Advanced Machine Learning with Databricks Training

Duration: **1 Day**

BİLGİNÇ IT Academy
info@bilginc.com
+44 20 3807 0925
+90 212 282 7700

Overview

Modern machine learning projects require more than building accurate models—they demand scalable data processing, efficient experimentation, reliable deployment, and continuous monitoring. This advanced course is designed for data scientists and machine learning professionals who want to develop enterprise-grade ML solutions using the Databricks Lakehouse Platform.

Throughout the course, participants will explore how Apache Spark, Databricks, and modern MLOps practices work together to support the complete machine learning lifecycle. Practical exercises demonstrate how to prepare large-scale datasets, train distributed machine learning models, automate experimentation, manage model versions, and deploy production-ready solutions.

The course combines advanced machine learning development techniques with operational best practices, enabling participants to build secure, scalable, and maintainable ML systems for real-world business environments.

Prerequisites

Participants should have practical experience with:

- Python programming
- Machine learning fundamentals
- Classification and regression algorithms
- Model evaluation techniques
- Scikit-learn or similar ML libraries
- Git version control
- Apache Spark fundamentals
- Basic Databricks development workflows

Previous experience with MLflow and Databricks notebooks is recommended.

Who Should Attend

This course is suitable for:

- Data Scientists
- Machine Learning Engineers
- MLOps Engineers
- AI Engineers
- Data Engineers working with ML workloads
- Analytics Professionals
- Cloud AI Specialists
- Technical professionals responsible for deploying machine learning solutions on Databricks

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What You Will Learn

After completing this course, participants will be able to:

- Understand distributed machine learning architectures.
- Develop scalable Spark ML solutions.
- Package and version machine learning models.
- Perform automated hyperparameter optimization.
- Build reusable ML pipelines.
- Implement CI/CD for machine learning projects.
- Configure automated deployment workflows.
- Monitor model drift and prediction quality.
- Manage model lifecycle using Databricks tools.
- Deploy enterprise-grade ML applications.

Outline

Module 1 – Scalable Machine Learning with Databricks

This module introduces the core concepts required for developing machine learning solutions on large-scale distributed platforms.

Topics

- Databricks Lakehouse architecture
- Apache Spark for machine learning
- Distributed data processing
- Spark ML fundamentals
- Feature engineering
- Large-scale model training
- Experiment tracking with MLflow
- Model governance
- Unity Catalog integration

Hands-on Lab

- Building Spark ML pipelines
- Training distributed models
- Tracking experiments with MLflow

Module 2 – Model Optimization

Participants learn techniques for improving model performance and automating experimentation.

Topics

- Hyperparameter optimization

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- Automated tuning workflows
- Optuna integration
- Parallel model training
- Performance evaluation
- Model comparison
- Experiment analysis

Hands-on Lab

- Hyperparameter tuning
- Automated experiment execution
- Performance benchmarking

Module 3 – MLOps Fundamentals

This module introduces modern operational practices for enterprise machine learning.

Topics

- MLOps lifecycle
- Development environments
- Source control
- Pipeline orchestration
- Model versioning
- Environment management
- Reproducible ML workflows

Hands-on Lab

- Managing ML projects
- Creating deployment pipelines

Module 4 – CI/CD for Machine Learning

Participants build automated workflows for testing and deploying machine learning models.

Topics

- Continuous Integration
- Continuous Deployment
- Automated testing
- Pipeline validation
- Deployment strategies
- Infrastructure automation
- Workflow scheduling

Hands-on Lab

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- CI/CD implementation
- Automated deployment testing

Module 5 – Model Deployment and Serving

Learn how to deploy machine learning models into production environments.

Topics

- Model packaging
- Model serving
- REST endpoints
- Real-time inference
- Batch inference
- API management
- Production deployment

Hands-on Lab

- Deploying models
- Publishing inference endpoints

Module 6 – Monitoring and Governance

This module focuses on maintaining reliable machine learning systems after deployment.

Topics

- Model monitoring
- Prediction quality
- Drift detection
- Custom metrics
- Operational dashboards
- Lakehouse Monitoring
- Performance optimization
- Governance best practices

Hands-on Lab

- Configuring monitoring dashboards
- Detecting model drift

Module 7 – Enterprise ML Operations

Participants learn how to manage machine learning assets across multiple environments.

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Topics

- Multi-environment deployment
- Asset management
- Infrastructure as Code
- Databricks Asset Bundles
- Workflow automation
- Security considerations
- Enterprise architecture

Hands-on Lab

- Deploying ML assets across environments
- Managing production workflows

Practical Labs

Throughout the course, participants will complete practical exercises covering:

- Distributed model training
- Spark ML development
- MLflow experiment tracking
- Hyperparameter optimization
- Automated testing
- CI/CD pipeline creation
- Model deployment
- Model monitoring
- Drift detection
- Enterprise MLOps implementation

Skills Gained

Upon successful completion, participants will be able to design, build, deploy, and manage scalable machine learning solutions using Databricks. They will understand how to combine Apache Spark, MLflow, and modern MLOps practices to create reliable, production-ready machine learning systems capable of supporting enterprise AI initiatives.