MLOps Training Program Details



Course Duration: 60 Hours

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Module 1: Introduction to MLOps

- **1. Definition and Goals of MLOps**
- 2. Differences between DevOps and MLOps
- 3. Overview of the MLOps Lifecycle
- 4. Key Tools: Docker, Kubernetes, MLflow, TensorFlow Serving

Module 2: Data and Model Versioning

- 1. Introduction to Data Versioning: Git-LFS, DVC
- 2. Model Versioning with MLflow
- 3. Hands-On: Version a dataset and track ML experiments

Module 3: Basics of Containerization

- 1. Docker: Containers vs. Virtual Machines
- 2. Building, Tagging, and Running Docker Images
- 3. Hands-On: Containerize a simple ML application

Module 4: Fundamentals of CI/CD

- 1. CI/CD Basics and Differences in ML Projects
- 2. Tools: GitHub Actions, Jenkins
- 3. Hands-On: Create a simple CI/CD pipeline for ML model training

Module 5: Integrating Testing and Validation

- 1. Unit and Integration Testing in ML Pipelines
- 2. Data Quality Validation: Great Expectations
- 3. Hands-On: Automate model validation and testing in a pipeline

Module 6: Model Deployment

- 1. Deployment Strategies: Batch, Online, and Edge
- 2. Deployment Tools: TensorFlow Serving, FastAPI, Flask
- 3. Hands-On: Deploy an ML model using FastAPI and Docker

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Module 7: Monitoring and Logging

- 1. Importance of Monitoring: Drift, Latency, Errors
- 2. Tools: Prometheus, Grafana, ELK Stack
- 3. Hands-On: Set up a monitoring dashboard for a deployed model

Module 8: Kubernetes Basics

- 1. Kubernetes Architecture: Pods, Deployments, Services
- 2. Setting up a Kubernetes Cluster
- 3. Hands-On: Deploy an ML application on Kubernetes

Module 9: MLOps with Kubeflow

- 1. Overview of Kubeflow
- 2. Pipelines and Components in Kubeflow
- 3. Hands-On: Create a training and deployment pipeline using Kubeflow

Module 10: Automated ML Pipelines

- 1. Automating Training, Validation, and Deployment
- 2. Tools: Apache Airflow, Kubeflow Pipelines
- 3. Hands-On: Build an end-to-end ML pipeline using Airflow

Module 11: Scaling ML Workflows

- 1. Distributed Training with Horovod or TensorFlow
- 2. Scaling Model Serving with Kubernetes Autoscaling
- 3. Hands-On: Scale a workflow on a cloud platform

Module 12: Advanced Topics

- 1. Explainable AI and Interpretability Tools
- 2. Security in MLOps: Data Privacy and Model Security
- 3. Continuous Training and Retraining Pipelines

Module 13: Capstone Project

Project: Develop a Scalable, Monitored ML Application

- Example Use ication
- Example Use Case: Predict customer churn with real-time monitoring
- Tasks:
 - Data Preprocessing and Versioning
 - Automated Training and Deployment Pipeline
 - Monitoring and Drift Detection