Introduction to the Course 'Foundations and Core Concepts of PyTorch'

Welcome to the course **Foundations and Core Concepts of PyTorch.** The first of the 3 course Specialization in [PyTorch Ultimate 2024 - From Basics to Cutting-Edge](#) ⧉

The course is structured into seven comprehensive modules:

1. **Course Overview and System Setup:** In this module, we will introduce you to the course structure, covering the main topics and learning objectives. You'll learn how to set up your system, including installing necessary software and creating a conda environment. We'll also guide you on accessing course materials and provide tips for navigating the course efficiently.

2. **Machine Learning:** In this module, we will delve into the basics of machine learning. You will start with an introduction to artificial intelligence and its core concepts. The module will then explore the essentials of machine learning and provide an overview of different machine learning models, laying the groundwork for more advanced topics.

3. **Deep Learning Introduction:** In this module, we will explore the foundational concepts of deep learning. You will gain insights into deep learning models, their performance evaluation, and the evolution from perceptrons to neural networks. The module also covers various types of neural network layers, activation functions, loss functions, and optimization techniques, providing a robust understanding of deep learning frameworks.

4. **Model Evaluation:** In this module, we will focus on evaluating machine learning models. You will learn about underfitting and overfitting, and how to mitigate these issues. The module will also cover the train-test split method and its importance in model evaluation, along with various resampling techniques to manage imbalanced datasets effectively.

5. **Neural Network from Scratch:** In this module, we will guide you through the process of constructing a neural network from scratch. You will start with data preparation and model initialization, and proceed to implement essential functions such as forward and backward propagation. The module also covers training and evaluation techniques to help you build and assess your neural network model effectively.

6. **Tensors:** In this module, we will explore the concept of tensors and their significance in PyTorch. You will learn about the relationship between tensors and computational graphs, and gain hands-on experience with tensor operations through coding exercises. This module aims to equip you with the skills to apply tensors in real-world machine learning scenarios.

7. **PyTorch Modeling Introduction:** In this module, we will introduce you to PyTorch modeling. You will learn to build and train models from scratch, including linear regression. The module covers batch processing, datasets, and dataloaders to manage data effectively. You will also explore techniques for saving, loading, and optimizing models, including hyperparameter tuning, to enhance your machine learning workflow.

Target Learner: This course is designed for data scientists, machine learning engineers, and AI enthusiasts with a basic understanding of programming (preferably Python) and fundamental machine learning concepts. Prior experience with deep learning is beneficial but not required.

Learning Objectives:

1. Understand and set up the PyTorch environment for development.

2. Grasp the fundamental concepts of machine learning and artificial intelligence.

3. Develop a basic understanding of deep learning principles and frameworks.

4. Learn to evaluate machine learning models and avoid issues like underfitting and overfitting.

5. Gain hands-on experience with tensors and computational graphs in PyTorch.

6. Build and understand the structure of neural networks from scratch.

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