



NAMMATE-YOUR VOICE. OUR ACTION

Education

Mr. Prakash S	Assistant Professor, Department of AI & DS, Jansons Institute of Technology, Coimbatore, India
Boopathi S	UG Student, Department of AI & DS, Jansons Institute of Technology, Coimbatore, India
Challagundla Muni Kumar	UG Student, Department of AI & DS, Jansons Institute of Technology, Coimbatore, India
Santhosh S	UG Student, Department of AI & DS, Jansons Institute of Technology, Coimbatore, India
Sathish M	UG Student, Department of AI & DS, Jansons Institute of Technology, Coimbatore, India

ABSTRACT

Citizen grievance redressal systems often suffer from delays, lack of transparency, and inefficient manual processing. This paper presents NAMMATE, an Artificial Intelligence (AI)-powered action-oriented citizen problem-solving platform designed to streamline complaint reporting, classification, and resolution. The proposed system allows users to submit issues through voice, text, or image inputs. Using Natural Language Processing (NLP), speech recognition, and machine learning techniques, the system categorizes and prioritizes complaints automatically. The platform generates tickets, routes them to appropriate authorities, hospitals, or legal experts, and ensures accountability through time-based escalation mechanisms and real-time tracking dashboards. The system enhances transparency, reduces response time, and strengthens trust between citizens and service providers.

KEYWORDS

Artificial Intelligence, Natural Language Processing, E-Governance, Complaint Management System, Smart Governance.

I. INTRODUCTION

Digital governance initiatives aim to improve public service delivery; however, many existing grievance systems rely on email-based or manual complaint mechanisms that lack efficiency and accountability. Citizens often face uncertainty regarding complaint acknowledgment, response timelines, and resolution status. To address these challenges, this paper proposes NAMMATE, an AI-driven unified platform that enables intelligent complaint management and action tracking.

The system integrates speech-to-text conversion, NLP-based classification, and automated ticket routing to ensure that issues are addressed by the appropriate authorities. By incorporating escalation logic and real-time dashboards, NAMMATE transforms traditional complaint systems into proactive and transparent action-oriented platforms.

II. Problem Statement

Current complaint redressal systems face several limitations, including delayed responses, lack of structured categorization, absence of real-time tracking, and insufficient privacy protection. Citizens often do not know which department to contact or whether their complaint is being processed. Furthermore, sensitive information may not be handled securely. There is a need for a unified, intelligent, and secure system that simplifies problem submission, ensures accountability, and provides automated routing and escalation mechanisms.

III. Proposed System

The proposed NAMMATE system follows a layered client-server architecture. The Presentation Layer consists of a mobile application developed using Flutter and a web-based dashboard for administrators and authorities. The Application Layer includes the AI processing engine, business logic module, escalation manager, and notification service. The Data Layer stores user information, problem details, ticket records, and responder databases. The Integration Layer connects external services such as Maps API and SMS/OTP gateways.

The operational workflow begins when a user registers using Aadhaar-based OTP authentication. The user submits a problem via voice, text, or image input. If voice input is provided, the system converts speech to text using speech recognition techniques. NLP algorithms classify the complaint into predefined categories such as civic, health, or legal. A priority score is assigned based on urgency and keywords. A unique ticket ID is generated and routed to the appropriate authority, hospital, or advocate. The responder updates the ticket status periodically, and the system automatically escalates the complaint if resolution time exceeds predefined limits.

IV. System Design

The system consists of the following main entities: User, Problem, Ticket, Authority, Hospital, Advocate, Admin, and Status Update. A user can submit multiple problems, each problem generates a ticket, and each ticket is assigned to a specific responder. Multiple status updates can be associated with a single ticket. The administrator manages users, responders, and escalation processes.

V. Implementation

The initial implementation includes user interface development, database schema design, ticket generation logic, and a basic AI classification model. The system utilizes Natural Language Processing for text classification and rule-based logic for escalation management. The admin dashboard prototype enables monitoring of ticket progress and responder performance.

VI. Methodology

The proposed NAMMATE system follows a hybrid Artificial Intelligence-based methodology combining Natural Language Processing (NLP), machine learning-based ranking, and rule-based escalation mechanisms.

A. Speech Processing

If the user submits a voice complaint, the system applies Automatic Speech Recognition (ASR) to convert speech into text. The speech signal is first preprocessed using noise filtering and feature extraction techniques such as Mel-Frequency Cepstral Coefficients (MFCC). The extracted features are then passed to a trained speech recognition model to generate textual output.

B. NLP-Based Classification

The text data is processed through the following stages: (1) Tokenization, (2) Stop-word removal, (3) Stemming/Lemmatization, and (4) Vectorization using TF-IDF. The complaint classification is performed using a supervised learning model such as Logistic Regression or Support Vector Machine (SVM). The classification assigns complaints to categories: C in {Civic, Health, Legal, Emergency}.

