AI+ Cloud™

COURSE OVERVIEW

The AI+ Cloud™ certification program targets developers and IT professionals aspiring to excel in cloud computing integrated with artificial intelligence. The curriculum offers an in-depth exploration of AI and cloud computing, encompassing advanced cloud infrastructure and AI model deployment. Participants gain practical insights into cloud-based AI applications, culminating in an interactive capstone project. With these skills, graduates are primed to navigate the dynamic AI+ Cloud™ integration landscape, equipped to design and implement AI solutions seamlessly within cloud environments for sustained success.

PREREQUISITES

- A foundational understanding of key concepts in both artificial intelligence and cloud computing
- Fundamental understanding of computer science concepts like programming, data structures, and algorithms.
- Familiarity with cloud computing platforms like AWS, Azure, or GCP
- Basic knowledge of mathematics as it important for machine learning, which is a core component of AI+ Cloud program.

COURSE OUTLINE

Module 1: Fundamentals of Artificial Intelligence (AI) and Cloud

1.1 Introduction to AI and its Application

Basic AI Concept: Gain a solid understanding of the fundamental concepts, principles, and methodologies related to Artificial Intelligence.
AI Applications: Explore real-world examples of AI, showcasing its impact on technology and business.

1.2 Overview of Cloud Computing and Its Benefits

Understanding Cloud Computing: Uncover definition, Properties and Characteristics of Cloud Computing.
Key benefits of Cloud Computing: Discover how businesses and projects use the cloud in real life, making things faster and more efficient.

1.3 Benefits and Challenges of AI-Cloud Integration

Advantages of AI-Cloud Integration: Explore the interactions between AI and cloud computing, focusing on enhanced scalability, accessibility, and collaborative development.
Addressing Challenges in AI-Cloud Integration: Investigate challenges related to security, privacy and how to make smart integration decisions.

Module 2: Introduction to Artificial Intelligence

2.1 Basic Concepts and Principles of AI

Understanding the Foundations: Delve into the basic principles of artificial intelligence, exploring its core concepts and the underlying ideas that make AI possible.

Key Components of AI: Identify the key components that form the foundation of AI systems, including machine learning, natural language processing, and computer vision.

2.2 Machine Learning and Its Applications

Introduction to Machine Learning: Explore the world of machine learning, understanding how computers can learn from data and improve their performance over time.

Types of Machine Learning: Explore various types of machine learning like Supervised, Unsupervised, and Reinforcement Learning.

Practical Applications of Machine Learning: Discover real-world applications of machine learning, from recommendation systems and autonomous vehicles to healthcare diagnostics.

2.3 Overview of Common AI Algorithms

Essential AI Algorithms: Introduce commonly used AI algorithms, such as regression, classification, clustering and Understand the strengths and limitations of each algorithm, exploring when to use them for various tasks.

Hands On: Dive into practical application scenarios.

2.4 Introduction to Python Programming for AI

Python Basics for AI: Learn the basics of Python programming, a versatile language widely used in AI development.

Python Libraries for AI: Explore Python libraries essential for AI, including NumPy, Pandas, and Scikit-learn, to manipulate data and implement machine learning models.

Module 3: Fundamentals of Cloud Computing

3.1 Cloud Service Models

Introduction to Cloud Services: Understand the basic concepts of cloud service models, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

IaaS: Building Blocks of Cloud Infrastructure: Explore Infrastructure as a Service, learning how it provides fundamental computing resources like virtual machines and storage.

PaaS: Platform for Application Development: Delve into Platform as a Service, exploring how it offers a platform for developers to build, deploy, and scale applications without managing underlying infrastructure.

SaaS: Software Delivery via the Cloud: Understand Software as a Service and how it delivers software applications over the internet, eliminating the need for local installation and maintenance.

3.2 Cloud Deployment Models

Public, Private, Hybrid: Deployment Choices: Explore different cloud deployment models, including public, private, and hybrid clouds, understanding the advantages and considerations for each.

