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Course Title:

GenAI Essentials for Beginners and Everyone.

Course ID # Genai-101

In this course, you will learn the principles, techniques, and the best practices for designing effective prompts. This course introduces the basics of prompt engineering and progresses to advanced prompt techniques. You will also learn how to guard against prompt misuse and to mitigate when interacting with FMs.

Course level: Basics and Intermediate

Duration: 30 hours (Lectures, hands-on labs, projects),

This course includes eLearning interactions, theory, Projects and Lab works.

Course objectives

In this course, you will learn to:

- Provide a foundational understanding of Generative AI concepts, including how models like GPT work.
- Introduce practical applications of GenAI across industries, such as content creation, customer support, and healthcare.
- Equip learners with skills to effectively interact with AI tools, including prompt engineering and model usage.
- Explore ethical considerations and best practices for responsible use of Generative AI technologies.
- Offer hands-on experience with beginner-friendly GenAI platforms to experiment with text, image, and data generation.

Intended audience

This course is intended for:

AI/ML Engineers, Data Scientists, Cloud Engineers, Developers, Data Engineer and IT admins

Prerequisites

We recommend that attendees of this course have taken the following courses:

- Introduction to Generative AI Essentials – Art of the Possible (14-hour, digital course)
- Planning a Generative AI Project (3-hour, digital course)
- Amazon Bedrock Getting Started (3-hour, digital course)

Course Outline

Introduction

- **GenAI Fundamentals– History, Overview**
  - Defining Ain/ ML
  - Fundamental Concepts of AI / ML
  - Fundamental Concepts Deep Learning

- Fundamental Concepts Generative AI

- **Familiarity with GenAI Applications**
  - Basics of Neural Networks (NN), Natural Language Processing (NLP)
  - Architecture of neural networks
  - Activation functions
- **Basic Knowledge of AI Models**
  - Types of Generative Models
  - Generative Adversarial Networks (GANs)
  - Architecture and working principles.
  - Overview of other models like Flow-based models and Transformer-based models
- **Building Your First Generative Model**
  - Building AI Applications on AWS Bedrock,
  - Building AI Applications on AWS SageMaker
- **Hands-on Experience with GenAI Tools**
  - Data Preparation
  - Data collection and preprocessing
  - Model Training through Knowledge Base, Action Group
- **Addressing Misuses of AI Applications**
  - Setting up the training environment,
  - Techniques of Prompts
  - Prompt Optimization
  - Model Evaluation Metrics
- **Practical Applications and Projects**
- **Ethical Considerations in Generative AI**
- **Awareness of AI Tools for Personal and Professional Use**

Course Summary

Session 1: GenAI, LLM – History, Overview and Defining AI/ ML

In this session, you will learn how to develop a fundamental understanding of foundation models (FMs), including an understanding of a subset of FMs called large language models (LLMs). First, you will be introduced to the basic concepts of a foundation model such as self-supervised learning and finetuning. Next, you will learn about two types of FMs: text-to-text models and text-to-image models. Finally, you will learn about the functionality and use cases of LLMs, the subset of foundation models that most often utilize prompt engineering.

Session 2: Familiarity with GenAI Applications

In this lesson, you are introduced to Generative AI engineering, the set of practices that focus on developing, designing, and optimizing AI Applications to enhance the output of FMs for the specific business needs. This Session first defines what is GenAI and describes the key concepts and terminology of Genai. Next students will learn an how AI/ML to show the different elements of a Genai. Finally, the session provides a list of general best practices for designing effective Generative AI Applications.

Session 3: Basic Knowledge of AI Models (LLMs and GANS)

In this lesson, you will learn about basic Genai techniques that can help you use generative AI applications effectively for your unique business objectives. First, the Session defines the Foundation Models, types of

Foundation Model (LLM & GANs). In this session you will also learn Neuro Network, Natural Language Processing (NLP) and AI techniques. Then, the Session defines AI ML Use cases and students will be able to build AI applications. This Session provides tips and examples of each type of Genai technique.

Session 4: Advanced Genai Techniques - Building Your First Generative Model

In this lesson, you will be introduced to several advanced techniques including involving cutting-edge methods and approaches that enhance the capabilities of AI systems to create, adapt, and optimize outputs. Retrieval augmented generation (RAG), Automatic Reasoning and techniques where models predict the next element in a sequence, often used in language generation and time-series forecasting. Tool-use (ART), ReAct, and LangChain. Examples are provided to show each technique in practice.

Session 5: Model-specific AI, Genai Techniques (Hands-on Experience with GenAI Tools)

In this lesson, you will learn the methods to tailored to specific types of AI models to improve performance, accuracy, or efficiency. how to engineer prompts for a few of the most popular FMs including Amazon Titan, Anthropic Claude, and AI21 Labs Jurassic-2. You will learn about the different parameters you can configure to get customized results from the models. Next you will learn about **techniques** to optimize different AI models, enhancing their ability to generate, interpret, and refine data in specialized ways, leading to more accurate and innovative AI-driven solutions.

Session 6: Addressing Prompt Misuses

In this lesson, you will learn how to Implement strict moderation tools to prevent the generation of harmful, inappropriate, or misleading content. AI models should have built-in content filters to automatically detect and block harmful outputs, such as violence, hate speech, or misinformation. In this session, you will learn how governments and organizations must create and enforce clear legal frameworks and ethical guidelines surrounding the use of GenAI. This includes policies on privacy, intellectual property, and the responsible development and deployment of AI technologies.

Session 7: Mitigating Bias

In this lesson, you will learn how bias is introduced into models during the training phase and how that bias can be reproduced in the responses generated by an FM. You will learn how biased results can be mitigated by updating the prompt, enhancing the dataset, and using training techniques. You will also learn GenAI models can inherit biases present in the training data, leading to discriminatory outputs. Regular audits, diverse datasets, and bias-correction techniques should be used to ensure fairness and eliminate bias from generated content.

Session 8 & 9: Hands-On Lab -Project. In this **Hands-on Lab session**, students will learn how to build an AI application tailored to specific use cases. They will work with examples such as **Question Answering**, **Summarization**, and **Semantic Search**, using Generative AI models to address real-world challenges. By the end of the session, Students will have practical experience in deploying AI Applications for these tasks, enhancing their skills in designing, building, and implementing AI applications.

Session 10: Projects Presentations