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Smart Grievance Grid: Intelligent City Issue Resolution Network through Digital Reporting

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Abstract: *Urbanization trends have brought about the need for effective and efficient grievance management in smart cities. This research document provides a Smart Grievance Grid: Intelligent City Issue Resolution Network through Digital Reporting which will ease the process of reporting, analyzing, and solving civic problems in a smart city environment. Through the proposed system, citizens can file complaints on problems affecting their communities through either mobile apps or web applications. Technologies such as image processing and natural language processing are applied to ensure automated classification and prioritization of complaints. In addition to classification and prioritization of issues, an intelligent routing process is utilized to ensure that citizens' grievances are routed to appropriate municipal departments for fast resolution of problems. Other capabilities include data visualization, feedback processes, among others.*

Keywords: *Smart City, Grievance Management System, Digital Reporting, Image Processing, Natural Language Processing (NLP), Issue Classification, Geo-tagging, Automated Routing, Citizen Engagement, Data Visualization*

I. INTRODUCTION

Urbanization has brought about many issues with regard to the handling of citizens' complaints. Poor infrastructure, waste management issues, water supply problems, and roads maintenance are among such problems. The traditional systems used in addressing the issues above are characterized by inefficiencies due to their nature. They are usually paper-based, manual, and non-transparent processes. Technological advancement, digital approaches such as mobile-based complaint reporting, geotagging, and AI-powered solutions have been adopted in the attempt to address grievances in an efficient manner. Citizens can easily register complaints and follow up on the process until a solution is achieved through these methods. Additionally, automation will speed up the process of complaint registration, processing, and resolving.

Nevertheless, current approaches suffer from some deficiencies, which include delays, lack of coordination among the relevant departments, and inadequate transparency. It becomes necessary to come up with a new innovative approach to make the grievance management process better in terms of transparency and response time. For this reason, this project aims to examine the existing approaches in order to come up with a better one known as the Smart Grievance Grid System.

II. LITERATURE SURVEY

1) *Authors: S. Kumar, S. Atreja, A. Singh, and M. Jain. Year: 2019*

This study seeks to address civic issues by creating models using the scene graph approach. The adversarial adaptation technique is used to enhance the effectiveness of the model developed. The solution seeks to identify and analyze urban issues within an image.

2) *Authors: E. D. Madyatmadja, H. Nindito, and D. Pristinella. Year: 2020*

The present study discusses the behaviour of the citizen while using smart city complaint application. The main concern here is the issue of citizen satisfaction, usability, and effectiveness of complaints handling. The study considers important factors that influence user participation and engagement. This paper describes challenges like slow reaction and poor transparency. Recommendations include improving the interface design and feedback mechanism.

3) *Authors: A. P. Singh, A. Goel, A. Goel, and D. Arya. Year: 2022*

This research paper develops a grievance redressal system based on natural language processing. Such an approach will be effective in processing large amounts of data at a faster rate and with more efficiency. It also decreases the efforts required by people manually.

4) *Authors: Gladys Andrews P, Kishor Kumar M G, Marcian Benedict D, and C. S. Madhumathi. Year: 2025*

The paper suggests the use of a crowdsourcing platform that enables citizens to report civic problems based on geographic locations. This allows authorities to react promptly and increases citizen engagement in smart cities through efficient information exchange and problem solving.

5) *Authors: Franklin G David, J. Savitha. Year: 2020*

FixMyCity is a geo-civic complaint reporting system where citizens can file complaints about civic matters using geo-location and photographs. The solution makes it easy for the administration to monitor, manage, and address citizen complaints effectively by leveraging an efficient platform.

6) *Authors: M. Silpa Raj, P. Sambasiva Rao, G. K. Monica Nandini, S. Sureshkumar, A. K. Mishra, and G. Saritha. Year: 2025*

The study emphasizes predictive analytics based on artificial intelligence (AI) in urban governance. It concentrates on real-time civic engagement and intelligent decision-making. The approach uses data analysis methods for improving urban services. It enables the identification of trends and predictions for potential challenges. The approach facilitates efficient and intelligent urban management.

