ResolveAI: Grievance Tracker

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Abstract—

This paper presents an AI-powered web application for automating petition analysis and grievance redressal. The system allows users to securely submit petitions, automatically classifies them into appropriate departments, and prioritizes urgent or critical cases. It identifies repetitive grievances to avoid duplication, supports better resource allocation, and sends timely reminders to officials to ensure prompt resolution.

To enhance transparency and user trust, the system provides real-time petition tracking and regular status updates to petitioners. It uses sentiment analysis to determine the emotional intensity of each petition, aiding in urgency detection. Additionally, the application is built on a scalable cloud-based infrastructure to ensure reliability and data security. By integrating intelligent automation, sentiment-based prioritization, and real-time communication, the proposed solution streamlines grievance handling, improves administrative efficiency, and fosters accountability in governance.

Keywords: AI-powered petition analysis, grievance redressal system, automated petition tracking, governance transparency.

I. INTRODUCTION

Effective grievance redressal is a cornerstone of transparent governance. Traditional petition processing systems are often slow, inefficient, and lack proper communication channels between petitioners and officials. Delays in addressing grievances can lead to dissatisfaction and a loss of trust in the system. To address these challenges, AI-driven solutions are increasingly being adopted to enhance efficiency, accuracy, and responsiveness in petition management.

This paper introduces an AI-powered web application that automates the petition submission, classification, and resolution process. The system categorizes petitions, prioritizes urgent cases, and identifies repetitive grievances for optimized resource allocation. By integrating automated notifications and real-time tracking, the proposed solution ensures seamless communication between petitioners and officials. This approach not only accelerates grievance resolution but also strengthens accountability and transparency within governance frameworks.

A. Overview and Educational Objective

This system enhances governance by streamlining petition management and expediting grievance resolution. It categorizes petitions, prioritizes urgent issues, and provides real-time updates.

- Enhances transparency and accountability through automated tracking.
- Improves decision-making by analyzing grievance trends.
- Strengthens communication, reducing response time and improving satisfaction.

By integrating AI-driven automation, this system not only speeds up grievance resolution but also serves as an educational tool for AI applications in public service management.

A. Objective

- Automate petition classification and prioritize urgent grievances for timely resolution.
- Enhance transparency and accountability by providing real-time updates to petitioners and officials.
- Optimize resource allocation by identifying repetitive grievances and trends.
- Improve communication between petitioners and officials, reducing delays and improving satisfaction.

B. Social Impact

- Promotes transparency in governance by keeping petitioners informed with real-time updates on petition status.

- Reduces delays in grievance resolution, fostering trust and confidence in public administration.
- Encourages accountability among officials through automated reminders and the requirement for justifications in case of delays.
- Enhances citizen engagement by providing a seamless platform for submitting, tracking, and resolving grievances.
- Optimizes resource allocation by identifying recurring grievances, allowing for better management of public resources.

II. REALTED WORK

In [1], Kumar et al. proposed an automated public grievance redressal system that utilizes Natural Language Processing (NLP) and Machine Learning (ML) techniques to classify and route complaints to appropriate departments. Their system focused on minimizing manual intervention and improving the response time by leveraging automation. This work lays a strong foundation for building intelligent grievance handling systems, which aligns closely with the objectives of our proposed AI-powered petition analysis and tracking framework.

In [2], Srinivasan et al. proposed an AI-based grievance management system to support smart governance by automating the classification and routing of complaints. The system uses keyword-based detection to assign grievances to the correct departments and prioritize them based on urgency. It also integrates with government platforms to enable real-time tracking, thereby improving response time and reducing manual workload. Their approach highlights the potential of AI in enhancing administrative efficiency, which aligns with the objectives of our proposed model.

In [3], Patel and Gokhale focused on classifying petitions and complaints using various machine learning algorithms such as Decision Tree and Logistic Regression. Their system aimed to automate the categorization of grievances into appropriate departments based on text features. This work demonstrates how traditional ML methods can effectively handle grievance classification, contributing to the foundation of automated redressal systems like ours.

In [4], Mehta and Jain introduced an AI-driven system for real-time citizen feedback and grievance redressal. Their model uses sentiment analysis to assess the urgency of complaints and automates workflow management for faster resolution. The system ensures timely updates and transparency, making it suitable for smart governance applications. This approach aligns with our objective of building an intelligent and responsive petition handling platform.

