Course Introduction

Welcome to this course on an introduction to Neural Networks with PyTorch.

PyTorch is one of the top 10 highest-paid skills in IT technology today. The use of PyTorch in neural networks is most common, and thus, professionals with PyTorch skills are highly sought after by all IT organizations.

Who will benefit from this course

This course is suitable for all aspiring AI engineers who want to gain fundamental knowledge of neural networks using PyTorch. As an AI developer, you will use PyTorch to design, train, and optimize neural networks to enable computers to perform tasks such as image recognition, natural language processing, and predictive analytics.

What you will learn

This course comprises 6 modules. After completing this course, you will be able to:

- Perform tensor operations in PyTorch.
- Implement and train linear regression models from scratch using PyTorch’s functionalities.
- Explain the concepts of logistic regression and apply them to classification problems.
- Handle data and training models using gradient descent for optimization.

Prerequisites

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

- Basic knowledge of Python
- Machine learning
- Neural networks

This course requires basic knowledge ofPytorch.

Module 1: Tensor and Dataset

In module one, you will learn the basics of one D tensors and the application of various methods to classify the type of data in a tensor and the type of tensor. You will be able to differentiate simple

and partial derivatives in PyTorch. In addition, you will build a simple dataset class and object and a dataset for images.

Module 2: Linear Regression

In module two, you will learn about linear regression and classes. You will learn how to build custom modules using nn.Modules to make predictions. You will further see how to minimize the cost and how to calculate loss using PyTorch. You will understand the Gradient Descent method and how to apply it on the cost function.

Module 3: Linear Regression PyTorch Way

Module three covers implementing stochastic gradient descent using PyTorch's data loader. You will compare Mini-Batch Gradient Descent and Stochastic Gradient Descent. Next, you will learn about Convergence Rate and using PyTorch's optimization modules. Finally, you will learn the best practices for splitting data to ensure robust model evaluation and training data.

Module 4: Multiple Input Output Linear Regression

In module four, you will learn to use the class linear to perform linear regression in multiple dimensions. In addition, you will learn about model parameters and how to calculate cost and perform gradient descent in PyTorch. You will learn to extend linear regression for multiple outputs.

Module 5: Logistic Regression for Classification

In module five, you will learn the fundamentals of linear classifiers and logistic regression. You will implement logistic regression for prediction. The module also covers statistical concepts like Bernoulli Distribution and Maximum Likelihood Estimation underpinning logistic regression.

Module 6: Final Project

In module 6, you will implement the final project and build a logistic regression model aimed at predicting the outcomes of League of Legends matches.

Learning materials:

You will learn about techniques such as Tensor one D, Linear regression, Logistic Regression and so on through instructional videos reinforced by hands-on labs. You will assess your learning with practice and graded quizzes and strengthen your knowledge with reference materials such as glossaries and coding cheat sheets. A culminating final project in the last module provides you with the opportunity to apply your knowledge to build a logistic regression model. You can readily share this project in your portfolio from your Github account with potential employers to showcase your talents.

Hands-on projects

Each module has one or more hands-on projects. These labs reinforce the instructional videos by applying what you've learned in realistic project scenarios. You will be working on hands-on labs on Tensors one D, datasets, Linear Regression 1D prediction, Stochastic Gradient Descent and Data Loader, Optimization, Training, Validation, and Test Split, Multiple Linear Regression Prediction, and Logistic Regression Prediction. Then, in the final module, you'll integrate all the skills learned throughout the course in a culminating project in building a logistic regression model aimed at predicting the outcomes of League of Legends matches.

Multiple programs available

This course is one in IBM AI Engineering Professional Certificate series of courses. Other available courses in this program that can benefit your career advancement are:

- Machine Learning with Python
- Introduction to Deep Learning & Neural Networks with Keras
- Deep Learning with Keras and Tensorflow
- Deep Learning with PyTorch
- AI Capstone Project with Deep Learning
- Generative AI and LLMs: Architecture and Data Preparation
- Gen AI Model Foundations for NLP and Language Understanding
- Generative AI Language Modeling with Transformers
- AI Engineering with Transformer-Based LLMs
- Project: Generative AI Applications with RAG and LangChain

Good luck!

So, there is a lot to cover here! To get the most from this course, watch each video, complete all hands-on labs, and check your learning with each quiz. We're very happy to have you with us as you start your introduction to Neural Networks with PyTorch journey. If you have any trouble with any of the course material, please don’t hesitate to contact us in the discussion forum. Let's get started!