

Machine Learning Operations

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Short -Description:

This comprehensive course, "Machine Learning Operations" offers a deep dive into the essential concepts of AWS Cloud and AWS SageMaker for machine learning operations. Beginning with basics of Python programming to work on machine learning, then in AWS Cloud essentials, you'll learn the foundations of cloud computing and how to leverage AWS services for ML. The course covers machine learning basics alongside practical implementation using AWS tools and services. You'll also gain valuable insights into version control with Git and automation of deployments using GitHub Actions. Building on this knowledge, you'll explore pipeline creation and MLOps CI/CD deployment using AWS CodePipeline and CodeDeploy. Lastly, the course provides an overview of AWS AI services like Rekognition and Polly, enabling you to harness advanced AI capabilities for your projects.

Total Duration: 36 Hrs | Modules: 8 | Projects – 8

Related Tags : Python, AWS, MLOps, Machine Learning, Machine Learning Operations, Git, Github

Modules and description:

Module - 1: Python Programming

Duration: 4:30 hrs

1. Python basics
2. Python programming fundamentals
3. Python Data Structures
4. Class and object
5. Modules, Package and Library

Key description:

Python Basics: Covers fundamental concepts like installation, syntax, variables in Python.

Python Programming Fundamentals: Explores concepts in Python such as conditional statements, looping statements, functions

Python Data Structures: Focuses on built-in data structures in Python like lists, tuples, dictionaries, and sets, and their respective methods and operations.

Class and Object: Covers object-oriented programming (OOP) principles in Python, including classes, objects, inheritance

Modules, Packages, and Libraries: Discusses the usage of modules in Python, creation and management of packages for code organization, and utilizing external libraries to enhance Python's functionality.

Module - 2 : AWS Cloud essentials:

Duration: 4 hrs

1. Introduction
2. Virtual machines (EC2)
3. Beanstalk, Lambda, Microservices
4. Data Storage in aws

Key Description:

Introduction: This will cover cloud introduction, aws introduction, aws account creation, budget alerts and IAM role in aws

Virtual machines(EC2): Covers virtual machines (EC2) in aws and services such as elastic load balancing and autoscaling

Beanstalk, Lambda, Microservices: This covers sample application deployment in Beanstalk, Lambda and introduction to microservices

Data Storage in aws: This covers data storage in aws such as RDS, DynamoDB, S3

Module 3: Tools for Machine Learning

Duration: 4:30 hrs

1. Introduction to machine learning
2. Data Collection
3. Pandas Library
4. Numpy Library
5. Matplotlib, Seaborn Library

Key Description:

Introduction to Machine Learning: Provides an overview of the principles, algorithms, and applications of machine learning.

Data Collection: Covers techniques for acquiring, cleaning, and organizing data for machine learning tasks.

Pandas Library: Utilizes the Pandas library for efficient data manipulation and analysis in machine learning workflows.

NumPy Library: Explores the NumPy library for numerical computing and efficient handling of numerical data in machine learning.

Matplotlib, Seaborn Library: Uses Matplotlib and Seaborn libraries for data visualization, facilitating data exploration and presentation in machine learning projects.

Module 4: Machine learning basics

Duration: 10 hrs

1. Feature Scaling, encoding, handling null values
2. Outlier detection and handling
3. Feature selection, Feature extraction

4. AWS Data Wrangler
5. Train, test, split
6. Data preprocessing with SageMaker's Scikit-Learn Container
7. Machine learning algorithms
8. AWS Sagemaker built-in algorithms
9. Deep learning introduction
10. NLP introduction

Key Description:

Feature Scaling, Encoding, Handling Null Values: Covers techniques for scaling numerical features, encoding categorical variables, and handling missing values in data preprocessing for machine learning.

Outlier Detection and Handling: Explores methods for detecting and handling outliers in datasets to ensure data quality and prevent them from negatively impacting machine learning models.

Feature Selection, Feature Extraction: Covers techniques for selecting relevant features and extracting meaningful information from the dataset to improve model performance and reduce dimensionality.

AWS Data Wrangler: Introduces AWS Data Wrangler, a AWS service that simplifies data preparation and transformation tasks for machine learning on AWS, facilitating efficient data wrangling and integration with other AWS services.

Train, Test, Split: Explains the concept of splitting a dataset into training and testing subsets for model development and evaluation, ensuring unbiased model performance estimation.

Data Preprocessing with SageMaker's Scikit-Learn Container: Demonstrates data preprocessing using SageMaker's Scikit-Learn Container, allowing users to leverage the popular Scikit-Learn library for data preprocessing tasks in AWS SageMaker.

Machine Learning Algorithms: Covers various machine learning algorithms, including classification, regression, clustering, and ensemble methods, explaining their principles and use cases.

AWS SageMaker Built-in Algorithms: Introduces AWS SageMaker's built-in machine learning algorithms, which provide pre-implemented models for common tasks like regression, classification, and recommendation systems, simplifying the model development process.

Deep Learning Introduction: Provides an overview of deep learning, including neural networks, activation functions, backpropagation, and popular deep learning architectures, highlighting its applications and potential.

