MLOPS FUNDAMENTALS

Course Code: 840034

A foundational MLOps course for those looking to advance their Machine Learning skills

MLOps Fundamentals is a comprehensive guide to the principles, components, and tools used in Machine Learning Operations (MLOps). It provides a thorough understanding of the machine learning lifecycle, MLOps lifecycle, and the benefits and tools involved, such as MLFlow and KubeFlow.

We will take a look at setting up an ML project, including using Git and GitHub, setting up virtual environments, and pre-commit hooks. The course will then delve into the fundamentals of data management, such as understanding data lifecycles, data versioning, governance, and storage solutions.

Practical, hands-on demonstrations will be provided on Exploratory Data Analysis (EDA), feature engineering, and data cleaning using pandas and matplotlib. The course will further explore the concept of feature stores, their types, working, best practices, and implementation challenges.

What You'll Learn

- Explain the core principles and challenges of MLOps in the context of the ML project lifecycle
- Design and structure ML projects using best practices and industry-standard tools
- Analyze and prepare datasets for machine learning applications using advanced data management techniques
- Develop and evaluate machine learning models using appropriate metrics and experiment tracking tools
- Apply version control and containerization techniques to ensure reproducibility in ML projects
- Implement comprehensive testing strategies for ML components and pipelines
- Deploy ML models using RESTful APIs and containerization technologies
- Construct automated CI/CD pipelines for ML projects
- Design and implement monitoring systems for deployed ML models
- Evaluate and address model drift and performance degradation in production environments
- Integrate data engineering practices into MLOps workflows

- Create an end-to-end MLOps pipeline incorporating all learned concepts

Who Needs to Attend

ML practitioners looking to make the leap from toy ML demos to productionized ML applications

- Data Scientists
- Developers
- Software Engineers

Prerequisites

Proficiency in Python; strong beginner/intermediate grasp of ML, familiarity with Git and version control, experience with cloud platforms

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VIRTUAL CLASSROOM LIVE	$2,195 USD	3 Day

Virtual Classroom Live Outline

Introduction to MLOps

- What is MLOps
- Machine Learning Life Cycle Overview

MLOps Components and Tools

- Brief overview of MlOps Life Cycle / Components of MLOps and Benefits
- Brief Overview of MLOps tools (MLFlow, KubeFlow, etc) and their role in automating ML Pipelines

Setting up an ML Project

- Git and GitHub Setup
- Setting Up Virtual Environments
- Pre-commit Hooks

Data Management Fundamentals

- Understanding Data Lifecycles
- Data Versioning
- Data Governance
- Data Storage Solutions

Demo: EDA, Feature Engineering, and Data Cleaning

- Hands-on EDA using pandas to summarize the dataset.
- Visualizing distributions using matplotlib (histograms, scatter plots).
- Creating new features and cleaning data by removing missing values and outliers.

Feature Stores

- Introduction to Feature Stores
- Types of Feature Stores
- How Feature Stores Work
- Best Practices for Using Feature Stores

- Challenges in Implementing Feature Stores

Model Development

- Overview of Model Development Process
- Choosing the Right Algorithm
- Model Training and Validation
- Avoiding Overfitting
- Model Evaluation Metrics

Implementing a Basic ML Pipeline

- Building the Pipeline
- Integrating Preprocessing and Model Development
- Training and Evaluating the Pipeline
- Introduction to Pipeline Automation

Model Development Strategies

- Overview of Model Development Approaches
- Data-Centric vs. Model-Centric Approaches
- Experimentation in Model Development
- Collaborative Development in MLOps

ML Model Interpretability and Explainability

- Introduction to Model Interpretability and Explainability
- Techniques for Model Interpretability
- Explainability in Different Model Types
- Tools for Interpretability
- Challenges in Explainability

Implementing Algorithms

- Selecting an Algorithm
- Implementing the Chosen Algorithm
- Evaluating Algorithm Performance
- Comparing Multiple Algorithms

