Module 6: Portfolio Milestone

NLP Chatbot

Ryan Thompson

Colorado State University - Global

CSC 525

Dr. Banerjee

20 May 2025

Mental Health NLP Chatbot Prototype

The current implementation of the mental health NLP chatbot is a foundational model built in Python that provides basic conversational support for individuals experiencing symptoms of anxiety, ADHD, and depression. It uses natural language processing (NLP) techniques, including tokenization, lemmatization, TF-IDF vectorization, and logistic regression, to classify user input into specific mental health related intents. It then delivers a relevant, supportive response based on the detected intent. A particularly important feature of the chatbot is its crisis escalation mechanism. When users input phrases associated with suicidal ideation or self harm, the bot immediately interrupts the conversation and provides the contact information for the 988 Suicide & Crisis Lifeline, a critical safety net for at risk users.

Despite its strengths, the current chatbot has several limitations. It operates with a relatively small and handcrafted training dataset, which restricts its ability to generalize across a wide range of user expressions. Its ability to detect nuanced emotional states or interpret more complex natural language is limited. The logistic regression model, while simple and fast, lacks the depth to understand contextual or idiomatic language often present in mental health conversations. The chatbot also lacks memory and multi turn dialogue capability, which are essential for creating meaningful, ongoing support interactions.

In the final version of the project, several improvements are envisioned. First, expanding the dataset with more varied and authentic mental health dialogues will help improve intent classification accuracy and response diversity. This will likely require retraining the model from scratch with the enriched data. Second, replacing the logistic regression classifier with a more sophisticated transformer based language model, such as BERT or DistilBERT, would allow the chatbot to understand and respond to user inputs with more empathy. These models, when fine tuned on relevant data, have been shown to outperform traditional machine learning approaches on language understanding tasks.

In addition to improving the model and training data, the final version could incorporate features such as sentiment analysis, emotion detection, and conversation memory. These would allow the bot to tailor responses more precisely to the user’s emotional state and carry context across multiple exchanges. Ultimately, these enhancements will create a more helpful and human-like experience for users seeking mental health support.

While the current version serves as a strong prototype, its evolution will require retraining, more data, and advanced NLP techniques. With these improvements, the chatbot will be better positioned to offer meaningful and ethical support to individuals navigating mental health challenges.