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Automated Municipal Complaint Analysis and Monitoring System

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ABSTRACT

Municipal complaint systems play a crucial role in enabling citizens to report civic issues such as road damage, water supply interruptions, waste management problems, and streetlight failures. However, existing systems primarily focus on complaint registration and lack intelligent mechanisms for analysis, monitoring, and decision-making. This often leads to delays in resolution, poor transparency, and inefficient resource allocation.

This paper presents an Automated Municipal Complaint Analysis and Monitoring System that integrates web-based complaint management with artificial intelligence techniques. The system utilizes Natural Language Processing (NLP) to automatically classify complaint descriptions into relevant categories and applies clustering techniques to identify recurring issues. Additionally, a monitoring mechanism tracks complaint resolution time based on predefined Service Level Agreements (SLA) and flags delayed complaints for administrative attention.

A user-friendly dashboard provides real-time analytics, including complaint statistics, pending cases, and delay indicators. The system enhances transparency, improves efficiency in complaint handling, and supports data-driven governance. Experimental evaluation demonstrates that the proposed system significantly reduces manual effort and improves response time in municipal complaint management.

Keywords — Municipal Complaints, NLP, Complaint Classification, Smart Governance, Data Analytics, Web Application

I. INTRODUCTION

Rapid urbanization has led to a significant increase in civic issues reported by citizens, including road damage, sanitation problems, drainage blockages, and water supply interruptions. Municipal authorities are responsible for resolving these issues efficiently; however, managing a large volume of complaints remains a major challenge.

Traditional complaint handling methods relied on manual processes such as written applications and phone calls, which resulted in delays and lack of transparency. Although modern systems allow online complaint submission, they primarily function as data collection platforms and lack intelligent analysis capabilities.

Most existing systems do not provide automated categorization, delay detection, or analytical insights. As a result, authorities face difficulties in identifying urgent issues, tracking complaint progress, and allocating resources effectively.

To address these challenges, this paper proposes an Automated Municipal Complaint Analysis and Monitoring System that integrates web technologies with artificial intelligence. The system enables automated complaint classification, real-time monitoring, and data-driven decision-making, thereby improving efficiency and transparency in municipal services.

II. RELATED WORK

Existing research in complaint management systems highlights several limitations in current approaches. Many systems focus only on complaint submission and tracking without incorporating intelligent analysis.

AI-based complaint classification systems utilize NLP techniques such as TF-IDF and machine learning algorithms to categorize complaints. However, these systems are often not integrated with real-time monitoring mechanisms.

Smart city complaint platforms provide digital interfaces for reporting civic issues but lack advanced analytics and automated delay detection. Government grievance systems allow complaint tracking but rely heavily on manual categorization and limited data analysis.

Overall, there is a lack of integrated systems that combine complaint analysis, monitoring, and decision support. The proposed system addresses this gap by combining NLP-based classification, clustering, and automated monitoring in a unified platform.

Existing System and its Limitations:

Existing System / Research	Author & Year	Description	Techniques Used	Limitations
Ai-based complaint classification system	Rajkumar et al., 2025	Research system that uses natural language processing to automatically classify and prioritize citizen complaints.	NLP, TF-IDF, machine learning	Not integrated with real-time municipal monitoring
Smart city complaint management system	Manu & ajith, 2025	A smart city platform where citizens report issues such as garbage overflow, road damage, and water supply problems.	Web application, database management	No ai-based analysis and limited data analytics
Municipal service monitoring platforms	Kim & lee, 2021	Platforms used by government authorities to track complaint resolution and monitor municipal service performance.	Complaint tracking dashboards, data monitoring tools	Lack of automated delay detection and predictive analysis
Online grievance redressal system	Government of india (CPGRAMS), 2019	A web platform that allows citizens to submit complaints related to public services and track their status online.	Web-based complaint management system	Manual complaint categorization and limited monitoring features

III. METHODOLOGY

The proposed system integrates multiple components to provide efficient complaint management, including complaint submission, classification, monitoring, and analytics.

