

# Effective MLOps

Stepping beyond the foundational theory and applications of Machine Learning (ML), the “Effective MLOps” bootcamp delves into the crucial territory of operationalizing ML models for real-world deployment. From the meticulous process of requirement collection to the sophisticated art of model monitoring, this training covers the gamut of ML operations (MLOps) in a comprehensive manner.

## DAY 1 Foundations of MLOps and Experiment Management



- Definition and scope of MLOps
- Comparison with DevOps
- ML lifecycle overview
- Business value and challenges
- MLOps maturity levels

### Data Exploration and Preprocessing



- Exploratory Data Analysis (EDA)
- Handling missing values and outliers
- Dealing with class imbalance
- Feature engineering techniques



### Setting Up the Environment

- Tooling: Git, Docker, Python environment
- Introduction to the fraud detection use case
- Dataset overview and problem framing
- Hands-on: Environment setup and dataset exploration

### Modeling and Experiment Tracking



- Model selection: Logistic Regression, Random Forest & XGBoost
- Train/test split and evaluation metrics
- Model training and interpretation
- Versioning with DVC and Git
- Experiment tracking with MLflow

**Hands-on lab: Train, version, and track multiple experiments**

## DAY 2 Modularization, Deployment & CI/CD Pipelines



### From Notebook to Production Code

- Principles of clean ML code
- Converting Jupyter notebooks into modular scripts
- Packaging ML code into reusable components



### Building a Web Application

- Backend: REST API with FastAPI
- Frontend: Interactive UI with Streamlit
- Connecting API to prediction logic



### Containerization and Local Deployment

- Introduction to Docker for ML
- Dockerizing backend and frontend services
- Orchestrating with Docker Compose
- Local deployment and testing



### Cloud Deployment and CI/CD

- Introduction to AWS ECS & ECR
- Pushing Docker images to ECR
- Deploying backend and frontend on ECS
- GitHub Actions for CI/CD/CT
- Hands-on lab: full deployment pipeline

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## DAY 3 Testing, Monitoring and Responsible AI

### ML System Testing



- Unit testing for ML components
- Integration testing of pipelines
- Data and model validation with Deepchecks
- Test coverage and automation strategies

### Capstone Project



- Build and deploy a complete MLOps pipeline
- Integrate DVC, MLflow, FastAPI, Streamlit, Docker, GitHub Actions
- Perform testing, monitoring, and optimization
- Peer review and solution presentation

### Monitoring and Governance



- Importance of monitoring in production
- Concepts of model drift and data drift
- Model performance monitoring tools
- Responsible AI: bias detection and explainability

### Conclusion and Learning Paths



- Key takeaways and best practices
- Advanced tools and future learning (KubeFlow, MLflow Model Registry, etc.)
- Certification and career roadmap
- Q&A and feedback session



## Learning outcomes

You will learn how to implement robust, scalable, and reproducible machine learning pipelines.

Learn to automate the ML lifecycle, from development and experimentation to deployment, monitoring, and governance. This course will enable your teams to reduce time-to-market, increase model reliability, ensure compliance, and foster collaboration between development and operations teams.

- Industrialization of ML workflows using best MLOps practices
- Hands-on experience with versioning, CI/CD, and container orchestration
- Deployment of reproducible and monitored ML models
- Understanding of ethical and responsible AI principles
- Full ownership of a deployed, tested, and tracked ML pipeline



## Your profile

- Data Scientists
- ML Engineers
- DevOps Engineers interested in operationalizing ML models in production environments.



## Prerequisites

- Proficiency in Python (1+ year)
- Basic understanding of ML algorithms and model development
- Familiarity with Git and command-line tools
- Knowledge of Docker and cloud platforms is a plus

