**Practical Connection (Residency Day 3)**

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MSAI532 - M51 Natural Language Processing

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**Practical Application of MSAI532 - Natural Language Processing (NLP) Course**

**in My Work Environment**

As a Software Engineer at Walmart, my work primarily focuses on analyzing clickstream data, and recently, I have taken on projects that involve developing artificial intelligence (AI) powered tools to enhance associate productivity. The knowledge, skills, and theories I acquired in this course are highly relevant to my role, particularly in building AI-driven solutions such as chatbots for engineering support and optimizing customer interaction analytics.

One of the core learning outcomes of this course is understanding text preprocessing techniques and their role in structuring unstructured data for meaningful insights. At Walmart, clickstream data from customer interactions recorded on web and mobile applications contains a wealth of information in an unstructured format. By leveraging the text processing techniques, I learned in week 3, such as tokenization, stemming, and stop-word removal, I can clean and structure raw data to improve customer behavior analysis. For example, understanding search query intent through natural language processing (NLP) allows us to optimize product recommendations and refine search algorithms, ultimately enhancing the overall customer experience.

Additionally, different word embeddings, such as Word2Vec, and Transformer-based embeddings like BERT, which will be covered in this course, enable us to create more accurate user intent models. These models assist in classifying user actions and providing predictive insights into customer behavior. By applying sequence-to-sequence models for predictive analytics, I can enhance how Walmart personalizes content, reduce friction in user navigation, and improve product discoverability.

The course also emphasizes practical implementations such as sentiment analysis, machine translation, and conversational AI. One of my primary responsibilities is developing an AI-driven chatbot to assist on-call engineering support teams. This chatbot must be able to understand, process, and respond to technical queries from engineers regarding Walmart's cloud infrastructure and application performance issues. By applying Named Entity Recognition (NER) and Transformer-based models covered in this course, I will gain a fundamental understanding of the workings of large language models such as GPT, Llama, Claude, and Gemini. I can leverage this knowledge to develop a Retrieval Augmented Generation (RAG) pipeline that enhances the chatbot's ability to extract key information from logs and documentation. For instance, if an engineer inquires about a database latency issue, the chatbot can identify relevant log entries and recommend corrective actions using pre-trained language models. Moreover, sentiment analysis techniques from this course can be applied to detect frustration or urgency in support tickets, helping to prioritize critical issues effectively.

This course has provided me with a strong technical foundation that I can apply to more advanced AI initiatives at Walmart. For example, using the sequence-to-sequence models we studied during the residency program, I plan to develop more sophisticated text summarization tools that help engineers quickly digest log files and system alerts. Additionally, exposure to neural machine translation (NMT) will give me the foundation to create multilingual support tools for Walmart’s diverse global workforce. Also, as a Ph.D. student specializing in Artificial Intelligence, I find that the knowledge gained from this course aligns well with my research interests in generative AI, automation, and cloud cost optimization. Understanding NLP at a deeper level enables me to contribute to Walmart’s AI innovation strategies, with a focus on making AI-driven tools more efficient and user-friendly.