3.1 Data Collection and Preprocessing

Complaint data is collected through a web-based interface where users submit textual descriptions of issues. The text data is preprocessed using NLP techniques such as tokenization, stop-word removal, and normalization to prepare it for analysis.

3.2 Complaint Classification

The system uses Natural Language Processing techniques to automatically categorize complaints into predefined classes such as:

- Road issues
- Water supply
- Sanitation
- Streetlights

This reduces manual effort and improves processing speed.

3.3 Clustering of Complaints

Clustering techniques are applied to group similar complaints. This helps identify recurring issues in specific locations and supports better decision-making.

3.4 Delay Detection Mechanism

Each complaint is monitored based on predefined SLA thresholds. If a complaint exceeds the expected resolution time, it is flagged as delayed and highlighted in the system.

3.5 System Architecture

The system follows a client-server architecture:

- Frontend: User interface for complaint submission
- Backend: Processing and logic handling
- Database: Storage of complaint records
- Analytics Module: Provides insights and reports

IV. IMPLEMENTATION

The system is implemented as a full-stack web application using modern technologies.

- **Frontend:** HTML, CSS, JavaScript
- **Backend:** Python (Flask framework)
- **Database:** SQLite / MySQL
- **Libraries:** NLP libraries for text processing

The application provides:

- Complaint submission portal
- Admin dashboard
- Complaint tracking system
- Analytics visualization

V. RESULTS AND DISCUSSION

The proposed system improves complaint management efficiency by automating classification and monitoring processes.

Key outcomes include:

- Reduction in manual effort for categorization
- Faster identification of delayed complaints
- Improved transparency through tracking features
- Better decision-making using analytics

The dashboard provides visual insights such as:

- Total complaints
- Pending vs resolved cases
- Category-wise distribution

These features help administrators prioritize tasks effectively.

5.1 System Interface Screens:

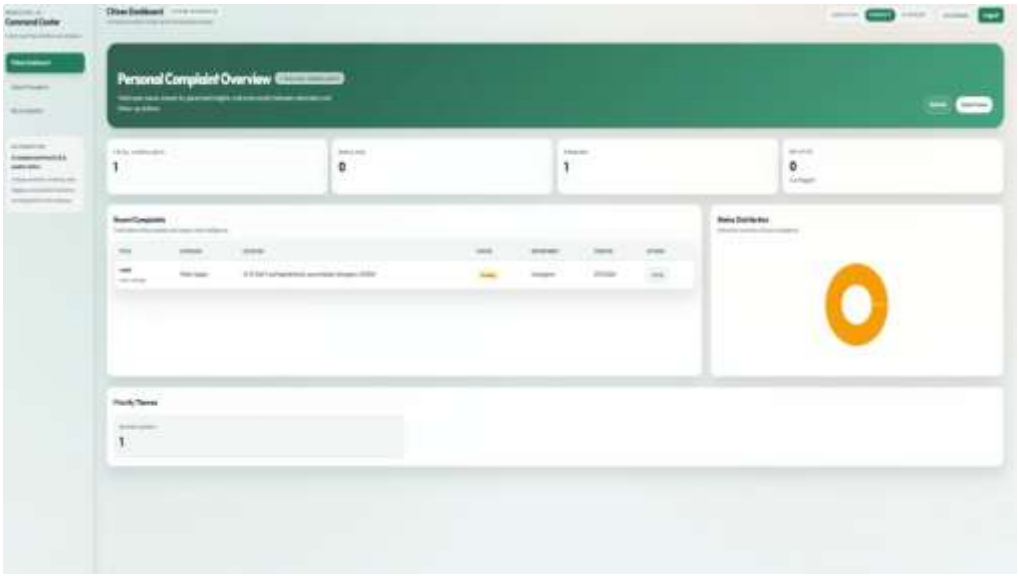

Figure 1: The User Dashboard provides an overview of all complaints submitted by the user. The dashboard enables users to track complaint progress efficiently and take necessary actions when required.