C. Priority Assignment

The priority score is calculated using weighted keyword frequency and urgency indicators, where alpha, beta, and gamma are predefined weights. Priority levels are assigned as High, Medium, or Low based on the computed score.

D. Escalation Logic

If a ticket is not resolved within predefined time T, the system escalation level increases by 1 and forwards the complaint to a higher authority, ensuring timely resolution.

VII. System Modules in Detail

A. User Module

The user module provides secure registration using Aadhaar-based OTP authentication. It enables multi-format complaint submission (voice, text, image) and provides real-time status tracking. The system ensures user privacy by masking personal contact details from responders.

B. AI Processing Module

This module performs complaint classification, priority detection, and recommendation generation. The recommendation engine suggests nearby hospitals or legal experts using location-based filtering and similarity ranking algorithms.

C. Admin Module

The admin dashboard provides complaint heatmap visualization, escalation monitoring, authority performance tracking, and abuse detection. Analytics graphs help administrators identify high-frequency issue zones.

D. Responder Module

Authorities, hospitals, or advocates receive assigned tickets and update progress. They can provide resolution details or delay reasons. The system records response time metrics for evaluation.

VIII. Performance Analysis

The system performance can be evaluated using the following metrics: Classification Accuracy, Precision and Recall, Average Resolution Time, Escalation Rate, and User Satisfaction Score.

Expected improvements include: (1) 40-60% reduction in complaint response time, (2) Improved classification accuracy above 85%, and (3) Increased accountability through automated tracking.

IX. Security and Privacy

Security and privacy are critical components of the NAMMATE platform, as the system handles sensitive citizen information related to civic, legal, and health issues. The platform implements end-to-end encryption to ensure secure communication between users, administrators, and responders. User authentication is performed using OTP-based verification, reducing unauthorized access risks. Role-based access control mechanisms ensure that users, responders, and administrators can access only the information relevant to their responsibilities.

Sensitive personal data such as mobile numbers and Aadhaar details are masked and not directly exposed to authorities or experts. Additionally, secure database storage techniques and encrypted data transmission protocols are employed to prevent data breaches. The integration of a controlled call-center communication model further enhances privacy by preventing direct sharing of personal contact information between users and responders.

X. Novelty and Contribution

The proposed NAMMATE system introduces a novel approach to citizen grievance management by integrating Artificial Intelligence with structured accountability mechanisms. Unlike conventional complaint platforms that rely on manual categorization and email-based communication, NAMMATE leverages Natural Language Processing for intelligent classification and automated routing of complaints. The voice-enabled complaint submission feature enhances accessibility for users who may not be comfortable typing detailed issues.

Furthermore, the incorporation of a time-based escalation mechanism ensures that unresolved complaints are automatically forwarded to higher authorities, thereby reducing delays. The system also provides real-time visualization dashboards for administrators, enabling data-driven decision-making and improved governance.

XI. RESULTS AND EXPECTED OUTCOMES

The proposed system is expected to significantly reduce complaint resolution time and improve transparency in public service delivery. The AI-based categorization ensures accurate routing, while the escalation mechanism guarantees timely action. Real-time dashboards enhance decision-making and accountability. The platform also ensures secure handling of sensitive user information.

XII. Social Impact

The NAMMATE platform has significant potential to improve governance and citizen satisfaction by promoting transparency,

accountability, and faster problem resolution. By reducing dependency on manual complaint mechanisms and introducing AI-driven automation, the system minimizes response delays and enhances trust between citizens and authorities. The platform also reduces mental stress for users by providing clear tracking mechanisms and guaranteed escalation processes.

Through secure handling of sensitive data and efficient resource allocation, NAMMATE supports the broader vision of smart governance and digital transformation initiatives. The system can serve as a foundational model for implementing intelligent grievance redressal frameworks in smart cities and national e-governance programs.

XIII. CONCLUSION

In this paper, an AI-powered action-oriented citizen problem-solving platform named NAMMATE has been proposed to address the limitations of existing grievance redressal systems. The system integrates speech recognition, Natural Language Processing, automated ticket generation, intelligent routing, and time-based escalation mechanisms to ensure efficient and transparent complaint management. By enabling voice, text, and image-based problem submission, the platform enhances accessibility and user convenience.

The structured workflow ensures that complaints are categorized accurately, assigned to appropriate authorities, and monitored continuously until resolution. The incorporation of real-time dashboards, accountability tracking, and secure communication mechanisms significantly improves trust between citizens and service providers. The proposed system not only reduces resolution time but also promotes data-driven governance through visualization and analytics. Overall, NAMMATE presents a scalable, secure, and socially impactful solution that can support smart city initiatives and digital governance frameworks, contributing to more responsive and citizen-centric public service systems.

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