Internship Report

Name: Tithi Banerjee

Internship Provider: NullClass

Internship Duration: 30-03-2025 to 30-04-2025

Project Title: Building Smart Chatbots – Article Generator, Multi-Modal Interaction, and Sentiment-Aware Conversations

# Introduction

This report outlines my experience and learning during the one-month internship at NullClass. The internship focused on developing intelligent chatbot systems through three core tasks: article generation using multiple LLMs, a chatbot that can process both images and text, and one that can understand and react to users' emotions. This experience helped me gain practical skills in AI, machine learning, and natural language processing.

# Background

Chatbots are a growing part of technology and customer interaction in industries today. They help businesses save time and offer better service. My interest in AI and chatbot systems led me to this internship, where I got the chance to explore the practical side of building and evaluating chatbot applications with different capabilities.

# Learning Objectives

- Learn how different open-source language models (LLMs) generate content.

- Create a chatbot that understands and responds to both images and text.

- Implement sentiment analysis for understanding user emotions.

- Evaluate models based on accuracy, precision, and recall.

- Organize and document a complete machine learning project from scratch.

# Activities and Tasks

Task 1: Article Generator using 3 LLMs

I used three different open-source language models to build a chatbot that could generate articles based on prompts. I compared their outputs in terms of clarity, accuracy, and fluency. The best-performing model was identified based on the quality and consistency of the generated text.

Task 2: Multi-Modal Chatbot

In this task, I created a chatbot capable of understanding both text and images using Google PaLM and Gemini AI APIs. The chatbot responded contextually to visual input along with text, integrating both into coherent conversations.

Task 3: Sentiment Analysis Chatbot

The third task focused on making the chatbot emotionally intelligent. It used sentiment analysis to detect whether the user's input was positive, negative, or neutral. The chatbot then responded in a way that matched the emotion—for example, offering support for negative sentiments and encouragement for positive ones.

# Skills and Competencies Gained

- Using LLMs for text generation.

- Image and text integration in multi-modal applications.

- Implementing and fine-tuning sentiment analysis models.

- Data pre-processing and model training using Jupyter Notebook.

- Version control and documentation using GitHub.

- Evaluation using accuracy, confusion matrix, precision, and recall.

# Feedback and Evidence

Each task was completed according to the guidelines provided. I created a proper requirements.txt, trained models in Jupyter notebooks, stored large files on Google Drive, and linked everything properly in the README.md. The GitHub repository includes organized folders and code for each task.

# Challenges and Solutions

- Combining everything into one chatbot was initially challenging. I tackled this by breaking the problem into smaller modules and integrating them gradually.

- Tuning the sentiment analysis model to be accurate took some time. I tested with multiple datasets and adjusted parameters until I achieved over 70% accuracy.

- Understanding and integrating multi-modal API tools like PaLM and Gemini was a learning curve, but online tutorials and documentation helped me solve it.

# Outcomes and Impact

By the end of the internship, I had successfully built three working chatbot models, each with unique capabilities. The models not only met the performance criteria (70%+ accuracy) but also taught me how to approach AI problems practically. This internship boosted my confidence in working independently on real-world ML projects.

# Conclusion

This internship with NullClass was a great learning journey. It helped me build hands-on skills in AI, especially in chatbot development and sentiment analysis. I’m proud of the results and grateful for the opportunity to take on real challenges and solve them with research and coding.