Course Overview

Welcome to the **Deep Learning with TensorFlow and Keras** course. We are excited to have you join us on this journey to master deep learning techniques using some of today's most powerful tools.

Prerequisites

To get the most out of this course, you should be comfortable with the following topics and technologies:

- This course requires basic knowledge of Python programming.
- Familiarity with basic mathematical concepts such as gradients and matrices.

If you need to learn more about this topic before taking this course, the following course will offer the experience you need for success in this one:

- Machine Learning with Python

Course objectives

After completing this course, you will be able to:

- Perform tensor operations in TensorFlow.
- Implement and train linear regression models using Keras and TensorFlow.
- Explain the concepts of logistic regression and apply them to classification problems using Keras.
- Handle data and train models and optimize them using gradient descent in Keras.

Course outline

This course has seven modules, which are listed below. We encourage you to set aside several hours each week to successfully complete all modules in 12 weeks. Consistency will help you achieve your learning goals!

You will derive the maximum benefit from viewing all videos and readings and solidifying that knowledge by completing all of the activities:

- **Module 1: Advanced Keras Functionalities**

This module provides an overview of Kera’s advanced features. It will cover Keras's functional API for complex model creation and the creation of custom layers and models in Keras. Then, the module describes the integration of Keras with TensorFlow 2. x for enhanced functionality.

- **Module 2: Advanced CNNs in Keras**

In this module, you will learn to develop advanced convolutional neural networks (CNNs) using Keras. You will learn data augmentation techniques with Keras. In addition, you will implement transfer learning with Keras and leverage pre-trained models. Finally, you will learn how to use TensorFlow to enhance image processing capabilities.

- **Module 3: Transformers in Keras**

This module covers building and training advanced Transformers using Keras. You will further develop Transformer models for sequential data and time series using TensorFlow with Keras. In addition, you will learn to implement advanced Transformer techniques for text generation.

- **Module 4: Unsupervised Learning and Generative Models in Keras**

In this module, you will learn the principles of unsupervised learning in Keras. You will learn to build and train autoencoders and diffusion models. In addition, you will develop generative adversarial networks (GANs) using Keras and integrate TensorFlow for advanced unsupervised learning tasks.

- **Module 5: Advanced Keras Techniques and Course Project**

In this module, you will learn advanced techniques for model development in Keras. You will create custom training loops, optimize models using Keras, and perform hyperparameter tuning with Keras Tuner. Finally, you will learn to use TensorFlow for model optimization and custom training loops.

- **Module 6: Introduction to Reinforcement Learning with Keras**

In this module, you will learn the fundamentals of reinforcement learning and its applications in Keras. The module also covers the Q-Learning algorithms using Keras. You will develop and train deep Q-networks (DQNs) with Keras for advanced reinforcement learning tasks.

- **Module 7: Final Project and Assessment**

In this module, you will implement the final project and attempt the final assessment.

Tools/Software

In this course, you will use free versions or trials of several tools, including:

- Python and Jupyter Notebook
- Keras and TensorFlow libraries

The course does not require you to pay to complete any activities. You may wish to upgrade to a paid version, though you must incur those costs.

Tips for success

- Stay organized and keep track of deadlines.
- Regularly practice coding and experiment with the examples provided.
- Engage with the community and ask questions if you need help.

Congratulations on taking these steps to further your knowledge and career! Enjoy your journey!