In [5], Raj and Verma proposed an AI-driven grievance redressal framework that leverages sentiment analysis to determine complaint urgency and applies workflow automation for efficient handling. The system prioritizes

tasks based on emotional tone and streamlines the resolution process, ensuring faster responses. Their work supports the integration of intelligent automation in grievance management, which complements the goals of our proposed solution.

III. DESIGN ARCHITECTURE

A. Design Architecture

The proposed AI-powered web application is designed to automate and streamline the grievance redressal process, ensuring efficient categorization, prioritization, tracking, and communication. The system is modular, with each module addressing a specific function in the workflow. The architecture leverages machine learning techniques, automation, and real-time communication mechanisms to enhance accountability and transparency.

- **Petition Submission and Categorization:** Users securely log in and submit their petitions through a web portal. The system applies **Natural Language Processing (NLP)** techniques to analyze the petition's content and categorize it under the relevant department. NLP-based classification ensures that petitions are routed to the appropriate authority, reducing manual effort and processing time.

- **Prioritization and Repetitive Grievance Detection:** The system assigns priority levels to petitions based on urgency using Sentiment Analysis, which evaluates the emotional tone of the submitted text. Petitions expressing critical issues or distress are flagged as high priority for immediate attention. Additionally, Text Similarity Algorithms are employed to identify duplicate or repetitive grievances, ensuring efficient resource allocation and avoiding redundant efforts.

- **Task Management and Automated Reminders:** To ensure timely resolution, a Task Scheduling System is integrated to track deadlines and automate reminders for officials. The system follows predefined service level agreements (SLAs) and notifies responsible personnel about pending petitions. In case of delays, it triggers an alert prompting the official to provide an explanation, which is logged and shared with the petitioner.

- **Real-Time Communication and Transparency:** Transparency is maintained through a **Web Sockets**-based real-time communication system that provides continuous status updates to petitioners. Users receive instant notifications regarding any progress or required actions on their grievances. This ensures engagement and trust between petitioners and the concerned authorities.

- The system is built entirely with **Streamlit**, providing an interactive and user-friendly interface. **MySQL** manages petition data, while **NLP, Sentiment Analysis, and Text Similarity Algorithms** handle categorization and prioritization. **Task scheduling** automates reminders, and **Web Sockets** enable

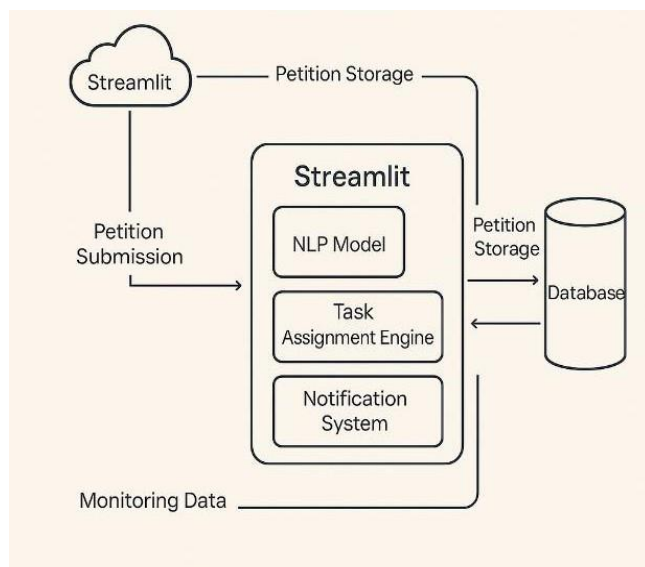real-time updates, ensuring transparency and efficiency in grievance resolution.

FIGURE 1: SYSTEM DESIGN

B. Model Mechanism

The AI-powered grievance redressal system follows a structured mechanism to automate the processing of petitions using natural language processing, machine learning, and real-time communication. Petitions are submitted through a Streamlit interface, where users upload their grievance documents in PDF format. Once uploaded, the system employs the pdfplumber library to extract textual content from the PDFs. The extracted text undergoes preprocessing, including tokenization, removal of stop words, and lemmatization, to prepare it for classification and analysis.

After preprocessing, the system uses a keyword-based matching approach to categorize the petition into the appropriate department. A predefined set of department-related keywords helps determine the context of the grievance. For instance, if keywords like "electricity", "power cut", or "voltage" are detected, the petition is categorized under the electricity board. This method ensures lightweight yet effective classification, especially when labeled training data is limited.