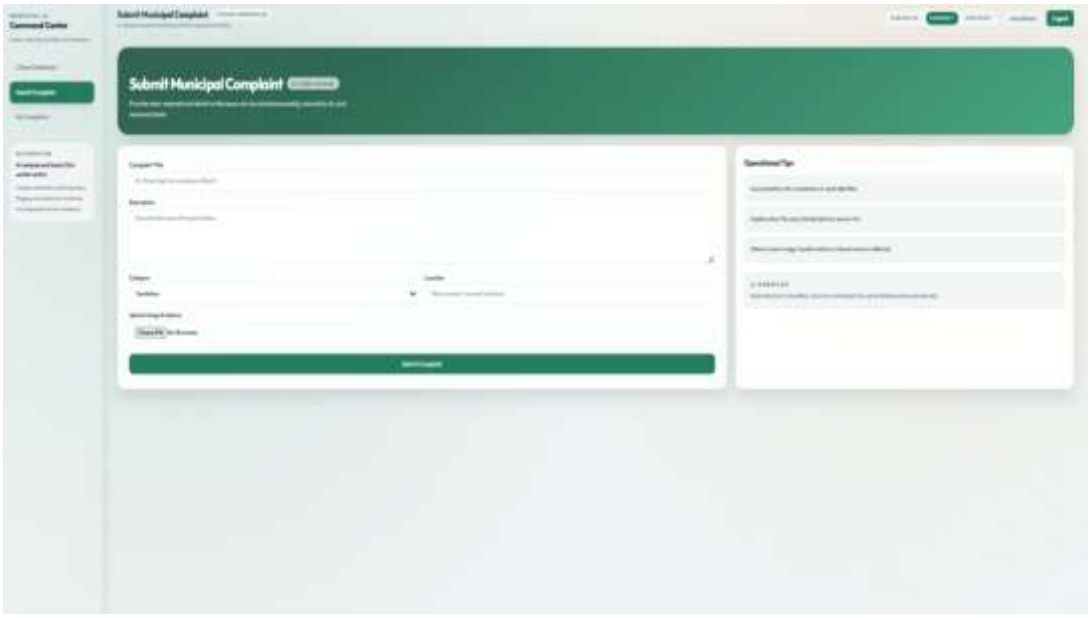

Figure 2: The Complaint Submission Page allows users to report municipal issues by entering details such as title, description, category, and location, along with optional image upload.

