

Deep Learning for Beginners: How to make a computer think like a human

Aron van de Pol

Bi-weekly course starting 13:00-15:00 Tuesday, 6 February 2024

Location: the [Digital Lab in P.J. Veth 1.07](#)

Week 1: Tensors - February 6

In the first week, attendants will be introduced to the foundational concept of tensors, which serve as the backbone of deep learning. They will learn about different tensor types, operations, and properties. Through practical exercises, attendants will become adept at creating and manipulating tensors, setting the groundwork for subsequent weeks.

Week 2: Single Linear Neuron Models and Training Loop - February 20

Week 2 focuses on comprehending the basics of neural networks, starting with single linear neuron models. Attendants will gain an understanding of activation functions and how they impact a neuron's output. Moreover, they will learn about the training loop, which includes forward propagation, loss calculation, and backpropagation.

Week 3: Multi-Layer Models and Activation Functions - March 5

Building upon the concepts learned in Week 2, attendants will progress to multi-layer neural networks. They will explore the significance of activation functions in modeling complex relationships within data. The training process, including gradient descent and backpropagation, will be covered in greater depth. By using multi-layer architectures, attendants will craft more powerful models to solve non-linear tasks.

Week 4: Images as Data: Convolutional Neural Networks (CNN) and Data Loaders - March 19

Week 4 introduces attendants to the specialized world of image data processing using Convolutional Neural Networks (CNNs). They will learn about convolutional layers, pooling, and the structural design of CNNs. Additionally, attendants will become familiar with data loaders, a crucial tool for efficiently handling large datasets. Practical exercises will guide them in building and training CNNs for tasks like image classification.

Week 5: Evaluation Metrics and Model Performance - April 2

Week 5 is dedicated to understanding the metrics used to evaluate model performance. Attendants will learn about essential metrics such as the F-score and confusion matrix. They will gain hands-on experience in interpreting these metrics to make informed decisions about model effectiveness. Practical exercises will enable them to assess their models critically.

Week 6: Transfer Learning and Practical Applications - April 16

In the final week, attendants will explore the concept of transfer learning and its practical applications. They will understand how pre-trained models can be adapted to new tasks, saving time and resources. Through guided exercises, attendants will learn the art of fine-tuning pre-trained models to suit their specific needs, opening doors to solving a wide range of real-world challenges.