Customer Emotion Analysis System

Executive Summary

The Customer Emotion Analysis System processes feedback in any language to analyze sentiment, identify emotions and topics, and provide tailored responses based on sentiment analysis.

Methodology

Data Processing Pipeline

1. **Input Collection**: Users submit feedback via Streamlit interface in any language
2. **Translation**: Non-English text translated to English using Groq's Gemma2-9b-it model
3. **Sentiment Analysis**:
    - Extracts emotions with activation levels
    - Identifies topics and subtopics
    - Calculates sentiment score (-100 to +100)
    - Provides sentiment breakdown by topic
4. **Response Generation**: Creates personalized responses based on sentiment

Technical Implementation

- **Core LLM**: Gemma2-9b-it model from Groq
- **Framework**: LangChain for orchestrating LLM interactions
- **Data Structure**: Pydantic models for structured outputs
- **Visualization**: Interactive dashboard with charts

LLM Monitoring and Evaluation

- **LangSmith Integration**: Implemented for LLM observability and performance tracking
- **Trace Analysis**: Captures execution flow of language model interactions
- **Performance Metrics**: Tracks response times, token usage, and completion rates
- **Evaluation Sets**: Benchmarks model accuracy across feedback scenarios
- **Quality Control**: Human-in-the-loop feedback mechanisms improve model outputs

Findings

1. **Multi-dimensional Analysis**
    - Captures emotional nuances and topic-specific sentiment
    - Quantifies intensity and activation levels of emotions
2. **Language Flexibility**
    - Enables global feedback analysis without language barriers
    - Provides consistent analysis regardless of input language
3. **Visual Storytelling**
    - Transforms sentiment data into intuitive visualizations
    - Communicates topic-specific sentiment differences effectively
4. **Structured Output**
    - Ensures schema-validated outputs for reliable processing
    - Facilitates integration with downstream systems
5. **Personalized Responses**
    - Provides customized responses based on sentiment
    - Closes the feedback loop with relevant communications

Recommendations

1. **Enhanced Analytics Capabilities**
    - Develop sentiment trend analysis for tracking satisfaction over time
    - Implement predictive modeling to anticipate customer needs
    - Create segment-specific analysis dashboards
    - Build automated alerts for significant sentiment shifts
2. **Data Persistence and Integration**
    - Develop database infrastructure to store feedback and analysis results
    - Implement direct integration with CRM systems
    - Create automated triggers for service intervention based on sentiment thresholds
    - Build exportable reports for executive dashboards