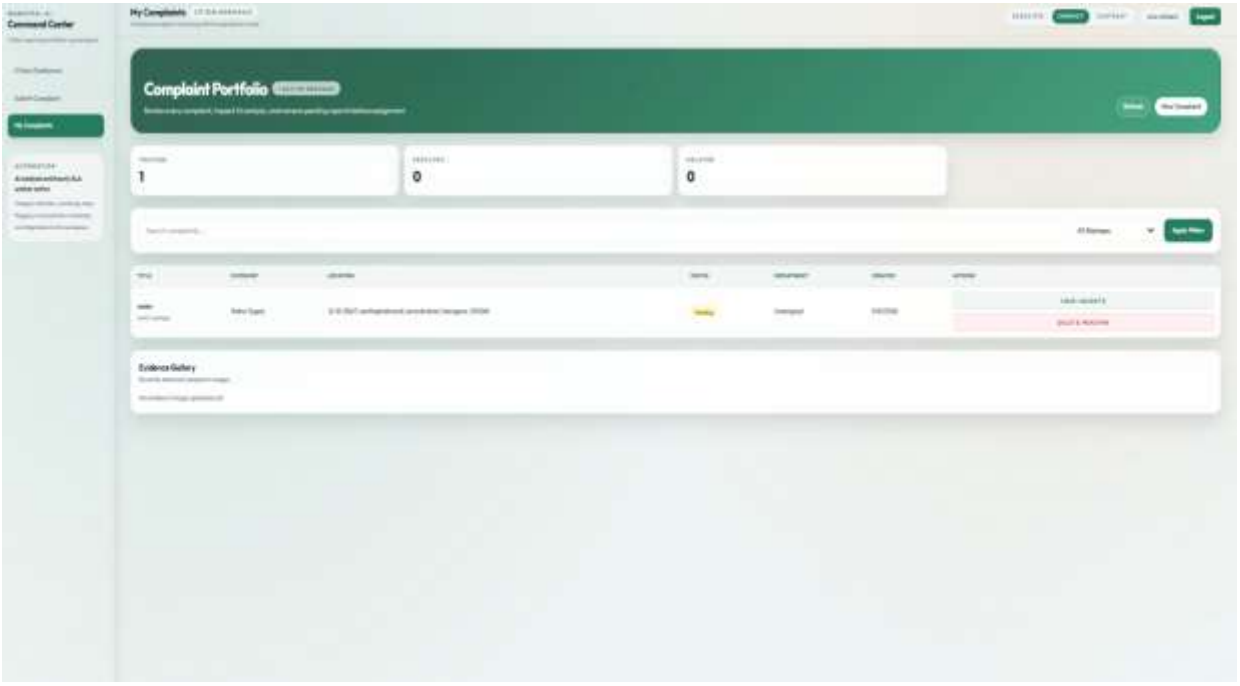

Figure 3: The My Complaints Page displays a detailed list of all complaints submitted by the user, including information such as category, location, status, and date.

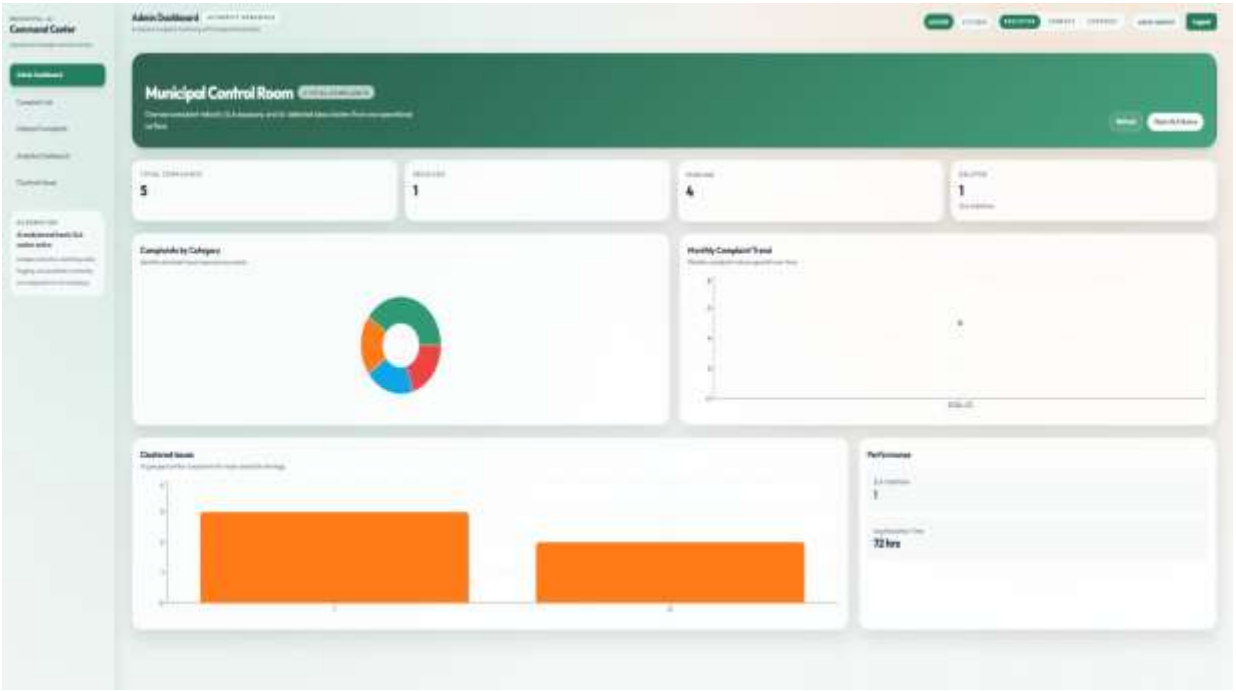

Figure 4: The Admin Dashboard provides a comprehensive overview of all complaints in the system, including total, pending, resolved, and delayed cases.

