AVENTURE
INFINITE POSSIBILITIES

Generative AI Course

Course Overview

This comprehensive course covers the breadth of Generative AI, including foundational concepts, practical implementation, and advanced applications. The course delves into various generative models such as GANs, VAEs, and transformers, and explores their use in natural language processing, image synthesis, and more. Students will gain hands-on experience with state-of-the-art models like ChatGPT and Gemini, and learn to deploy AI applications.

Course Modules

Part 1: Introduction to Generative AI

Module 1: Overview of Generative AI

- Introduction to Generative AI
- Historical Evolution and Key Milestones
- Applications and Impact of Generative AI

Module 2: Fundamentals of Machine Learning and Deep Learning

- Basics of Machine Learning
- Neural Networks and Deep Learning
- Overview of TensorFlow and PyTorch

Part 2: Core Concepts in Generative Models

Module 3: Introduction to Generative Models

- Types of Generative Models: GANs, VAEs, Normalizing Flows
- Training Techniques and Challenges
- Evaluation Metrics for Generative Models

Module 4: Generative Adversarial Networks (GANs)

- Overview of GAN Architecture
- GAN Training: Discriminator and Generator
- Variants of GANs: DCGAN, WGAN, CycleGAN
- Hands-On with GAN Implementations

Module 5: Variational Autoencoders (VAEs)

- Introduction to VAEs
- VAE Architecture and Training
- Applications of VAEs in Image Generation

Module 6: Normalizing Flows

- Introduction to Normalizing Flows
- Flow-based Models and Their Advantages
- Implementation and Applications

Part 3: Natural Language Processing and Generative AI

Module 7: Fundamentals of NLP

- Introduction to NLP and Language Models
- Text Preprocessing Techniques
- Word Embeddings: Word2Vec, GloVe

Module 8: Transformer Models and Language Models

- Overview of Transformer Architecture
- Key Transformer Models: BERT, GPT, T5
- Fine-Tuning Transformers for NLP Tasks

Module 9: Building with ChatGPT and Similar Models

- Introduction to ChatGPT and Its Capabilities
- Fine-Tuning ChatGPT for Specific Applications
- Building Conversational Agents and Chatbots

Module 10: Introduction to Gemini and Other Modern Models

- Overview of Gemini and Its Innovations
- Comparison with Other Generative Models
- Hands-On with Gemini for Text and Image Generation

Part 4: Advanced Techniques in Generative AI

Module 11: Conditional and Few-Shot Learning

- Conditional Generative Models
- Few-Shot and Zero-Shot Learning Techniques
- Applications in Text, Image, and Video Generation

Module 12: Advanced Topics in Generative AI

- Training GANs and VAEs
- Conditional GANs
- Applications in Image and Text Generation

Part 5: Practical Applications and Use Cases

Module 13: Generative AI in Image Synthesis

- Introduction to Image Synthesis Techniques
- Using GANs for Image Generation
- Hands-On with StyleGAN and BigGAN

Module 14: Generative AI in Text and Music

- Text Generation with GPT Models
- Music Generation with RNNs and Transformers
- Creative Applications of Generative AI

Module 15: Developing Real-World Applications

- Building a Chatbot with GPT
- Generating Art and Content with AI
- Ethical Considerations and Safety in Generative AI

Part 6: Tools and Deployment

Module 16: Tools for Developing Generative AI

- Overview of AI Frameworks: TensorFlow, PyTorch, Hugging Face
- Using Pre-trained Models and Fine-Tuning
- Developing and Training Custom Models

Module 17: Deployment and Scaling Generative Models

- Model Deployment Techniques: Flask, Django, FastAPI
- Scaling Generative Models with Cloud Services
- Monitoring and Maintaining AI Models in Production

Capstone Project

- Designing and Building a Generative AI Application
- End-to-End Development: Data Collection, Model Training, and Deployment

- Demonstrating the Application to Solve Real-World Problems

Assessment and Certification

- Quizzes and Assignments
- Practical Lab Projects
- Final Project Presentation and Evaluation
- Certification of Completion