NLP Introduction: Introduces Natural Language Processing (NLP) concepts and techniques, including text preprocessing, feature extraction, sentiment analysis, and language modeling, enabling learners to understand and work with text data effectively.

Module 5: Machine Learning Projects

Duration: 5 hrs

- 1.** Vehicle insurance claim fraud detection
- 2.** Abalone age prediction
- 3.** Mall customer segmentation
- 4.** Heart disease prediction with AWS Sagemaker Canvas
- 5.** Dog vs Cat identification using CNN
- 6.** Clothing - e commerce review project

Key Description:

Vehicle Insurance Claim Fraud Detection: Develops a machine learning model to identify fraudulent vehicle insurance claims, aiding in detecting and preventing insurance fraud.

Abalone Age Prediction: Utilizes machine learning techniques to predict the age of abalone based on various physical attributes, contributing to research and understanding of abalone populations.

Mall Customer Segmentation: Applies clustering algorithms to group mall customers based on their purchasing patterns and demographic information, enabling targeted marketing strategies.

Heart Disease Prediction with AWS Sagemaker Canvas: Utilizes AWS Sagemaker Canvas, an integrated development environment, to build a predictive model for detecting heart disease based on patient health records, assisting in early diagnosis and treatment.

Dog vs Cat Identification using CNN: Implements a Convolutional Neural Network (CNN) to classify images as either dogs or cats, showcasing the capability of deep learning in image recognition tasks.

Clothing - E-commerce Review Project: Analyzes customer reviews for a clothing e-commerce platform using Natural Language Processing (NLP) techniques to extract sentiment and provide insights for business improvement.

Module 6: Git & Github for machine learning

Duration: 2 hrs

1. Git & Github
2. Github actions for deployment

Key Description:

Git & Github : This covers introduction about git & github, installation of git, account creation in github, basic git commands for devops such as configuration, add, commit, push, pull, merge, dealing conflicts

Github actions for deployment: This covers explanations about how to perform CI/CD with github actions

Module 7: MLOps with AWS

Duration: 4 hrs

1. Pipeline building for deployment
2. CI/CD with codepipeline, codebuild
3. Census income prediction project
4. Music recommender system project

Key Description:

Pipeline Building for Deployment: Develops a deployment pipeline that automates the process of building, testing, and deploying applications, ensuring efficient and reliable software delivery.

CI/CD with Code Pipeline, Code Build: Implements Continuous Integration (CI) and Continuous Deployment (CD) practices using AWS Code Pipeline and Code Build, enabling automated code builds, testing, and deployment to accelerate software delivery.

Census Income Prediction Project: Builds a machine learning model to predict the income level of individuals based on census data, assisting in socioeconomic analysis and targeted policy-making.

Music Recommender System Project: Creates a recommendation system using collaborative filtering or content-based techniques to provide personalized music recommendations to users, enhancing their music discovery and listening experience.

Module 8: AI services in AWS overview

Duration: 2 hrs

1. Amazon Rekognition
2. Amazon Polly
3. Amazon Lex
4. Amazon Transcribe
5. Amazon Textract

Key Description:

Overview of Amazon Rekognition: Amazon Rekognition is a deep learning-based image and video analysis service that can perform tasks such as object and scene detection, facial analysis, text recognition, and content moderation.

Overview of Amazon Polly: Amazon Polly is a text-to-speech service that allows developers to convert text into natural-sounding speech, adding lifelike voices to applications and devices.

Overview of Amazon Lex: Amazon Lex is a conversational interface service for building chatbots and interactive voice response systems. It utilizes automatic speech recognition and natural language understanding technologies to create intelligent conversational experiences.

Overview of Amazon Transcribe: Amazon Transcribe is an automatic speech recognition service that converts speech into written text, making it easier to analyze and process audio data.

Overview of Amazon Textract: Amazon Textract is a service that automatically extracts text and data from documents, including tables and forms, using machine learning algorithms. It simplifies the process of extracting information from documents for further analysis and processing.

MLOPS learning Path:

Python program – python basics, data structure, fundamentals, class & objects and modules and package

AWS Cloud Essentials – virtual machine(EC2) Beanstalk, Lambda, Microservices

Tools for machine learning – overview of machine learning, python libraries, data collection

Machine learning projects: classification, regression, Neural Network

Git & Github for machine learning - Git & Github, Github actions for deployment

MLOps with AWS – pipeline building for deployment, CI/CD, projects

AI services in AWS overview: Rekognition, polly, lex, Transcribe, Textract

Software / Tools: Python 3.2 - [Download Python | Python.org](https://www.python.org/)

NoteBook: <https://colab.research.google.com/>

For More Projects:

NLP Projects (19) - <https://www.pantechelearning.com/students-project/nlp-projects/>

Python Projects (132) - <https://www.pantechelearning.com/students-project/python-projects/>

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Raspberry pi - <https://www.pantechelearning.com/diy-kits-sensors/raspberry-pi-kits-accessories/>

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Deep-Learning-using-PyTorch - <https://lms.pantechelearning.com/courses/Deep-Learning-using-PyTorch-1675409854096-63dcb9bee4b037e33c9b2f9b>

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