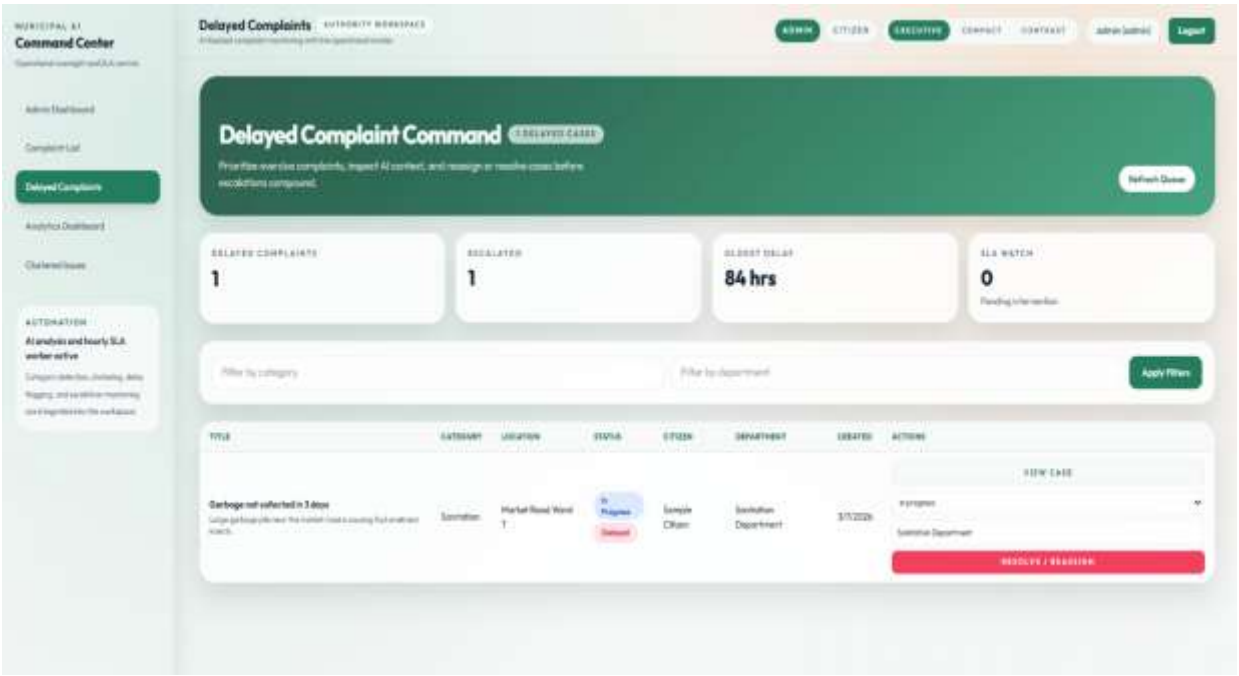

Figure 5: The Delayed Complaints Page highlights complaints that have exceeded the defined SLA time limit. It displays key details such as category, location, status, and assigned department, along with options to resolve or reassign cases.

