

Full stack Generative AI and Prompt Engineering Course Contents

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Introduction to Generative AI

- Definition and applications of generative AI
- Overview of different types of generative models (e.g., GANs, VAEs)
- Case studies showcasing generative AI in various fields

Fundamentals of Machine Learning

- Basics of supervised and unsupervised learning
- Introduction to neural networks and deep learning
- Hands-on exercises with simple machine learning models using Python and libraries like TensorFlow or PyTorch

Introduction to Natural Language Processing (NLP)

- Basics of NLP and its significance
- Overview of common NLP tasks (e.g., text classification, named entity recognition)
- Practical exercises using Python libraries such as NLTK or spaCy

Deep Dive into Generative Models

- Understanding the architecture and training process of generative models
- Exploration of key concepts such as latent space and probability distributions
- Hands-on implementation of basic generative models using TensorFlow or PyTorch

Generating Text with Language Models

- Introduction to language models and their role in text generation
- Hands-on exercises with building and training language models for text generation tasks
- Evaluation metrics for assessing the quality of generated text

Prompt Engineering and Model Fine-Tuning

Introduction to Prompt Engineering

- Significance of prompts in controlling generative AI output
- Overview of prompt engineering techniques and strategies
- Case studies demonstrating effective prompt design

Fine-Tuning Pre-trained Models

- Overview of transfer learning and fine-tuning pre-trained models
- Hands-on exercises with fine-tuning language models for specific tasks using libraries like Hugging Face's Transformers
- Strategies for selecting appropriate pre-trained models and adjusting hyperparameters

Advanced Prompt Engineering Techniques

- Deep dive into advanced prompt engineering strategies
- Exploration of techniques for bias reduction and fairness in generative AI
- Practical exercises with designing complex prompts for nuanced control over model output

Deploying Generative Models

- Overview of deployment options for generative AI models
- Introduction to containerization with Docker for model deployment
- Hands-on exercises with deploying generative models as web services or APIs

Ethical Considerations and Best Practices

- Discussion on ethical considerations surrounding generative AI
- Best practices for using and deploying generative AI models responsibly
- Case studies and real-world examples highlighting ethical challenges and solutions

Introduction to GitHub Copilot

- Overview of GitHub Copilot
- Installation and setup
- Understanding how GitHub Copilot works
- Exploring supported programming languages and platforms

Getting Started with GitHub Copilot

- Basic usage and interface overview
- Generating code snippets for common tasks
- Understanding code suggestions and completions
- Hands-on exercises to practice using GitHub Copilot for code generation

Advanced Usage and Customization

- Exploring advanced features and capabilities
- Customizing prompts and preferences
- Using GitHub Copilot for specific programming tasks
- Best practices for integrating GitHub Copilot into your workflow

Collaboration and Code Reviews with GitHub Copilot

- Collaborative coding with GitHub Copilot
- Leveraging GitHub Copilot for code reviews and feedback
- Integrating GitHub Copilot with version control systems
- Tips and tricks for effective collaboration using GitHub Copilot

Ethical Considerations and Future Directions

- Ethical considerations in using AI-powered tools like GitHub Copilot
- Understanding limitations and biases in AI-generated code
- Discussion on the future of AI-assisted programming and GitHub Copilot
- Q&A session and wrap-up

Capstone Project Work

- Students work on a capstone project applying concepts learned throughout the course
- Project proposal, development, and refinement stages
- Guidance and support provided by instructors and mentors

Capstone Project Showcase and Conclusion

- Students present their capstone projects to the class
- Peer feedback and evaluation
- Recap of key learnings and discussion on further opportunities in generative AI and prompt engineering