Public Cloud: Services for Everyone: Learn about public cloud deployments, where services are offered over the internet to a broad audience, with examples from major cloud providers.

Private Cloud: Tailored Solutions: Understand private cloud deployments designed for a specific organization, offering increased control and customization.

Hybrid Cloud: Combining the Best of Both Worlds: Explore hybrid cloud models, combining elements of both public and private clouds for flexibility and scalability.

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Hands-on Activity: Create and deploy a virtual machine on AWS and Deploying Web Services on Azure: Set up a web application on Azure App Service

3.3 Key Cloud Providers and Offerings (AWS, Azure, Google Cloud)

AWS: Amazon's Cloud Ecosystem: Dive into Amazon Web Services (AWS), understanding its services, infrastructure, and its role as a leading cloud provider.

Azure: Microsoft's Cloud Solutions: Explore Microsoft Azure, its services, and how organizations leverage its cloud solutions for diverse applications.

Google Cloud: Innovation and Scalability: Learn about Google Cloud Platform (GCP), its innovative services, and how it provides scalable solutions for businesses.

Module 4: AI Services in the Cloud

4.1 Integration of AI Services in Cloud Platforms

Overview of Cloud AI Services: Explore cloud-based AI services offered by major providers (e.g., AWS AI services, Azure Cognitive Services, Google Cloud AI) and understand their capabilities.

Integrating Cloud AI Services: Hands-on exercise on integrating AI services into cloud platforms to enhance applications.

4.2 Working with Pre-built Machine Learning Models

Leveraging Pre-built Models: Understand the concept of pre-built machine learning models available in cloud environments.

Practical Application: Working with Pre-trained Models: Use a cloud-based service (e.g., Google Cloud Vision AI or Azure Computer Vision)

Analyzing Results and Fine-tuning: Evaluate the results of using pre-built models and explore the possibilities of fine-tuning parameters for specific use cases.

4.3 Introduction to Cloud-based AI Tools

Overview of Cloud-based AI Development Tools: Explore tools provided by cloud platforms for AI development, including notebooks, model training environments, and collaborative tools.

Module 5: AI Model Development in the Cloud

5.1 Building and Training Machine Learning Models

Traditional Machine Learning Model Development: Explore traditional methods for developing machine learning models, covering foundational concepts, algorithms, and techniques in model development.

Hands-on: Exercises on Building and Training Models using Code: Engage in practical exercises to build and train machine learning models through hands-on coding, implementing algorithms, and

evaluating performance.

Building Machine Learning Models with AutoML: Discover the power of AutoML in simplifying the machine learning model development process, leveraging automated tools for efficient model creation.

Hands-on exercises: Demonstration of Building a Machine Learning Model using AutoML: Dive into hands-on demonstrations illustrating the utilization of AutoML tools to build machine learning models swiftly.

5.2 Model Optimization and Evaluation

Hyperparameter Tuning: Learn techniques to optimize model performance by tweaking parameters for better accuracy and efficiency in machine learning models.

Evaluation Metrics and Techniques: Understand various metrics and techniques to assess model performance and choose the most suitable evaluation methods for different scenarios.

Interpretability and Explainability: Gain insights into techniques for explaining and understanding machine learning models, making their decisions transparent and interpretable for stakeholders.

5.3 Collaborative AI Development in a Cloud Environment

Version Control for Machine Learning Projects: Master Git and other tools to track changes, collaborate effectively, and manage versions in machine learning projects for enhanced productivity and reproducibility.

Collaborative Development Platforms: Explore platforms like GitHub and GitLab to facilitate team collaboration, code sharing, and project management in machine learning development environments.

Model Deployment and Sharing: Learn strategies and platforms for deploying machine learning models, enabling seamless integration into production environments and sharing insights with stakeholders.

Module 6: Cloud Infrastructure for AI

6.1 Setting up and Configuring Cloud Resources

Infrastructure as Code (IaC): Learn to automate and manage infrastructure using tools like Terraform, ensuring consistent and scalable deployment for machine learning workflows.