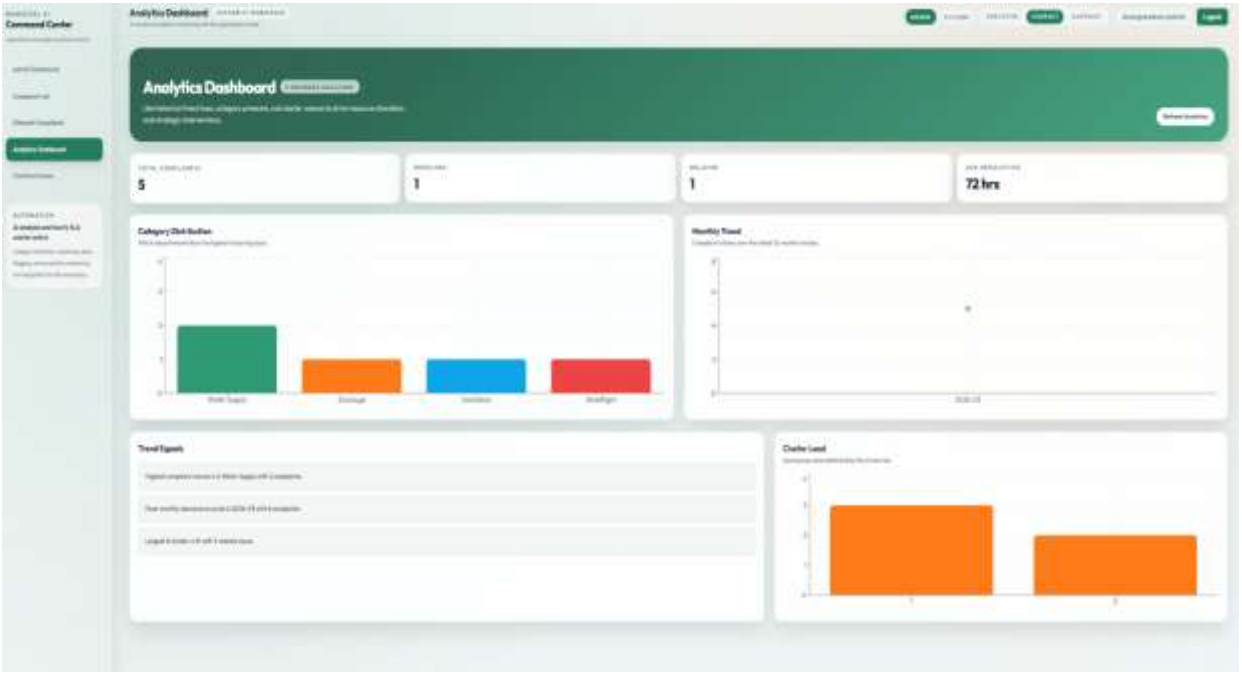

Figure 6: The Analytics Dashboard provides visual insights into complaint data using charts and graphs such as category distribution and monthly trends. It displays key metrics like total, resolved, and delayed complaints along with average resolution time.

