

Introduction

Artificial Intelligence (AI) is rapidly becoming one of the most critical technologies of our time. As AI evolves, it presents numerous opportunities for students to gain practical knowledge and skills while contributing to research and development in the field. The CCSU AI laboratory will be well-equipped and designed to enhance student learning, which is an essential step toward preparing students for the future of work.

A significant goal of this lab is to make **New Britain and surrounding communities AI-informed. Students in the AI curriculum will accomplish this** by engaging the community and relaying the info to the general public. Perhaps a required community service course can be part of the lab curriculum. Lastly, as we build the lab, we can garner public support by advertising that CCSU is on the ground floor of AI—and educating the general public is a good start. We should pursue a series of articles in the NB Herald and other local outlets, building community curiosity and interest in CCSU as a resource.

AI is an interdisciplinary domain. We propose creating a multidisciplinary council from the CCSU faculty to guide further use of the AI Lab. Below is a draft curriculum that gives students the necessary skills to work in AI. Remember, this is a draft, and the council will provide the final curriculum.

The goal is to have a new program submitted by early January 2024 for offering in September 2024.

Development of Curriculum BS in Artificial Intelligence

The interdisciplinary council should develop a comprehensive AI curriculum covering foundational and advanced AI, NLP, and machine learning topics. Below is a detailed outline of the critical areas to include in the curriculum:

- 1. Introduction to Artificial Intelligence (AI):**
 - a. History and Evolution of AI
 - b. Types of AI (Narrow AI, General AI, Superintelligence, and LLMs)
 - c. AI applications across various industries
- 2. Introduction to Python and Lab Resources**
 - a. Python
 - b. Software/ecosystem
 - c. Github
- 3. Fundamentals of Natural Language Processing (NLP):**
 - a. Basic Concepts in Linguistics
 - b. Tokenization, stemming, and lemmatization
 - c. Part-of-speech tagging and named entity recognition
 - d. Syntax and dependency parsing
 - e. Sentiment analysis and text classification

4. Basics of Machine Learning (ML):

- a. Supervised, unsupervised, and reinforcement learning
- b. Standard ML algorithms and techniques
- c. Feature engineering and data preprocessing
- d. Model evaluation and validation
- e. , Overfitting, underfitting, and model selection
- f. Application of ML principles to the training of LLMs

5. Introduction to Deep Learning:

- a. Artificial neural networks and their components
- b. Activation functions, loss functions, and optimization algorithms
- c. Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs)
- d. Basics of transfer learning

6. Advanced NLP with Deep Learning:

- a. Word embeddings and pre-trained language models
- b. Transformer architecture and attention mechanisms
- c. State-of-the-art models like Google's BERT (Bidirectional Encoder Representations from Transformers) and Bard, OpenAI's ChatGPT, and their variants.

7. ChatGPT-specific topics:

- a. Overview of the GPT architecture and its evolution (GPT-1, GPT-2, GPT-3, GPT 3.5, and GPT-4)
- b. Preprocessing and tokenization for ChatGPT
- c. Fine-tuning techniques for domain-specific applications
- d. Model evaluation metrics and best practices
- e. , Techniques for controlling and improving model output

8. Ethics and Responsible AI:

- a. Bias, fairness, and Transparency in AI Models
- b. Privacy and data protection concerns
- c. AI safety and robustness
- d. Responsible deployment and use of AI systems
- e. , Regulatory and policy considerations

9. Practical applications and projects:

- a. Building LLM-powered chatbots, virtual assistants, and Q&A systems
- b. Content generation, summarization, and translation
- c. Sentiment analysis, emotion detection, and personality modeling
- d. Domain-specific applications in healthcare, finance, law, and more

10. Research and innovation:

- a. Current research trends and challenges in AI, NLP, and ChatGPT
- b. Identifying research gaps and opportunities
- c. Methods for Conducting and disseminating research

11. Community Engagement (6 credits?)

- a. Internship at a company working on AI
- b. Creating or giving a series of lectures to the community

12. Potential Electives

- a. LLM Prompt Engineering
- b. Human-AI Interaction and User Experience Design
- c. Business Analytics and AI
- d. Business Intelligence and Data Warehousing
- e. E-commerce and AI
- f. Customer Relationship Management (CRM) and AI
- g. Enterprise Resource Planning (ERP) systems and AI integrations
- h. Robotics and Autonomous Systems
- i. Computer Vision
- j. Signal Processing for AI
- k. AI in Gaming
- l. AI for Sustainability and Environmental Science