FIRST hubIT
Holding your future

Artificial Intelligence

(40h / 5 Days)

Description:

The artificial intelligence training course is a comprehensive program designed to immerse participants in the foundational and advanced aspects of Artificial Intelligence, with a strong emphasis on practical applications using AWS services. The course begins with an introduction to the fundamental concepts of AI, tracing its historical development and exploring key milestones that have shaped the field. Participants will gain a solid understanding of how AI technologies can be leveraged using AWS tools to build and deploy effective AI-driven solutions. As the course progresses, learners will delve into Machine Learning (ML) basics, covering essential techniques like supervised and unsupervised learning, and how to build machine learning models with Amazon SageMaker. Deep learning will be explored through the lens of neural networks, offering hands-on experience with frameworks such as TensorFlow and PyTorch, to help participants understand and model

complex data patterns. The natural language processing (NLP) module will introduce participants to key NLP tasks, such as sentiment analysis and chatbot creation, using Amazon Comprehend to derive insights from textual data.

In addition to these core topics, the course provides a deep dive into advanced AI applications such as computer vision, which enables the implementation of facial recognition and object detection using Amazon Rekognition. The principles of reinforcement learning are introduced next, highlighting how agents learn through interaction with their environment, and how AWS tools can be used to implement these models. The course also addresses the growing need for scalable AI solutions, equipping participants with best practices for scaling AI applications using AWS infrastructure to ensure cost-effectiveness and robustness. Ethical considerations and governance frameworks will be discussed in the context of AI's societal impact, including fairness and transparency. To round out the program, advanced AI topics like Generative Adversarial Networks (GANs) and the integration of AI with IoT will provide cutting-edge knowledge to participants. The course culminates in a capstone project, where learners will apply all the skills and techniques they've acquired to design and deploy a real-world AI solution, followed by an in-depth review and feedback session to solidify their learning outcomes.

Target Audience:

This program is designed for participants who have a basic understanding of programming and a foundational knowledge of Cloud services. It's ideal for those looking to practically apply AI concepts and tools in real-world scenarios, leveraging the power of Cloud Services for scalable solutions.

1. **IT Professionals**: Individuals with a background in information technology or software development who are looking to specialise or enhance their skills in artificial intelligence.
2. **Data Scientists and Analysts**: Data professionals seeking to leverage AI for data analysis, model building, and implementing advanced data-driven strategies.
3. **Software Developers**: Developers interested in building AI-driven applications or integrating AI functionalities into existing software systems.
4. Machine Learning Engineers: Engineers who specialise in machine learning and are looking to deepen their knowledge of AI techniques and AWS tools for deploying scalable AI solutions.
5. **Product Managers and Technical Leads**: Managers and leads who oversee tech teams and need to understand AI capabilities to guide product development or improve service offerings.
6. **Students and Academics in STEM Fields**: University students and academic staff from science, technology, engineering, and mathematics disciplines who wish to apply AI in their research or future careers.
7. **Entrepreneurs and Innovators**: Individuals in startup environments or innovation departments aiming to utilise AI to develop new products or services.

Training Expected Outcomes:

Upon completing this training program, participants will be able to:

1. **Design and Build AI Models**: Confidently design, build, and deploy AI models using AWS cloud infrastructure.
2. **Leverage AWS for AI Solutions**: Effectively utilise various AWS services to enhance AI project outcomes.
3. **Implement Diverse AI Applications**: From natural language processing to computer vision, develop a broad range of AI applications.
4. **Solve Practical Problems with AI**: Utilise AI technologies to solve real-world problems, demonstrating a clear understanding of AI's capabilities and limitations.
5. **Lead AI Projects:** Be prepared to lead AI initiatives and projects within their organisations or in entrepreneurial ventures.

Training Strategy

1. **Structured Learning:** The program is structured into 10 modules, each covering different AI concepts and applications, ensuring comprehensive learning.
2. **Theoretical Lessons:** Each module starts with theoretical lessons that provide foundational knowledge and contextual understanding necessary for mastering AI technologies.
3. **Hands-On Labs:** To reinforce learning, practical labs using AWS AI services are integrated into each module, allowing participants to apply AI concepts in real-world scenarios.
4. **Assessments:** Regular assessments through quizzes and a final project evaluate the participants' understanding and practical skills in AI.

