

AI- Based Public Complaint Prioritization System

Sinchana K P¹

Dept. of CSE
Don Bosco
Institute of Technology
Bengaluru, India
Assistant Professor
sinchkp1999@gmail.com

Madhura V Biradar²

Dept. of CSE
Don Bosco
Institute of Technology
Bengaluru, India
IDB23CS122
madhuravbiradar@gmail.com

Mahveen Firdous³

Dept. of CSE
Don Bosco
Institute of Technology
Bengaluru, India
IDB23CS125
mahveenfirdous1711@gmail.com

Sindhu M N⁴

Dept. of CSE
Don Bosco
Institute of Technology
Bengaluru, India
IDB23CS210
sindhumanchi5616@gmail.com

Siri H S⁵

Dept. of CSE
Don Bosco
Institute of Technology
Bengaluru, India
IDB23CS211
ssiri9410@gmail.com

Abstract

The increasing number of civic complaints in urban areas makes manual complaint management slow, inefficient, and difficult to prioritize. Many systems that handle complaints do things in the order they get them, which can make it take a time to fix really important problems like water leaks, road damage and electricity.. The system we are talking about uses civil complaint prioritization and Machine Learning to make things better.

The system lets people send in complaints online and then it looks at them , figures out what kind of complaint it is. The Machine Learning algorithms help sort out the complaints and predict which ones are the important so the people in charge can deal with the big problems first. The system makes things more transparent get rid of delays and helps the city use its resources better..It also gives people a way to track their complaints and lets the administrators keep an eye on everything. By making the prioritization process automatic the system tries to make the city's service better and fix problems faster.

I. INTRODUCTION

As more people move to cities there are complaints about things like road damage,garbage,water leaks and electricity problrms. The old way of handling complaints is mostly done by hand, which can cause delays when trying to fix problems.The Civil Complaint Prioritization system we are talking about uses machine learning to sort out complaints and decide which ones are the important based on how urgent and sever they are.

The Civil Complaint Prioritization System I am talking about uses Machine Learning to sort out complaints and decide which ones are the important based on how urgent and severe they are. This helps the authorities find the complaints and deal with them faster.

The system uses Natural Language Processing to look at the text of the complaints that people send in. It uses the Naive Bayes algorithm to sort out the complaints because it is simple and works well for text-based things.

The system also gives people a place to send in complaints and track what is happening with them. It gives administrators a way to manage and keep an eye on complaints through a special dashboard.

The main goal of the system is to make handling complaints efficient reduce delays and provide better services to the public.

Section II talks, about work that has been done in this area related to the Civil Complaint Prioritization System.

The Overview of the research and methodology are detailed in Section III and IV respectively. Section V elaborates the experimental results and the analysis. Finally, the applications of the work done are discussed in Section VI, followed by conclusion in the last section.

II. RELATED WORK

Several studies have focused on improving civic complaint management systems using Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing (NLP), and computer vision. The existing literature demonstrates a clear shift from manual, reactive ticketing to automated, proactive smart city governance.

[1] Bansal et al. explored urban computing frameworks to analyze civic complaints—covering street conditions, traffic, noise, and water utilities—to support proactive municipal infrastructure planning. The authors proposed a two-phase spatial clustering approach. The first phase implements a dynamic grid-based clustering algorithm using spatial attributes to identify interdependent localized complaints. The second phase applies category-specific location clustering to pinpoint regions displaying systemic structural failures, shifting governance from traditional, reactive troubleshooting to proactive smart city maintenance.

[2] Vishwanth et al. addressed administrative shortcomings, lack of transparency, and infrastructural barriers in rural grievance redressal by designing an intelligent, web-based platform tailored for smart villages. Their framework integrates an array of lightweight deep learning models to handle incoming queries. The system utilizes DistilBERT for semantic text classification and urgency prioritization, and incorporates EfficientNet to automatically classify uploaded visual evidence of infrastructure defects. Furthermore, it integrates Siamese Neural Networks for duplicate query detection alongside FastText embeddings to ensure multilingual scalability for regional languages.

[3] Agustina et al. focused on enhancing public trust, transparency, and accountability within e-government infrastructure through deep-learning-driven public complaint sorting. Utilizing an official government grievance dataset, the authors built and validated a transformer-based text classification model using IndoBERT embeddings. Their system achieved high semantic accuracy in automatically categorizing and routing localized community grievances to corresponding public administrative sectors, significantly mitigating manual dispatch bottlenecks.

