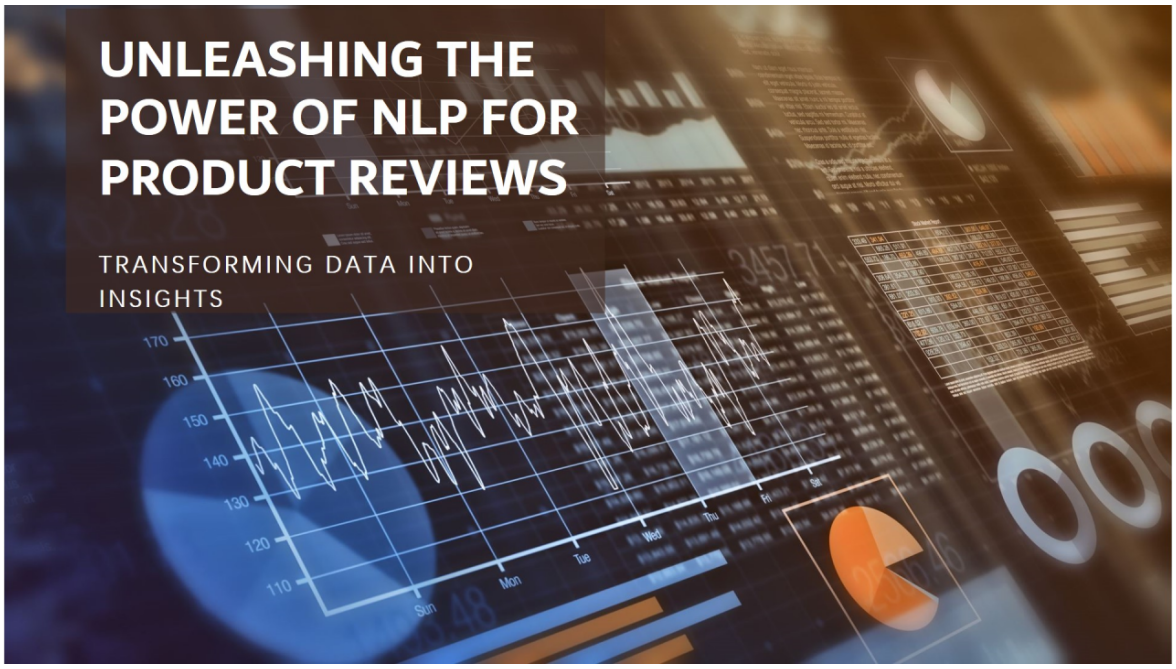
Sentiment Analysis Web Application

User Manual

Eshan Kulkarni, ME21B057

May 15, 2025



Overview

This application provides real-time sentiment analysis for customer reviews and other text content using state-of-the-art Transformer models. Built with Streamlit and powered by Deep learning, it offers:

- **Instant sentiment prediction** (Positive/Negative classification)
- **Confidence scoring** with percentage certainty
- **Feedback mechanism/Data Drift** to improve model accuracy
- **Automatic retraining** when sufficient feedback is collected
- **Version control** with Git and DVC for complete reproducibility
- **Model deployment and analytics** MLflow allows to load model and switch between versions seamlessly. It also tracks performance metrics of the model allowing insights into overall model analytics.

Tip: The model improves with your feedback! Incorrect predictions help retrain the system.

Business Relevance

This sentiment analysis solution delivers critical business intelligence capabilities:

- **Brand Protection**: Monitor and rapidly respond to negative customer feedback to maintain brand reputation
- **Market Intelligence**: Track sentiment trends across your products and competitors to identify:

  - Emerging customer preferences
  - Product improvement opportunities
  - Competitive advantages/disadvantages
- **Product Development**: Pinpoint specific strengths and weaknesses through:
  - Feature-level sentiment analysis
  - Comparative performance metrics
  - Customer need identification

Future Direction: Implement longitudinal tracking to analyze sentiment trends for specific products over time, enabling predictive market analysis.

Potential Improvements & Future Directions

The system is designed for continuous enhancement:

Area	Development Roadmap
Granular Analysis	Feature-specific sentiment (e.g., battery life, design)
Multilingual Support	Expand beyond English to global markets
Real-time Dashboard	Live monitoring of incoming reviews
Model Explainability	SHAP/LIME integration for prediction explanations
System Integration	CRM/product management system automation
Custom Analytics	Deep dive into customer needs and preferences

Strategic Advantage: When fully implemented, these improvements will enable:

- 360° customer sentiment visibility
- Automated alerting for critical feedback
- Data-driven product roadmaps
- Competitive benchmarking

Getting Started

Option 1: Local Installation

Prerequisites:

- Python 3.8+ (`python --version`)
- Docker (for containerized deployment)

Installation Steps:

1. Clone the repository:

```
git clone https://github.com/ehindasche/Amazon-Review-Sentiment-Analysis
```

2. Install dependencies:

```
pip install -r requirements.txt
```

3. Launch the application:

```
streamlit run app.py
```

Access: `http://localhost:8501`

Option 2: Docker Deployment (Recommended)

```
docker-compose up --build
```

- **Streamlit UI**: `http://localhost:8501`
- **MLflow Dashboard**: `http://localhost:5000`
- **Monitoring**: Grafana (`http://localhost:3000`)

Using the Application

Step 1: Text Analysis

1. Enter text in the input box
2. Click the **Analyze** button

Step 2: Interpretation of Results

The system will display:

- **POSITIVE** (with confidence percentage)
- **NEGATIVE** (with confidence percentage)

Step 3: Feedback Submission

exclamation-triangle Found an incorrect prediction?

1. Select correct sentiment from dropdown
2. (Optional) Add explanatory comments
3. Click **Submit Feedback**

Note: After **2+ feedback submissions** (2 is a configurable parameter. I as a developer may increase this as required), the system automatically initiates model retraining.

Troubleshooting

Advanced Features

Issue	Solution
App crashes on launch	Check `logs/app_errors.log` and verify dependencies
Model fails to load	Ensure MLflow server is running (`http://localhost:5000`)
Docker container issues	Run `docker system prune` and rebuild containers

For Administrators

- **Model Retraining**: Automatic when feedback threshold reached
- **Data Tracking**: All feedback stored `/data/feedback.csv`
- **Performance Monitoring**: Grafana dashboard with real-time metrics

FAQs

- **Multilingual Support?** Currently English-only. Contact team for custom language model requests.
- **Training Frequency?** Only when 2 feedback submissions are received.
- **Data Privacy?** All user data is anonymized and stored locally by default.

Support

- **Email**: Eshan-Kulkarni-Developers.pvt.ltd
- **GitHub**: GitHub link for New Issue

Version 1.2.0 — Last updated: May 15, 2025
Documentation generated automatically with each deployment