5. **Case Studies:** Real-world AI applications and case studies are discussed to illustrate the practical use of AI technologies in various industries.

Course Modules:

1. **Introduction to AI** – Fundamental concepts, AI history, and AWS tools for AI development.
2. **Machine Learning Basics** – Supervised and unsupervised learning, and model building with Amazon SageMaker.
3. **Deep Learning Fundamentals** – Neural networks, using AWS frameworks like TensorFlow and PyTorch.
4. **Natural Language Processing** – Key NLP tasks, such as sentiment analysis and chatbot creation using Amazon Comprehend.
5. **Computer Vision** – Implementing facial recognition and object detection with Amazon Rekognition.
6. **Reinforcement Learning** – Understanding and implementing RL using AWS tools.
7. **Scalable AI Solutions** – Best practices for scaling AI models using AWS infrastructure.
8. **AI Ethics and Governance** – Exploring AI's ethical considerations, governance frameworks, and societal impact.
9. **Advanced AI Techniques** – Exploring cutting-edge AI topics like GANs and IoT-integrated AI.
10. **Capstone Project** – A final project that synthesises all learned skills in a real-world AI solution, followed by a peer-reviewed feedback session.

Training Program

Data Analytics	
Training Objectives: • Develop Foundational AI Knowledge • Build and Deploy Machine Learning Models: • Implement Deep Learning and NLP Solutions • Create Advanced Computer Vision Applications • Apply Reinforcement Learning Techniques • Ensure AI Solutions are Scalable and Ethical: • Integrate Advanced AI Techniques:	
Time	***Modules***

4 Hours
 	
1.5h
 	
2.5h
	Module 1: Introduction to Artificial Intelligence
	
	Objective: Introduce trainees to the fundamentals of artificial intelligence, covering its history, key concepts, and the various domains it encompasses.
	
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	• AI Concepts and History:
	  ○ Delve into the evolution of AI, covering seminal moments and foundational theories that have shaped the field.
	• AI in the Cloud with AWS:
	  ○ Introduce AWS's ecosystem and its integrated tools specifically designed for AI development.
	  ○ provide a foundational understanding for navigating and leveraging AWS AI services.
	
	Lab: Participants will set up their Cloud Services environments (AWS), ensuring they are prepared to use Cloud Services for various AI projects throughout the course.
	
	Assessment: A quiz covering AI fundamentals and AWS tools will solidify the foundational knowledge needed for more advanced topics.

4 Hours	**Module 2: Fundamentals of Machine Learning**
2h	**Objective**: Assimilate machine learning concepts, including types of learning methods and the basic process of building a machine learning model.

2h	• **Machine Learning Overview:**
	  ○ Explore different types of machine learning techniques—supervised, unsupervised, and reinforcement learning
	  ○ highlighting ML applications and impact.
	• **Data Preparation Techniques:**
	  ○ Understand the critical role of data in machine learning, focusing on collection, cleaning, and preprocessing to ensure quality inputs for models.
	
	Lab: Use Amazon SageMaker to build basic machine learning models, applying data preparation techniques learned.
	
	Assessment: Evaluate understanding through a quiz on machine learning principles and practical exercises in model building.

4 Hours
 	
2h
 	
2h
	Module 3: Deep Learning Fundamentals
	
	Objective: Provide a deep dive into deep learning techniques, focusing on neural networks, their architecture, and how they are used to model complex patterns in data.
	
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	• **Introduction to Neural Networks:**
	  ○ Break down the components and workings of neural networks,
	  ○ explaining how ***NN*** mimics human brain functions to solve complex problems.
	• **Frameworks and Tools:**
	  ○ Overview of AWS-supported frameworks like TensorFlow and PyTorch
	  ○ highlight when and how to use TF & Pytorch effectively.
	
	Lab: Train a simple neural network model using Amazon SageMaker to classify data or recognize patterns.
	
	Assessment: A project-focused assessment on implementing neural networks, emphasising practical application and problem-solving.