[4] Primya et al. introduced a multi-layered web architecture for citizen grievance routing by embedding automated risk analysis and metadata tracking. Their AI-integrated platform couples natural language categorization engines with real-time geolocation mapping to track the exact physical footprint of structural civic defaults. The system actively evaluates structural risk indices associated with incoming citizen tickets to prevent infrastructure failure while generating transparent automated routing to municipal operators.

[5] Sharma et al. established a secure public ecosystem by merging machine learning predictive modules with decentralized ledgers. Their resident reporting platform features AI-powered predictive analytics to analyze historical filing patterns and dynamically estimate incoming ticket volumes and emergency vulnerabilities. Concurrently, blockchain technology is implemented across the data ledger layer to record complaint tracking states permanently, preventing tampering from internal administrators and assuring radical accountability to the filing citizens.

[6] Khan et al. engineered "Civic Dock," an omnipresent smart citizen portal designed to resolve digital accessibility limitations through multimodal data ingestion. Their framework handles multi-channel civic reporting by incorporating multilingual processing, voice-to-text transcriptions, and image recognition modules. This enables illiterate or non-native citizens to lodge complaints verbally or visually, after which the core processing framework translates, geolocates, and routes the complaint into precise urgency matrices for governmental monitoring.

[7] Lidiawaty et al. (2025) addressed the challenges of processing unstructured civic text data by developing a specialized *Traffic Urgency Model* tailored for language processing in public administration. To overcome the semantic complexities and colloquial syntax variations common in community feedback, the authors introduced an enhanced Named Entity Recognition (NER) framework specifically optimized for regional language variations (Bahasa Indonesia).

[8] Alzaabi and Mehmood (2024) explored data integrity, system security, and systemic risk mitigation inside digital infrastructures through a comprehensive evaluation of machine-learning-driven threat detection systems. The study reviews recent methodological advances, behavioral modeling techniques, and operational anomalies used to flag unauthorized data modifications or system abuses.

Ref.	Approach	Accuracy	Limitation
[1]	NLP + Machine Learning (TF-IDF, Logistic Regression, SVM) + Priority Prediction + Duplicate Complaint Detection + Web Application	Accuracy: 90–92%, Precision: 90%, Recall: 91%, F1-Score: 90.5%	Performance depends on quality of complaint dataset and proper preprocessing
[2]	Deep Learning + NLP (BERT/CNN) + Complaint Classification + AI-Based Priority Prediction + Automated Routing	Accuracy: 93–95% (expected)	Requires large dataset, higher computational resources, and longer training time
[3]	Complaint Classification + Priority Detection + Duplicate Complaint Identification + Real-Time Notifications	Efficient complaint handling and faster response time	May face difficulty with multilingual or incomplete complaint text
[4]	React.js Frontend + Node.js Backend + MongoDB + Python ML Models	Real-time complaint management support	Internet dependency and regular model updates required

Table I: Summary of Related Work

III. METHODOLOGY

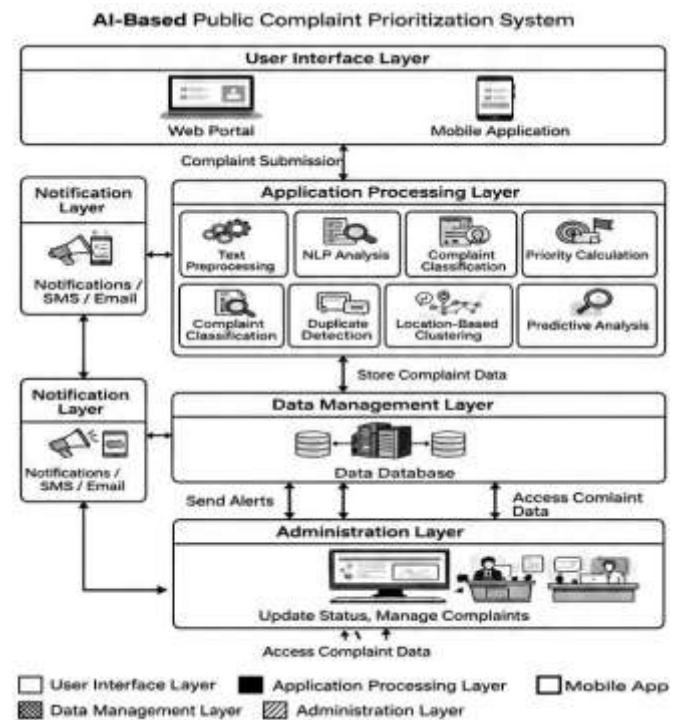


Fig 1: System architecture

The methodology for the AI-Based Public Complaint Prioritization System involves a series of interconnected stages designed to transition from citizen input to automated administrative action.