To assess the urgency of the petition, sentiment analysis is applied to the extracted and cleaned text. Pre-trained models such as VADER or TextBlob analyze the emotional tone, and petitions indicating frustration, anger, or distress are marked as high-priority. This allows the system to escalate critical issues to officials for faster attention.

To avoid duplication, the system performs a similarity check using text comparison techniques such as Cosine Similarity. If a petition closely matches previously submitted grievances, it is flagged as repetitive, helping optimize resource allocation and reduce redundancy.

A task scheduling mechanism is integrated to track deadlines and ensure timely responses from officials. If a petition remains unresolved past its assigned deadline, the system sends automated reminders and requests an explanation from the responsible authority. This explanation is stored in the database and made visible to the petitioner, promoting accountability.

Real-time updates are delivered to petitioners using WebSockets or Streamlit polling. The dashboard displays the current status of each petition—such as "Received," "In Progress," or "Resolved"—and notifies users about delays or new messages. This continuous feedback loop ensures transparency and keeps users informed throughout the redressal process.
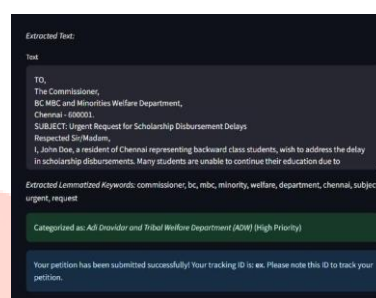
IV.   RESULTS

FIGURE 2: PETITION CATEGORIZATION RESULT

The image shows the system successfully analyzing and categorizing a petition related to scholarship delays. It extracts key information, assigns the petition to the *Adi Dravidar and Tribal Welfare Department (ADW)* with high priority, and generates a tracking ID for follow-up. The dashboard also highlights department-wise prioritized complaints.
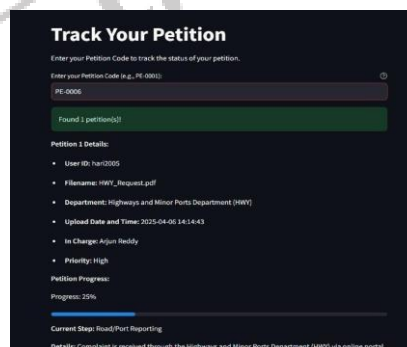

FIGURE 3: PETITION TRACKING INTERFACE

This interface displays the tracking details of a submitted petition using a unique petition code. It shows key information such as user ID, department, priority, assigned officer, and current progress. The system helps users monitor the real-time status of their grievances with clear updates on each processing stage.
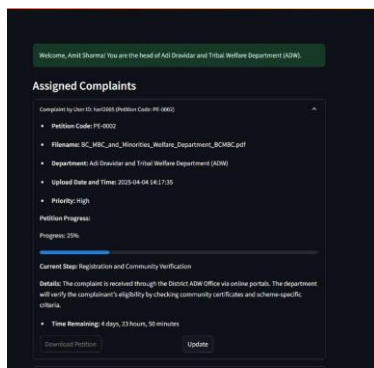
FIGURE 4: ASSIGNED COMPLAINT VIEW

This screen shows the details of a complaint assigned to a department head. It includes the petition code, department name, upload date, current step, and progress. The official can view the complaint, check the deadline, and update the status.

V. CONCLUSION & FUTURE WORK

In summary, the proposed AI-powered grievance redressal system offers a smart, transparent, and user-centric approach to handling petitions. By enabling users to upload grievances in PDF format and leveraging tools like pdfplumber for text extraction, the system efficiently processes and categorizes petitions using keyword-based classification and sentiment analysis. The integration of Streamlit for the frontend and MySQL for data management ensures a seamless and scalable platform. Features like automatic prioritization, repetition detection, deadline tracking, and real-time status updates foster accountability and build trust between citizens and officials.

In the future, the system can be enhanced to support multilingual text processing using transformer-based models like BERT or GPT. Deep learning approaches may also improve classification accuracy for complex petitions. Additionally, incorporating multi-platform notification systems (SMS, email, WhatsApp) and developing a centralized admin dashboard for monitoring departmental performance could further improve transparency and operational efficiency. These improvements aim to make the system even more robust, adaptive, and effective in addressing citizen grievances at scale.

VI . REFERENCES

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