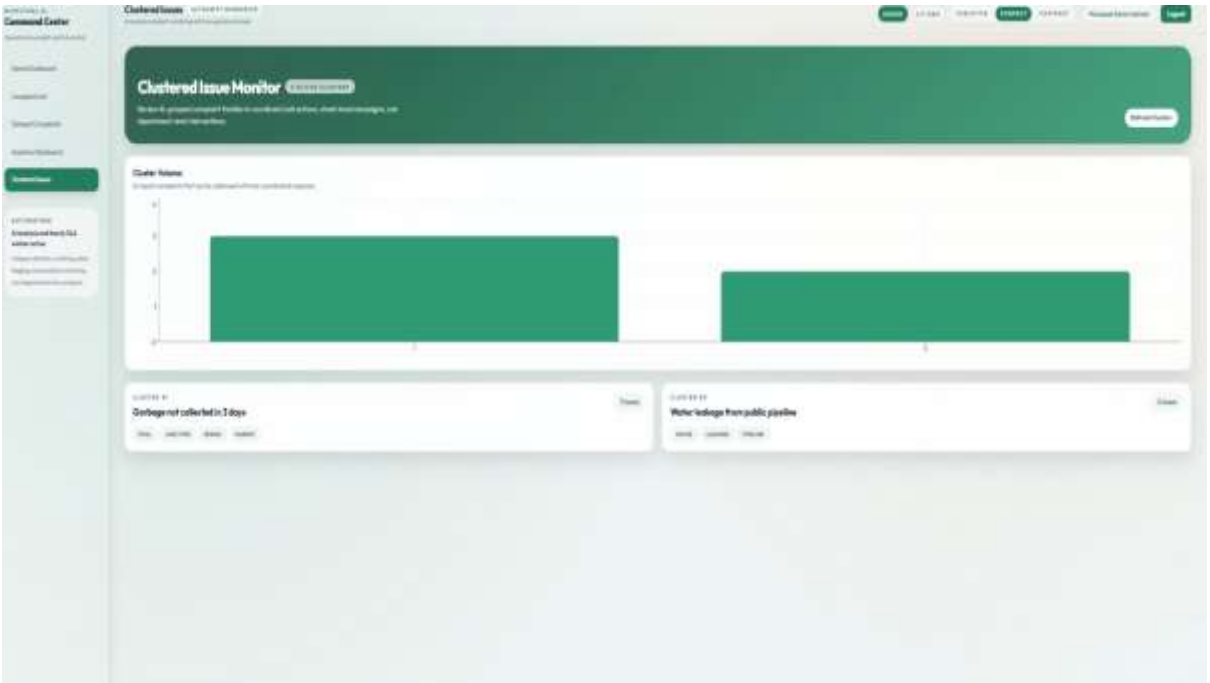

Figure 7: The Clustered Issues Page groups similar complaints using AI-based analysis to identify recurring problems. It displays clustered data visually, helping administrators understand common issues and prioritize actions.

VI. FUTURE SCOPE

Future improvements may include:

- Integration with real-time municipal databases
- Image-based complaint analysis
- Multi-language support
- Deployment across multiple cities
- Advanced AI models for prediction

VII. CONCLUSION

The Automated Municipal Complaint Analysis and Monitoring System provides an efficient and intelligent solution for handling civic complaints. By integrating artificial intelligence with web technologies, the system improves transparency, reduces delays, and enhances decision-making in municipal services.

The proposed system transforms traditional complaint management into a data-driven process, contributing to better governance and increased citizen satisfaction.

REFERENCES

[1] Rajkumar, R., et al., "AI-Based Grievance Classification System Using NLP Techniques," Scientific Reports, 2025.

[2] Manu, S., & Ajith, K., "Smart Complaint Management System for Smart Cities," International Journal of Smart City Applications, 2025.

[3] Kim, B., & Lee, J., "Big Data Analysis of Civic Complaints for Smart City Governance," Sustainable Cities and Society, 2021.

[4] Jurafsky, D., & Martin, J., "Speech and Language Processing," Pearson Education, 2020.

[5] Devlin, J., Chang, M. W., Lee, K., & Toutanova, K., "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding," Proceedings of NAACL-HLT, 2019.

[6] Government of India, "Centralized Public Grievance Redress and Monitoring System (CPGRAMS)," 2019.

[7] World Bank, "Improving Public Sector Performance Through Citizen Feedback," 2018.

[8] Ruder, S., "An Overview of Multi-Task Learning in Deep Neural Networks," arXiv preprint arXiv:1706.05098, 2017.

[9] Hashem, I. A. T., et al., "The Role of Big Data in Smart City," International Journal of Information Management, 2016.

[10] Government of India, "Digital India Programme: Transforming Governance through Technology," 2015.

[11] Han, J., Kamber, M., & Pei, J., "Data Mining: Concepts and Techniques," Morgan Kaufmann, 2012.

[12] Pedregosa, F., et al., "Scikit-learn: Machine Learning in Python," Journal of Machine Learning Research, 2011.

[13] Nam, T., & Pardo, T. A., "Conceptualizing Smart City with Dimensions of Technology, People, and Institutions," Proceedings of the 12th Annual International Digital Government Research Conference, 2011.

[14] Manning, C. D., Raghavan, P., & Schütze, H., "Introduction to Information Retrieval," Cambridge University Press, 2008.

[15] MacQueen, J., "Some Methods for Classification and Analysis of Multivariate Observations," Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability, 1967.