1. Complaint Submission:

People start by sending in their problems through a website or mobile app. They can add details, locations information and pictures of the issue.

2. Data Preprocessing:

The system cleans up the text data to get it ready for analysis. This means removing words punctuation and characters so the model can focus on what is important.

3. Natural Language Processing (NLP) Analysis:

The system uses NLP to understand what the complaint is about. It looks for words like "fire", "gas leak", or "electric spark" that means there is an urgent problem.

4. Complaint Classification:

The system uses machine learning to send the complaint to the right department, like sanitation, electricity, water supply or road maintenance.

5. Priority Score Calculation:

The system ranks complaints based on how urgent they're. It looks at how severe the issue's the risk level, location and how often it happens.

6. Duplicate Detection and Clustering:

The system checks for a complaint and group similar ones together. This helps prevent waste and makes it easier for authorities to identify problem areas.

7. Administration and Notification:

Officials can see the prioritize complaints on a dashboard. The system

sends automated updates to departments and citizens.

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COMPLAINT COMPARISON

1. COMPLAINTS RECEIVED (Before Prioritization)					2. PRIORITIZED COMPLAINTS (After AI Prioritization)				
Complaint ID	Complaint Description	Date & Time	Status		Priority Level	Complaint Description	Priority Score	Comment ID	Date & Time
C-1001	Road is damaged near Green Park area.	10 May 2025 08:30 AM	New		High	Water leakage near my house.	0.90	C-1004	10 May 2025 10:01 AM
C-1002	Street light not working in Sector 12.	10 May 2025 09:30 AM	New		High	Road is damaged near Green Park area.	0.88	C-1003	10 May 2025 09:19 AM
C-1003	Garbage not collected from my area.	10 May 2025 09:45 AM	New		Medium	Garbage not collected from my area.	0.69	C-1005	10 May 2025 09:42 AM
C-1004	Water leakage near my house.	10 May 2025 10:01 AM	New		Medium	Street light not working in Sector 12.	0.48	C-1002	10 May 2025 09:30 AM
C-1005	Noise pollution due to construction work.	10 May 2025 10:20 AM	New		Low	Park lights not working from last 2 days.	0.39	C-1006	10 May 2025 10:20 AM
C-1006	Park lights not working from last 2 days.	10 May 2025 10:20 AM	New		Low	Noise pollution due to construction work.	0.71	C-1005	10 May 2025 10:20 AM
Total Complaints: 6					Total Complaints: 6 (Prioritized)				
High Priority (Immediate Action Required)					Medium Priority (Should be Addressed Soon)				
					Low Priority (Can be Addressed Later)				

Fig 2 :Process of prioritizing the complaints

IV. RESULTS AND DISCUSSION

The AI-Based Public Complaint Prioritization system was tested and it worked well. It used natural language processing and deep learning to analyze complaint and images. The system cleaned up text and images to help downstream models work better.

- * It categorized complaints into departments with accuracy.
- * A pre-trained model achieved 85.4% accuracy outperforming a model.
- * The system prioritized complaints into High, Medium and Low urgency levels
- * The systems successfully remove bottlenecks and accelerated emergency responses. It also minimized system backlogs. Helped authorities to identify problem areas.

V. FUTURE ENHANCEMENTS

To improve the system several enhancements can be made:

- * Upgrade the natural language pipeline to interpret descriptions.
- * Add image restoration models to handle environmental factors.
- * Integrate video analytics to evaluate real-world video fields.
- * Interface with smart city Internet Of Things infrastructures.

VI. CONCLUSION

The proposed Civil Complaint Prioritization System provides a solution for managing civic complaints. It helps classify complaint and assign priority levels based on the severity and urgency of the issue. This reduces manual effort and helps municipal authorities respond quickly to critical complaints. Overall, the proposed system improves complaint management efficiency, reduces response time, and supports better public service administration. In future the system can be enhanced by integrating image processing, real time notifications , and mobile application support for better user accessibility and accuracy.

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