AI in Society & Economics

Digital Business University (DBU) Berlin
Course by: Dr. H. Asghari, Aug/Sep 2022

Part of: Masters in Data Science Program
Online lectures: https://dbuappliedsciences.mrooms.net/course/view.php?id=451

Learning Goals

At the end of this module, students should be able to:

1. Define artificial intelligence and related concepts; Describe the history of AI; Give examples of current real world uses of AI systems; And be wary of 'fake' AI.

2. Distinguish different machine learning methods used in AI systems; Describe how artificial neural networks work; And train a simple neural net using Keras.

3. Describe transfer learning (in particular in the context of natural language processing); Develop a simple AI system that uses transfer learning with foundation models to solve a business/societal problem of their choice.

4. Explain the biases and inequalities that AI systems can propagate; Using one of the proposed governance/ethical AI frameworks, evaluate the societal impacts of the AI system they have developed above.

Module Structure

This module is divided into 4 units/weeks. Each unit covers one of the learning goals. For each unit there is some mandatory reading and video lectures to watch. In addition, a number of supplementary resources are linked for students who wish to go deeper into any of the topics. Units 2 and 3 are also accompanied by Python notebooks (on Collab). In parallel to the lectures, you will develop and evaluate a simple AI system as part of the course project.

1. Defining AI
- What is AI?
- History of AI
- AI Applications

2. Deep Learning
- An Overview of Machine Learning
- Artificial Neural Networks
- Deep Learning with Keras. Accompanying notebook: Keras Walkthrough on Colab

3. Transfer Learning

- Pretrained Language Models. Accompanying notebook: Pretrained-Models-Intro.ipynb
- Diving into Transformers (Hugging Face)
- Fine-tuning Models (Hugging Face)
- Transfer Learning for Text Complexity Example. Accompanying notebook: TL-Example-Complexity.ipynb

4. Societal Aspects

- Societal Implications of AI
- Algorithmic Bias
- Public Interest AI

Study Material

The following material are mandatory reading. You are expected to read the part specified for each unit/week as the module progresses.

Book Chapters (Available on ProQuest)

- Kaplan (2016) "Artificial Intelligence: What Everyone Needs to Know" (ch 1-3, 6-7)
- Chollet (2021) "Deep Learning with Python, 2e" (ch 1-3, 6)

Online Lessons (Free)

- The Elements of AI Course (ch 1, 4—6)
- The Hugging Face Course (ch 0—3)

Research Papers (Open Access)

- Caliskan, A. Bryson, J., Narayanan, A. (2017). "Semantics derived automatically from language corpora contain human-like biases". In *Science*. doi: 10.1126/science.aal4230
- Gebru, et al. (2021). "Datasheets for Datasets". In: *CACM*.
- Züger, T., Asghari, H. (2022). "AI for the public. How public interest theory shifts the discourse on AI". In *AI & Soc*. doi:10.1007/s00146-022-01480-5

Additional Learning Material

Some lecture videos point to additional learning material—such as websites, books, or talks. These are optional to explore and study. They help to dive deeper into particular topics.

Examination and Grading

The examination (Prüfungsleistung) for the module consists of 50% project and 50% reflection paper. In short, the project is a simple AI system that you will develop (using the transfer learning approach) that solves a specific business or societal task. The paper explains the task, evaluates the project, and reflects on its societal impacts.