Customer Complaints Analysis (LLM)

Project Report

Project Report Date: September 02, 2025:-

1. Introduction

Library	Purpose
streamlit	Used to build the web application interface
pandas	Manages and manipulates the complaint data
faker	Generates synthetic data, such as customer names
transformers	Provides access to the Zero-Shot Classifier model from Hugging Face
torch	A dependency required by the transformers library
matplotlib	Used for creating the bar chart visualization
wordcloud	Generates the word cloud visualizations for each category

Customer feedback is the heartbeat of every organization. The way businesses understand and act on complaints defines the customer experience.

The **Customer Complaints Analysis (LLM)** project was designed to bridge the gap between raw customer feedback and meaningful insights. Using *Large Language Models (LLMs)*, this application automatically generates, categorizes, and visualizes complaints. Instead of manually sifting through hundreds of grievances, businesses can now rely on a structured, data-driven approach to identify patterns and improve service quality.

2. Technical Details:-

2.1. Dependencies:-

The project makes use of modern Python libraries that ensure reliability, performance, and interactive visualization. Each library was carefully chosen to serve a specific purpose, making the project lightweight yet powerful.

2.1Application Logic (app_complaints.py):-

The heart of the application is the **app_complaints.py** script.

It consists of three main pillars: **Smart Data Generation:** Using Faker, synthetic yet realistic complaints are generated to simulate a customer feedback environment. **Intelligent Categorization:** With Hugging Face's *BART-large-MNLI* zero-shot classifier, every complaint is automatically categorized without requiring pre-labeled data. This makes the system versatile and adaptable. **Human-Centric Visualizations:** Instead of raw data dumps, the system provides easy-to-read bar charts, word clouds, and interactive tables so decision-makers can act quickly.

3. Installation and Execution:-

Running this application is as simple as installing dependencies and launching Streamlit. This ensures even non-technical stakeholders can quickly explore the tool with minimal effort.

1. Deployment

The project is deployable to platforms such as **Streamlit Cloud** and **Hugging Face Spaces**, making it shareable with teams or customers in just a few clicks. This means businesses can adopt it without heavy infrastructure investments.

2. Conclusion

In today's competitive market, speed and empathy in handling customer complaints are essential.

The **Customer Complaints Analysis (LLM)** project is more than a technical experiment

— it is a step toward humanizing data science. By combining machine efficiency with thoughtful visualization, businesses can listen to their customers better, resolve issues faster, and build stronger trust.

3. Future Scope

While this project lays the foundation, the journey of improving customer experience is ongoing. Some potential future directions include: **Real-time Complaint Monitoring:** Integrating the model into live systems to analyze complaints as they arrive. **Sentiment Analysis:** Extending beyond categorization to understand the emotions behind complaints, such as frustration, disappointment, or urgency. **Multilingual Support:** Expanding to support feedback in multiple languages, making the tool inclusive for global businesses. **Integration with CRM Systems:** Connecting with platforms like Salesforce or HubSpot to provide businesses with actionable insights directly in their workflow. **Predictive Insights:** Using historical complaint data to predict potential customer churn or service breakdowns before they occur. Ultimately, the vision is to create a system where businesses don't just respond to complaints — they anticipate them and turn challenges into opportunities for growth.