7) *Authors: N. D. Gowda, B. V., M. Hindasagatti, T. S. Monika, and D. R. Pallavi. Year: 2025*

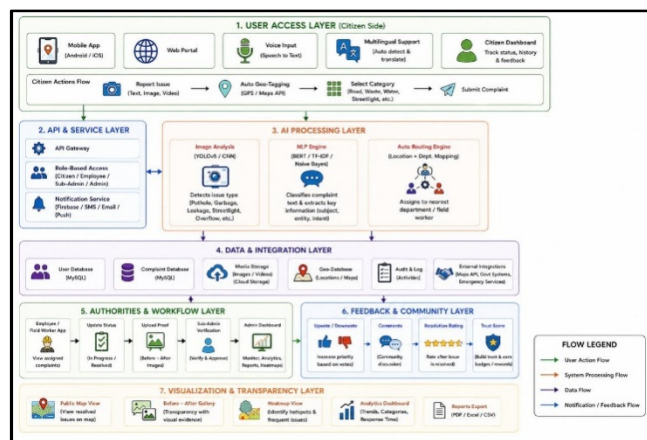
This paper introduces “Urban-Echo,” an innovative smart reporting platform for cities. Citizens can submit their complaints through mobile devices or web applications. It enhances the interaction between citizens and government officials. It provides timely monitoring and solutions to submitted issues. The approach boosts transparency and civic participation in urban governance.

8) *Authors: D. Verma and M. Thevar. Year: 2025*

The current study is dedicated to the problem of complaints classification based on NLP methods. The technique analyses the text content to categorize the complaints automatically. The approach boosts the speed and effectiveness of managing the grievances. The approach promotes effective handling of civic complaints.

III. METHODOLOGY

A. Architecture



The architecture of the proposed Smart Grievance Grid is a multiple-level system aimed at ensuring efficient urban problem management using digital technology and artificial intelligence-based processing.

1) User Access Layer

The process starts from the User Access Layer that provides citizens with the option to make their reports via either mobile application or web portal, using textual messages, photos, videos, audio recordings, or voice messages, as well as providing translation options for multilingual citizens and geo-tagging.

2) API & Service Layer

API & Service Layer serves as a connecting layer between the front end and back end, facilitating requests using the API gateway and maintaining security. It takes care of role-based access control and notification through SMS, emails, and push notifications.

3) AI Processing Layer

The AI Processing Layer detects images and texts with the help of various algorithms such as CNN and NLP. The process layer will be responsible for allocating complaints to respective departments, enabling quick decision-making.

4) *Data & Integration Layer*

The Data & Integration Layer manages user data, complaints, and media along with location data and logging of the system. It also interacts with external systems to ensure seamless data transfer within the system.

5) *Authorities and Workflow Layer*

The Authorities and Workflow Layer allows government officials to handle complaints by changing the status of the complaint, uploading evidence, and verifying that the complaint is resolved.

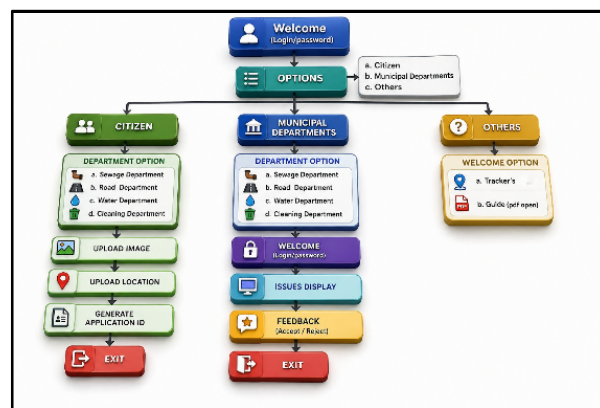
6) *Feedback and Community Layer*

The Feedback and Community Layer involves citizen participation by allowing them to vote, leave comments, and rate their satisfaction level.

7) *Visualization and Transparency Layer*

Lastly, the Visualization and Transparency Layer ensures that citizens have access to maps, reports, heat maps, and analytical dashboards.

B. *Flow Diagram*



The suggested model starts off with the use of the login portal where the user needs to enter his credentials and can choose from one of the three categories offered which include Citizen, Municipal Departments, and Others.

1) *Citizen*

The Citizen part of the portal lets the user pick the concerned department out of sewage, road, water, and cleaning, and uploads a picture of the problem along with other details like its location. Once the data is entered, an Application ID is generated for each complainant for tracking purposes.

2) *Municipal Departments*

The second part involves logging in at the municipal departments side where a list of complaints is provided to be analyzed and evaluated for further actions, whether it may be acceptance or rejection of the complaint based upon its validity.

3) *Others*

The third part is called the “Others” segment of the portal that offers some auxiliary functions, such as complaint tracking using application ID and providing users with PDF files as guides.

IV. CONCLUSION

Smart Grievance Grid is an intelligent and effective system that helps address urban problems. With the Smart Grievance Grid, citizens can make reports quickly by utilizing digital means along with images and locations. Utilizing AI techniques makes the detection and classification of the problem accurate. Complaints will be routed and tracked automatically, helping to avoid any delays in solving them. The system helps improve transparency and citizen involvement. It aids in better decision-making for officials by offering visualizations and analytics. The system ultimately helps build smart cities.

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