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Deep Learning Development

Using pytorch and tensorflow - 2 days

FA-0159 · 2 days

DevOps, Cloud & Infrastructure · Data & Analytics

Introduction

This is a 2-day intensive course on Deep Learning using PyTorch and TensorFlow. In today's rapidly evolving tech landscape, deep learning has emerged as a transformative force, driving innovations in areas such as artificial intelligence, natural language processing, computer vision, and beyond. By harnessing the power of neural networks, professionals can unlock new dimensions of data analysis and application development.

This course is designed to propel you into the world of deep learning, offering hands-on experience with two of the most powerful and popular frameworks: PyTorch and TensorFlow. Whether you are a budding data scientist, a seasoned programmer looking to expand your skill set, or a curious enthusiast, this course will equip you with the knowledge and skills to explore the endless possibilities of deep learning.

Learning outcomes

By participating in this course, you will:

- Understand the fundamental concepts and architectures of deep learning, including neural networks, convolutional neural networks (CNNs), and recurrent neural networks (RNNs).
- Gain proficiency in PyTorch and TensorFlow, learning how to build, train, and deploy deep learning models.
- Explore advanced deep learning techniques, such as transfer learning and generative adversarial networks (GANs).
- Develop skills in preprocessing data, fine-tuning models, and optimizing neural networks for performance and efficiency.
- Complete hands-on projects that demonstrate your ability to apply deep learning to real-world problems.
- Learn best practices for deep learning model development and deployment.

Prerequisites

To maximize your learning experience, you should have:

- A solid understanding of Python programming.
- Basic knowledge of linear algebra, calculus, and probability.
- Familiarity with fundamental machine learning concepts.
- Access to a computer with Python installed, along with PyTorch, TensorFlow, and related libraries.

Training outline

1. Introduction to Deep Learning

1. Overview of deep learning and its significance in today's tech landscape
2. Key concepts and terminologies in neural networks
3. Understanding the difference between deep learning and traditional machine learning

2. Getting Started with PyTorch and TensorFlow

1. Setting up the development environment for deep learning
2. Introduction to PyTorch and TensorFlow ecosystems
3. Basics of tensor operations and computational graphs

3. Neural Network Foundations

1. Anatomy of a neural network: Neurons, layers, activation functions
2. Implementing basic neural networks in PyTorch and TensorFlow
3. Loss functions and optimization algorithms

4. Deep Learning for Computer Vision

1. Introduction to convolutional neural networks (CNNs)
2. Building and training CNNs for image classification tasks
3. Techniques for image preprocessing and augmentation

5. Sequential Data and Recurrent Neural Networks

1. Understanding sequential data and its applications

2. Basics of recurrent neural networks (RNNs) and Long Short-Term Memory (LSTM) networks
3. Developing models for time series analysis and natural language processing

6. Advanced Models and Techniques

1. Implementing advanced neural network architectures (e.g., ResNet, Transformer)
2. Introduction to transfer learning and its advantages
3. Exploring generative adversarial networks (GANs) for content generation

7. Optimizing Deep Learning Models

1. Techniques for improving model performance and preventing overfitting
2. Hyperparameter tuning and model evaluation metrics
3. Utilizing hardware accelerators (GPUs/TPUs) for faster training

8. Real-World Applications of Deep Learning

1. Case studies on successful deep learning projects in various domains
2. Ethical considerations and societal impacts of deploying deep learning models
3. Best practices for model deployment and maintenance

9. Hands-On Projects

1. Guided project: Building an image classifier with CNNs in PyTorch and TensorFlow
2. Guided project: Developing a sentiment analysis model with RNNs
3. Capstone project: Participants will choose a problem statement and apply the concepts learned to develop a deep learning solution using either PyTorch or TensorFlow

This intensive 2-day course is thoughtfully designed to be comprehensive yet accessible, blending theoretical knowledge with practical application. Participants will leave with a strong foundation in deep learning, ready to explore new challenges and opportunities in the field.

Through a combination of lectures, hands-on labs, and projects, you will experience the full spectrum of deep learning capabilities and emerge prepared to harness these powerful tools in your projects and research.

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