CivicPulse

Mini Project

Project-I(6IT342)

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Project Guide
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Agenda

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Introduction

- Citizens increasingly voice civic issues such as traffic, water, sanitation, and waste on social media and complaint portals.
- Existing platforms depend on manual logging and categorization, making them slow and unable to handle large volumes.
- We propose an AI-based system that automates sentiment detection, categorizes issues, and provides explainable insights for decision-makers.

Problem Statement

Citizens share civic issues on social media and portals, but authorities lack a real-time automated system to process feedback. Manual analysis is slow and error-prone, leading to delays. An AI-based platform is needed to analyze sentiments, categorize issues, and provide explainable insights for faster decisions.
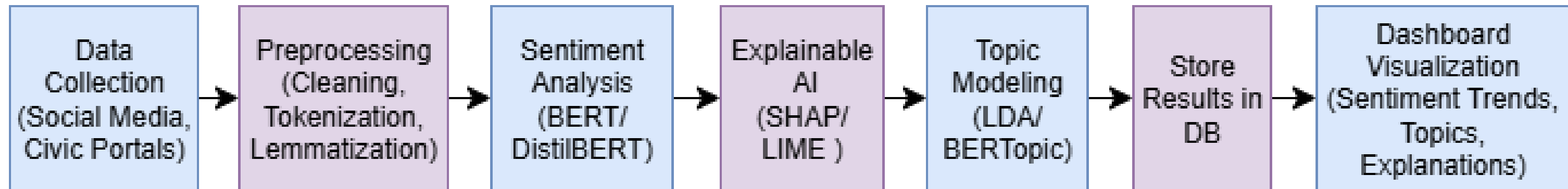
Objectives

1. **Collect and preprocess civic feedback data** from social media and civic portals to create a clean, structured dataset.

2. **Implement sentiment analysis** using pretrained NLP models and apply **Explainable AI (XAI)** techniques to make predictions interpretable.

3. **Apply topic categorization methods** to group feedback into major civic domains such as traffic, water supply, and sanitation.

4. **Develop an interactive dashboard** to visualize sentiment trends, categorized issues, and explainability insights for municipal stakeholders.

Implementation

1. Data is collected from civic complaint portals and social media posts.
2. Preprocessing removes noise, normalizes text, and prepares it for analysis.
3. Transformer models classify complaints into positive, neutral, or negative sentiments.
4. Explainable AI highlights why predictions were made, ensuring transparency.
5. Topic modeling groups complaints into civic domains like traffic, water, and sanitation.
6. A dashboard visualizes sentiment trends, categorized issues, and explainability insights.

Flow Diagram

Technologies and tools

Component	Technology Used	Justification
Frontend / Dashboard	Flask + Plotly / Chart.js	Simple, interactive visualization for trends
NLP Preprocessing	SpaCy, NLTK	Efficient text cleaning and lemmatization
Sentiment Analysis	Hugging Face (BERT / DistilBERT)	Accurate, transformer-based sentiment classification
Explainable AI (XAI)	SHAP, LIME	Highlights key words influencing AI predictions
Database	SQLite / PostgreSQL	Open-source, lightweight and scalable storage

References

1. Social Media, Topic Modeling and Sentiment Analysis in Municipal Decision Support https://arxiv.org/abs/2308.04124 (Aug 2023)

2. Explaining Sentiments: Improving Explainability in Sentiment Analysis Using Local Interpretable Model-Agnostic Explanations and Counterfactual Explanations | IEEE Journals & Magazine | IEEE Xplore (July 2023)

3. Sentiment Analysis Meets Explainable Artificial Intelligence: A Survey on Explainable Sentiment Analysis | IEEE Journals & Magazine | IEEE Xplore (April 2025)

THANK YOU!