Introduction to AI, machine learning and neural networks

Dr. Stefan Leijnen

Dr. Sieuwert van Otterloo

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https://utrechtsummerschool.nl/courses/engineering-and-technology/introduction_to_artificial_intelligence_machine_learning_and_neural_networks

Agenda

Monday Jul15: Data science	Tue Jul16: machine learning	Wed Jul17: Standard neural networks	Thu Jul18: complicated neural networks	Fri Jul19: other AI algorithms
Data exploration and visualisation	Decision trees and regression	Prediction with neural networks	Image recognition	Evolutionary algorithms
History of AI	Current AI research (guest speaker)	AI, ethics and Human Centered AI	Neural network and explainability	Current AI research (guest speaker)

Structure of each day

Time	Content	Remarks
8.45-9.05*	Walk-in and coffee	
9.05 – 9.30*	Recap and questions	Discuss previous day. On day 1: check if people have practical questions
9.30 – 10.30	Theory	Presentation by lecturer of key concepts
10.30 - 10.45	Coffee break	
10.30 – 11.45	Practical session	Working on assignements, individual or in groups
11.45 – 12.15	Discuss practice results, conclusion	
12.15 – 13.15	Lunch	
13.15 – 14.30	Theory	Presentation by lecturer of key concepts
14.30 – 14.45	Coffee break	
14.45 – 15.45	Practical session	Working on assignments, individual or in groups
15.45 – 16.00	Discuss practice results, conclusion	
16.00 – 16.15	Time for individual questions	Lecturer is available for individual questions

* Day one will start later at 9.30

Monday Jul15: data science

Programme:

Morning theory

- Your expectations for this week
- Data science basics
- Exploring data sets

Morning practical

- Exploring data sets with python

Afternoon theory

- History of AI
- AI problems
- AI methods

Afternoon practical

- Classifying AI problems

Tuesday Tue Jul16: machine learning

Programme:

Morning theory

- Classification and clustering
- Decision trees
- Linear regression

Morning practical

- Predicting prices

Afternoon theory

- Current AI research (probably large language models like ChatGPT

Afternoon practical

- AI and natural language

Wednesday Jul17: Standard neural networks

Programme:

Morning theory

- Perceptrons
- Neural network structure
- Neural network training

Morning practical

- Neural networks in python

Afternoon theory

- Ethics and AI
- AI values
- AI risk examples

Afternoon practical

- Measuring and correcting bias
- AI values quiz

Thursday Jul18: complicated neural networks

Programme:

Morning theory

- Collecting and classifying images
- Images as vectors
- Training images

Morning practical

- Image recognition practical

Afternoon theory

- Neural network zoo : different types of neural networks
- LIME, SHAP and explainability

Afternoon practical

- Practical assignment explainability

Friday Jul19: other AI algorithms

Programme:

Morning theory

- Evolutionary algorithms
- Search algorithms

Morning practical

- Exploring data sets with python

Afternoon theory

- AI guest speaker (to be determined) on AI research

Afternoon practical

- Discussion of the future of AI

Course preparation

- You must bring a laptop in order to participate. You will use the computer for programming in python.
- You must bring paper and pencil for making notes.
- It is useful to have a google account, since we recommend the use of google colab. Alternatively, you can install python and jupyter before the course.