - Approx. from early November to end of Semester

Learning objectives

- (*p1*) Theoretical foundations of LLM
  - Transformers architecture
  - LLM taxonomy and evolution
  - LLM training, fine-tuning, evaluation

- (*p2*) Practical applications of LLM to SE
  - Understanding of SE
  - Prompt engineering
  - Ethical & Societal impacts

Prerequisites

- *Core concepts of Machine Learning*
  - Today we will have an intro to deep learning
  - But, we assume that you have an understanding of basic ML concepts

- *Solid knowledge of Python and main libraries*
  - We will use PyTorch, but as long as you're familiar with NumPy, you will learn PyTorch just fine!

Timeslots

- Mondays
  - 8:30 – 11:30 (3h)
  - Room 19A
- Wednesdays
  - 11:30 – 13:00 (1.5h)
  - Room 9S

Classes' structure

- Classes will be mainly divided into:
  - *Lectures*
    - covering the main topics of the course in traditional lecture-style classes
  - *Workshops*
    - Hands-on sessions where you will either work on assignments, or follow the instructor is solving practical exercises

Final exam

- *Written test*
  - 18 points
  - Covers theoretical concepts of the course
  - Closed- and open-ended questions
  - 75 minutes

- *Group project*
  - 15 points (mandatory)
  - 3 group members
  - Application of LLM skills to address SE-related activities
  - Written report + oral presentation
  - Project assigned once, delivered once and valid for the entire academic year

Office hours

- No predefined office hours
- Send us an email to schedule an appointment!
  - flavio.giobergia@polito.it
  - riccardo.coppola@polito.it

Course materials

- Slides
  - Available for both parts of the course
  - Course website:
    - https://dbdmg.polito.it/dbdmg_web/2024/large-language-models-2024-25/
  - Uploaded before each lecture
  - Constitute the main reference for the course

- Lecture recordings
  - All lectures will be recorded & available online