Course Overview

Course Overview: Introduction to Deep Learning & Neural Networks with Keras

Welcome to the introduction to Deep Learning & Neural Networks with Keras course. This course will equip learners with the knowledge and skills required to effectively create and use artificial neural networks using Keras in Python. Through a blend of videos, readings, labs, and hands-on activities, participants will gain a deep understanding of the concepts, features, and tools of deep learning and neural networks.

Prerequisites

To get the most out of this course, learners should have:

- Proficiency with Python

- Basic knowledge of machine learning

- High-school level mathematics

- Completed courses such as:

    - [Data analysis with Python ⧉](#)

    - [Machine learning with Python ⧉](#)

Course learning objectives

After completing this course, you will be able to:

- Describe what a neural network is, what a deep learning model is, and the difference between them.

- Implement unsupervised deep learning models such as autoencoders, transformers and restricted Boltzmann machines.

- Demonstrate an understanding of supervised deep learning models such as convolutional neural networks and recurrent networks.

- Build deep learning models and networks using the Keras library.

Course description

Looking to start a career in AI Engineering or Deep Learning? Then look no further. This course will introduce you to the field of deep learning and help you answer many questions that people are asking nowadays, like what is deep learning, and how to use different deep learning models to solve problems such as object detection and classification, image captioning and text-to-image generation? You will learn about the different deep learning models and build your first deep learning model using the Keras library. ENROLL today!

Course outline

Module 1: Introduction to Neural Networks and Deep Learning

This module introduces learners to deep learning and neural networks. Topics covered include:

- **Introduction to Deep Learning and Neural Networks**

- ○ Introduction to deep learning

- ○ Neurons and neural networks

- ○ Artificial neural networks

- **Lab**: Build an artificial neural network from scratch and code how it performs predictions using forward propagation

Module 2: Basics of Deep Learning

In this module, you will learn about the gradient descent algorithm, backpropagation, and how neural networks learn and update their weights and biases. You will learn about the vanishing gradient problem. Finally, you will learn about activation functions. Topics include:

- **Basics of Deep Learning**

- ○ Gradient descent

- ○ Backpropagation

- ○ Vanishing gradient

- ○ Activation functions

- **Lab**: Mitigate the vanishing gradient problem by using a ReLU activation function

Module 3: Keras and Deep Learning Libraries

In this module, you will learn about some of the different deep learning libraries available and how to build regression and classification models using the Keras library. Topics include:

- **Modeling with Keras**

- ○ Deep learning libraries

- ○ Regression models with Keras

- ○ Classification models with Keras

- **Lab**: Use the Keras library to build a regression model and build a model for classification problems

Module 4: Deep Learning Models

In this module, you will learn about the difference between shallow and deep neural networks, learn about convolutional networks and recurrent neural networks, and about transformers and autoencoders. Topics include:

- **Supervised and unsupervised neural networks**

- ○ Shallow versus deep neural networks

- ○ Convolutional neural networks

- ○ Recurrent neural networks

- ○ Transformers

   ○   Autoencoders

- **Lab**: Use the Keras library to build convolutional neural networks and build a transformer model

Module 5: Final project and wrap-up

Learners will apply the knowledge gained throughout the course in a final project where they will use convolutional neural network for detect the type of objects and then generate the captions for that using transformers. The course will conclude with a comprehensive wrap-up and additional resources for further learning.

Tools and software

In this course, you will use:

- Python

- Jupyter notebooks

- The Numpy library

- The Keras libary

- The Pandas library

- The Matplotlib library

Tips for success

- Stay organized and follow a structured approach when responding to incidents or conducting investigations

- Engage with the community and ask questions if you need clarification

- Regularly practice using the tools and techniques provided in the course

- Take time to experiment with the lab activities to deepen your understanding

Congratulations on taking this step to advance your skills in **Deep Learning** and **Neural Networks**! Enjoy your learning journey!