6.2 Scalability and Performance Considerations

GPU and TPU Utilization: Optimize machine learning workloads by harnessing the power of GPUs and TPUs for accelerated training and inference tasks.

Auto-Scaling Strategies: Implement dynamic scaling strategies to adapt computing resources based on workload demands, ensuring efficient utilization and cost-effectiveness in machine learning deployments.

6.3 Data Storage and Management in the Cloud

Data Security and Compliance: Explore strategies and technologies to safeguard sensitive data, ensuring compliance with regulations and protecting against breaches in machine learning environments.

Data Lifecycle Management: Manage data from creation to disposal efficiently, ensuring quality, accessibility, and compliance throughout its lifecycle in machine learning workflows.

Module 7: Deployment and Integration

7.1 Strategies for Deploying AI Models in the Cloud

Popular Deployment Strategies & Pattern: Explore popular deployment patterns like blue-green, canary releases, and others for efficient and reliable deployment of machine learning models at scale.

Platform-Specific Deployment: Learn to deploy machine learning models on various platforms like AWS, Azure, and Google Cloud, leveraging platform-specific features for optimal performance.

7.2 Integration of AI Solutions with Existing Cloud-based Applications

Cloud Application Architecture: Design scalable and resilient cloud-based architectures for machine learning applications, leveraging services like AWS, Azure, and Google Cloud for optimal performance.

Microservices and AI: Explore the integration of microservices with AI, enabling modular and scalable architectures for building and deploying machine learning solutions.

Data Integration Considerations: Address challenges and considerations in integrating diverse data sources, ensuring compatibility, quality, and reliability for effective machine learning workflows.

7.3 API Usage and Considerations

API Design for AI Services: Master designing APIs for AI services, covering protocols, authentication, and documentation to ensure interoperability, security, and ease of use.

Testing APIs: Learn Testing Apis Through Various Tools Like Postman or Other Tools: Develop proficiency in testing APIs using tools like Postman, ensuring reliability, functionality, and performance in AI service deployments.

Module 8: Future Trends in AI+ Cloud Integration

8.1 Introduction to Future Trends

Introduction to Explainable AI or XAI: Explore methods to interpret and explain AI models, enhancing transparency and trustworthiness in decision-making processes for diverse stakeholders.

Federated Learning: Delve into decentralized machine learning techniques, enabling model training across distributed devices while preserving data privacy and security.

AI for Good: Harness AI's potential to address global challenges, focusing on applications in healthcare, sustainability, education, and humanitarian efforts for societal benefits.

Quantum Computing and AI: Explore the intersection of quantum computing and AI, unlocking possibilities for solving complex problems and optimizing machine learning algorithms with quantum processing power.

8.2 AI Trends Impacting Cloud Integration

Edge AI and Hybrid Cloud: Implement AI models on edge devices and leverage hybrid cloud infrastructure, optimizing performance and privacy for decentralized applications.

Serverless AI: Explore serverless computing for AI, enabling scalable and cost-efficient deployment without managing infrastructure, ideal for dynamic workloads.

AutoML and Automated MLOps: Automate machine learning model selection, training, and deployment processes, streamlining ML operations and empowering developers with efficient AI solutions.

Responsible AI in the Cloud: Integrate ethical considerations into cloud-based AI development, ensuring fairness, accountability, transparency, and privacy throughout the machine learning lifecycle.

Module 9: Hands on Examples

9.1 Applying AI and Cloud Concepts to Solve a Real-world Problem

Exercise 1: Diabetes Prediction Using Machine Learning.

Exercise 2: Building & Deploying an Image Classification Web App with GCP AutoML Vision Edge, Tensorflow.js & GCP App Engine

Exercise 3: How to deploy your own ML model to GCP in 5 simple steps

Exercise 4: Google Cloud Platform Custom Model Upload , REST API Inference and Model Version Monitoring.

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