HOGESCHOOL UTRECHT

Introduction to AI, machine learning and neural networks

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

Agenda

Monday Jul11: Data science	Tue Jul12: machine learning	Wed Jul13: Standard neural networks	Thu Jul14: complicated neural networks	Fri Jul15: other AI algorithms
Data exploration and visualisation	Decision trees and regression	Prediction with neural networks	Image recognition	Evolutionary algorithms
History of AI	AI and ethics (Ethics Inc)	AI validation / medical AI	Neural network types	Business process mining

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 assignements, individual or in groups
15.45 – 16.15	Discuss practice results, conclusion	
16.15 – 16.30	Time for individual questions	Lecturer is available for individual questions

* Day one will start later at 9.30

Monday Jul11: 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 Jul12: machine learning

Programme:

Morning theory

- Classification and clustering
- Decision trees
- Linear regression

Morning practical

- Predicting prices

Afternoon theory

- Ethics and AI
- AI values

Afternoon practical

- Ethics inc – serious game

Wednesday Jul13: Standard neural networks

Programme:

Morning theory

- Perceptrons
- Neural network structure
- Neural network training

Morning practical

- Neural networks in python

Afternoon theory

- AI validation
- AI bias
- Medical AI risks

Afternoon practical

- Measuring and correcting bias

Thursday Jul14: 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
- Generative AI

Afternoon practical

- Style transfer
- Deepfake recognition

Friday Jul15: other AI algorithms

Programme:

Morning theory

- Evolutionary algorithms
- ANT algorithms
- Search algorithms

Morning practical

- Exploring data sets with python

Afternoon theory

- Business process modelling
- Business process mining

Afternoon practical

- Business process mining

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 install python and jupyter before the course. See instructions on next slide

Installing python and Jupyter

1. Install python (https://www.python.org/downloads/) and the Jupyter toolbox:
2. Download the data set and python notebook at https://github.com/swzaken/cars-neuralnetwork
3. Install python packages. You can use the following commands

Library	Description	Command to install
Updated version of Pip	Installing packages	*python –m pip install –upgrade pip*
Numpy	Arrays and numbers	*pip install numpy*
MatPlotLib	Data visualization	*pip install matplotlib*
Pillow	Image processing	*pip install pillow*
JuPyter Notebooks	Running the code	*pip install jupyterlab*
Tensorflow	Machine learning algorithms	*pip install tensorflow*