Demo: Selecting, Implementing, and Evaluating Algorithms

- Select a dataset, choose two different algorithms (e.g., Decision Tree and SVM)
- Implement the algorithms using scikit-learn
- Evaluate the performance of each algorithm
- Compare the results using metrics like accuracy, precision, etc

Experiment Tracking and Model Evaluation

- Introduction to Experiment Tracking
- Setting Up Experiment Tracking
- Evaluating Model Performance
- Visualizing Model Performance

Setting Up MLflow for Experiment Tracking

- Introduction to Mlflow
- Tracking Experiments with Mlflow

- Comparing Multiple Runs
- Storing and Retrieving Models

Evaluating Models

- Preparing the Evaluation Environment
- Evaluating Model Performance
- Comparing Models Based on Evaluation

Hyperparameter Tuning Techniques

- Introduction to Hyperparameter Tuning
- Grid Search vs. Random Search
- Bayesian Optimization
- Practical Considerations

Automated Hyperparameter Tuning

- Introduction to Automated Hyperparameter Tuning
- Running Hyperparameter Tuning
- Analyzing the Results

Model Serving and Deployment Strategies

- Introduction to Model Serving
- Deployment Strategies
- Containerization of ML Models
- Serving Models with Docker
- Model Serving Frameworks
- Deploying Models on Cloud Platforms

Legal and Compliance issues in MLOps

- Introduction to Legal and Compliance in MLOps
- Key Regulatory Standards
- Model Governance and Compliance
- Challenges in Legal and Compliance Issues

Containerizing ML Models with Docker

- Introduction to Docker
- Setting Up Docker
- Building a Docker Image
- Deploying Docker Containers on Cloud Platforms

Deploying Models to Cloud Platforms

- Introduction to Cloud Deployment
- Preparing the Model for Deployment
- Setting Up Cloud Infrastructure
- Deploying the Model with Ray Serve

Federated Training and Edge Deployments

- Introduction to Federated Learning and Edge Computing
- Federated Training Architecture
- Edge Model Deployment

- Tools and Frameworks
- Challenges in Federated Learning and Edge Computing

CI/CD for ML

- Introduction to CI/CD for Machine Learning
- Setting Up CI/CD Pipelines for ML
- Integrating CI/CD with Experiment Tracking
- Automating Model Validation and Testing

Setting up CI/CD Pipelines for ML

- Introduction to GitHub Actions for CI/CD
- Automating Model Training and Deployment
- Integrating MLflow with CI/CD
- Testing the CI/CD Pipeline

Monitoring and Maintaining ML Systems

- Introduction to Monitoring ML Systems
- Tools for Monitoring ML Models
- Setting Up Alerts for Model Drift
- Monitoring Model Performance in Real-Time
- Continuous Feedback Loops
- Scaling Monitoring for Large-Scale Deployments

Implementing Monitoring Tools

- Introduction to Monitoring Tools
- Instrumenting the ML Model for Monitoring
- Code Implementation - Exposing Metrics for Prometheus
- Visualizing Metrics in Grafana

Mar 9 - 11, 2026 | 8:30 AM - 4:30 PM EDT

Apr 13 - 15, 2026 | 8:30 AM - 4:30 PM EDT

May 18 - 20, 2026 | 8:30 AM - 4:30 PM EDT

Jun 15 - 17, 2026 | 8:30 AM - 4:30 PM EDT

Jul 27 - 29, 2026 | 8:30 AM - 4:30 PM EDT

Aug 31 - Sep 2, 2026 | 8:30 AM - 4:30 PM EDT

Sep 21 - 23, 2026 | 8:30 AM - 4:30 PM EDT

Oct 19 - 21, 2026 | 8:30 AM - 4:30 PM EDT

Nov 30 - Dec 2, 2026 | 8:30 AM - 4:30 PM EST

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PRIVATE GROUP TRAINING	3 Day

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