

AI-Driven Yelp Review Analysis & Two-Dashboard Feedback System

Abstract

This report presents the design, evaluation, and deployment of two AI-driven systems. The first system focuses on prompt-based star rating prediction for Yelp reviews using Large Language Models (LLMs). Three distinct prompting strategies were evaluated based on accuracy, JSON validity, and reliability. The second system is a fully deployed, web-based two-dashboard feedback platform consisting of a public user dashboard and an internal admin dashboard.

1. Introduction

Online reviews play a crucial role in shaping customer perception and business decision-making. Automated analysis of textual reviews can significantly reduce manual effort while providing valuable insights. With the rise of Large Language Models (LLMs), prompt engineering has emerged as a powerful alternative to traditional model training.

2. Task 1: Rating Prediction via Prompting

2.1 Dataset Description

The Yelp Reviews dataset was sourced from Kaggle. A subset of approximately 200 reviews was randomly sampled for evaluation. Each review contains free-text feedback and a ground-truth star rating from 1 to 5.

2.2 Prompt Engineering Methodology

Three prompt versions were designed to evaluate how instruction specificity affects LLM performance. Each prompt required the model to return a structured JSON output.

2.3 Prompting Approaches

V1 Basic Prompt: Minimal instruction baseline.

V2 Rule-Based Prompt: Explicit rating scale with JSON enforcement.

V3 Structured Reasoning Prompt: Expert role with constrained output.

2.3 Evaluation Results

v1_basic → Accuracy: 0.46, JSON Validity: 0.78

v2_rules → Accuracy: 0.64, JSON Validity: 1.00

v3_cot → Accuracy: 0.66, JSON Validity: 1.00

3. Task 2: Two-Dashboard AI Feedback System

The system consists of a public user dashboard for review submission and an internal admin dashboard for analytics and AI-generated insights.

4. Deployment

Both dashboards were deployed using Hugging Face Spaces with Streamlit. Reviews are stored persistently in a CSV file, and LLM access is handled via secure environment secrets.

5. Conclusion

This project demonstrates effective prompt engineering and practical deployment of AI-powered applications. Future improvements include database-backed storage and enhanced analytics.