Machine Learning Engineering on AWS Training

Duration: **3 Day**

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Machine Learning Engineering on AWS is an intermediate-level training program designed for professionals who want to build, deploy, scale, and operationalize machine learning solutions on Amazon Web Services. As organizations increasingly adopt cloud-based artificial intelligence solutions, AWS provides a comprehensive ecosystem for managing the entire machine learning lifecycle—from data preparation and model training to deployment and monitoring.

Throughout this hands-on course, participants gain practical experience using**Amazon SageMaker AI**, **Amazon EMR**, **SageMaker Data Wrangler**, **SageMaker Pipelines**, **Model Registry**, **MLOps**, **CI/CD**, and advanced monitoring services to build production-ready machine learning applications.

Combining theoretical knowledge, guided labs, and real-world projects, this training prepares learners to develop secure, scalable, and enterprise-grade machine learning solutions on AWS.

Prerequisites

Participants are recommended to have:

- Familiarity with basic **Machine Learning** concepts
- Experience with Python programming
- Knowledge of **NumPy**, **Pandas**, and **Scikit-Learn**
- Basic understanding of cloud computing concepts
- Familiarity with AWS services
- Experience with Git or other version control systems (beneficial)

Who Should Attend

This course is ideal for:

- **Machine Learning Engineers**
- **Data Scientists**
- **AI Engineers**
- **DevOps Engineers**
- **Cloud Engineers**
- **SysOps Engineers**
- Software Developers
- Data Engineers
- Professionals building ML solutions on AWS

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What You Will Learn

By the end of this course, learners will be able to:

- Build machine learning solutions on AWS.
- Train and deploy models using **Amazon SageMaker AI**.
- Process large-scale datasets with **Amazon EMR**.
- Perform data preparation and feature engineering.
- Select appropriate modeling approaches.
- Evaluate and optimize model performance.
- Apply **Hyperparameter Tuning** techniques.
- Implement production-grade deployment strategies.
- Establish **MLOps** workflows.
- Monitor model performance and data quality.
- Design secure AWS machine learning architectures.

Training Outline

Introduction to Machine Learning on AWS

Machine Learning Fundamentals

- **Machine Learning Fundamentals**
- Supervised and unsupervised learning
- Machine learning lifecycle
- Translating business problems into ML solutions

Machine Learning on AWS

- AWS machine learning ecosystem
- **Amazon SageMaker AI**
- AWS ML services overview
- Cloud-native AI solutions

Responsible AI

- Ethical AI principles
- Fairness and bias mitigation
- Explainable AI
- Responsible machine learning practices

Analyzing Machine Learning Challenges

Business Problem Evaluation

- ML use cases
- Defining business objectives
- Success criteria and KPIs

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Training Approaches

- Model development strategies
- Training methodologies
- Algorithm selection techniques

Data Processing and Preparation

Data Types and Management

- Structured and unstructured data
- Data collection processes
- Data storage strategies

AWS Storage Solutions

- Amazon S3
- AWS storage services
- Choosing the right storage architecture

Exploratory Data Analysis

- Data exploration techniques
- Data visualization
- Data quality assessment

Data Transformation and Feature Engineering

Data Cleaning

- Handling missing data
- Correcting inaccurate records
- Removing duplicate entries

Feature Engineering

- Feature creation techniques
- Feature selection strategies
- Data transformation methods

AWS Data Processing Services

- **Amazon SageMaker Data Wrangler**
- **Amazon EMR**
- SageMaker Processing

Choosing a Modeling Approach

SageMaker Built-In Algorithms

- **SageMaker Built-In Algorithms**
- Algorithm selection

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- Business use cases

Amazon SageMaker Autopilot

- **AutoML**
- Automated model development
- Intelligent model recommendations

Model Selection Considerations

- Performance evaluation
- Business alignment
- Cost optimization

Training Machine Learning Models

Model Training Concepts

- Training methodologies
- Training infrastructure
- Distributed training approaches

Training with Amazon SageMaker

- SageMaker Training Jobs
- Resource allocation
- Training optimization techniques

Model Evaluation and Optimization

Performance Evaluation

- Evaluation metrics
- Accuracy and error analysis
- Model comparison methodologies

Hyperparameter Optimization

- **Hyperparameter Tuning**
- Reducing training time
- Automated optimization strategies

Model Deployment Strategies

Deployment Approaches

- Real-time inference
- Batch inference
- Edge deployment

Inference Infrastructure

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- Endpoint management
- Containerized inference
- Resource optimization

A/B Testing

- Traffic shifting strategies
- Model comparison
- Canary deployment approaches

Securing AWS Machine Learning Resources

Identity and Access Management

- IAM policies
- Role-based access controls
- Secure ML environments

Network Security

- Network access controls
- VPC integration
- Data protection strategies

CI/CD Security

- Secure deployment pipelines
- Pipeline protection
- Security validation controls

MLOps and Automation

MLOps Fundamentals

- **Machine Learning Operations (MLOps)**
- Model lifecycle management
- Continuous integration and delivery

Amazon SageMaker Pipelines

- **Amazon SageMaker Pipelines**
- Workflow automation
- Process standardization

Model Registry

- **Amazon SageMaker Model Registry**
- Model versioning
- Model governance

Monitoring Model Performance and Data Quality

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Model Monitoring

- **SageMaker Model Monitor**
- Performance tracking
- Production observability

Data Drift and Model Drift

- Detecting data drift
- Monitoring model degradation
- Automated remediation strategies

Automated Troubleshooting and Continuous Improvement

- Anomaly detection
- Automated corrective actions
- Performance optimization
- Operational excellence