4 Hours	**Module 4: Natural Language Processing (NLP)**
2h	**Objective**: Master the fundamentals of NLP, introduce how machines understand and generate human language, with practical applications using Python and AWS tools.
2h	• **NLP Concepts and Applications**: Cover the basics of NLP, discussing key tasks such as text parsing, sentiment analysis, and the creation of chatbots. • **Using Amazon Comprehend**: Explore how to utilise Amazon Comprehend for scalable and efficient natural language processing. **Lab**: Create an NLP application to analyse text data, extracting insights and performing sentiment analysis using AWS services. **Assessment**: A quiz on NLP techniques will test the participant's ability to apply these concepts practically.

4 Hours

Module 5: Computer Vision with Cloud Services

2h

Objective: Enable trainees to develop computer vision applications using AWS services, learning to process and analyse visual data from images and videos.

2h

- **Fundamentals of Computer Vision**: Introduce the principles of computer vision, discussing how machines interpret visual data from the world around them.
- **Using Amazon Rekognition**: Learn to implement Amazon Rekognition for tasks such as facial recognition and object detection.

Lab: Develop a model to detect and classify objects in images or videos, using Amazon Rekognition.

Assessment: Project work that applies computer vision to a real-world scenario, demonstrating the practical capabilities of AWS tools.

4 Hours 2h 3h	**Module 6: Reinforcement Learning** **Objective**: Introduce the principles of reinforcement learning, focusing on how agents learn to make decisions through trial-and-error interactions with an environment. --- - **Introduction to Reinforcement Learning**: Explore the unique aspects of reinforcement learning, where algorithms learn to make a sequence of decisions. - **Implementing Reinforcement Learning with AWS**: Learn how to use AWS services to set up environments where reinforcement learning models can be trained and tested. **Lab**: Implement a basic reinforcement learning project to solve a simple decision-making problem. **Assessment**: A quiz to assess understanding of reinforcement learning concepts and their application.

4 Hours 2h 2h	**Module 7: Scalable AI Solutions with Cloud Services** **Objective**: Enable trainees to scale AI applications efficiently using AWS cloud infrastructure, ensuring solutions are cost-effective and robust under varying loads. --- • **Scalability in AI**: Discuss strategies to scale AI applications efficiently using cloud infrastructure. • **Using AWS for Scalable AI**: Deep dive into AWS services that support the scaling of AI applications without compromising performance. **Lab**: Scale an AI model using Amazon SageMaker, focusing on enhancing performance and handling larger datasets. **Assessment**: Implement a scalable AI solution, testing its efficacy and scalability under different loads.

4 Hours 2h 2h	**Module 8: AI Ethics and Governance** **Objective**: Discuss the ethical considerations and governance issues surrounding AI, including fairness, transparency, and the societal impacts of AI technologies. - **Ethical AI**: Tackle the ethical implications of AI, discussing topics such as algorithmic bias, transparency, and the societal impact of AI technologies. - **AI Governance**: Examine the importance of governance frameworks to ensure AI systems are used responsibly and within regulatory guidelines. **Lab**: Apply ethical guidelines and governance frameworks in the development of an AI project. **Assessment**: Engage in a debate or write a position paper on a controversial AI ethics issue, demonstrating critical thinking and ethical reasoning.
4 Hours 2.5h 1.5h	**Module 9: Advanced AI Techniques** **Objective**: Explore advanced AI topics such as generative adversarial networks (GANs), AI-enhanced IoT, and blockchain applications in AI, providing cutting-edge knowledge and skills. - **Advanced Topics**: Cover cutting-edge AI topics like Generative Adversarial Networks (GANs) and applications of AI in the Internet of Things (IoT). - **Integrative AI with AWS Services**: Learn how to integrate various AWS AI services to create comprehensive solutions for complex problems. **Lab**: Execute an advanced AI project utilizing multiple AWS services, integrating various AI techniques. **Assessment**: A quiz and hands-on tasks will test advanced knowledge and the ability to synthesize information across different AI domains.

4 Hours	**Module 10: Capstone Project and Review.** **Objective**: Consolidate all learned skills in a comprehensive capstone project that challenges participants to design, build, and deploy a real-world AI solution, followed by a critical review and feedback session. --- • **Capstone Project**: A culminating project that requires participants to utilise all skills learned throughout the course to design and implement a complete AI solution using AWS. • **Review and Feedback**: Participants receive detailed feedback on their projects from instructors and peers, providing learning points and areas for improvement. **Assessment**: Participants present their capstone projects, demonstrating their comprehensive understanding and application of AI technologies.