Course Outline

Saturday, December 2, 2023 10:32 PM

Course Title:

"Exploring Large Language Models and Generative AI: Practical Applications and Innovations"

Course Duration:

10 Weeks (2 sessions per week, 3 hours per session)

Week 1-2: Introduction to LLMs and Generative AI

Topics:

- Overview of AI and Machine Learning
- Introduction to Natural Language Processing (NLP)
- Fundamentals of Large Language Models (LLMs)
- History and Evolution of LLMs (from early models to GPT-4, BERT, etc.)
- Basic principles of Generative AI

Hands-On Lab:

- Setting up a basic NLP environment in Python and Node.js
- Exploratory projects: Simple text generation and analysis using pre-trained models

Week 3-4: Deep Dive into LLM Architectures

Topics:

- Understanding Transformer models
- GPT, BERT, and other model architectures
- Comparing OpenAI's models with those from Meta and other companies
- Model training and fine-tuning basics

Hands-On Lab:

- Implement a small-scale language model
- Fine-tuning a pre-trained model for specific tasks

Week 5-6: Advanced Applications of LLMs

Topics:

- Advanced NLP tasks (sentiment analysis, text summarization, etc.)
- Chatbots and conversational AI
- Ethics and biases in LLMs
- Generative AI in other domains (e.g., art, music)

Hands-On Lab:

- Developing a chatbot using LLMs
- Experimenting with generative AI for creative tasks

Week 7-8: Industry-Specific Use Cases

Topics:

- LLM applications in healthcare, finance, legal, etc.
- Case studies of successful implementations
- Integration of LLMs in existing software ecosystems
- Performance and scalability considerations

Hands-On Lab:

- Building a domain-specific application using LLMs
- Integrating LLM with web services (using Python/Node.js)

Week 9: Project Development

Topics:

- Project ideation and planning
- Best practices in project management for AI projects
- Data collection and model training strategies

Hands-On Lab:

- Start working on individual/group projects
- Initial presentations and feedback sessions

Week 10: Project Completion and Review

Topics:

- Finalizing and deploying LLM projects

- Presentations of completed projects
- Peer and instructor feedback

Hands-On Lab:

- Final project presentations
- Q&A and feedback session with instructors

Continuous Elements Throughout the Course:

- **Discussion Sessions:** Weekly open forums for discussing news, advancements, and ethical considerations in the field of AI and LLMs.
- **Office Hours:** Regularly scheduled times for students to bring questions or project challenges to instructors.
- **Online Resources:** Access to a curated list of readings, tutorials, and research papers.
- **Guest Lectures:** Inviting industry experts for special sessions (subject to availability).

Assessment and Project:

- **Ongoing Assessments:** Quizzes and mini-projects at the end of each major topic.
- **Final Project:** A capstone project where students apply the concepts learned to build an innovative application using LLMs. This project should be both technically robust and creatively engaging, ensuring the application of skills in a real-world scenario.

This course aims to provide a comprehensive understanding of LLMs and Generative AI, equipping students with the skills to apply these technologies in various domains. The blend of theoretical knowledge, practical labs, and a capstone project ensures a holistic learning experience.