



AI-Powered Smart Civic Issue Management System: A Multi-Modal Approach for Enhanced Urban Governance and Citizen Engagement

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Abstract. In developing countries like India infrastructure and other public issues which are directly related to the country growth are most prominent and should not be delayed. These issues such as potholes, garbage accumulation, water leakage, fire etc requires quick attention of authorities to get resolved. General public must be involved to report such issues and a quick coordination among departments/authorities and also quick monitoring requires to get over. It motivates us to design an automated system that may ensure every complaint reaches the right authority and gets resolved on time. In this system, citizens can register complaints by uploading an image, description, and location of the issue. Using AI models like, Vision Transformers for image understanding and BERT for text analysis, combined through CLIP, the platform accurately identifies the issue type and automatically assigns it to the appropriate department. Each complaint is given a priority level, such as high, medium, or low, based on its urgency and impact. The system continuously monitors the complaint, sends reminders as the SLA approaches, and if unresolved, auto-escalates it to higher authorities. Additionally, a two-way feedback module allows authorities to update progress while citizens can track the real-time status of their complaints.

Keywords: Civic Issue Management · Artificial Intelligence · Vision Transformers · BERT · CLIP · Smart Governance · Service Level Agreement Monitoring

1 Introduction

When essential services like clean water timely garbage removal functional street-lights and well-maintained roads operate effectively. People hardly notice them but as soon as a problem arises, it becomes instantly apparent. General public involvement through online portal may make it convenient for government authorities also. Country citizens may raise complaint on online portal and may also track the progress on it. If any issue raised by anyone may involve multiple departments, all departments may collectively make decisions which will

be visible transparently on this portal. Availability of online portal is 24X7 [1]. Public members may raise complaint any time from any where and also may track the progress any time. Many developed and developing countries [2] have online portals to raise the complaints and get it resolved fast.[3]. Till now, no complaint system have AI based prioritization , so we decided to integrate the priority model in order to solve the issue more efficiently and rapidly.

Technology is always changing. We found some research by Jonathan Mast that shows how machine learning can help find urgent complaints, recent articles in Fortune India say that the Reserve Bank of India has made their handling of a lot of complaints more open and effective by using AI[5]. IEEE Xplore research show machine learning can predict financial disputes, and these approaches could be applied to solve complaints at the municipal level [11]. for meaningful improvements in how civic complaints are addressed, cities must move away from outdated, paper-based systems [15]. Developing digital and intelligent solutions that are tailored to local needs and supported by the best research available is essential. Hence, implementing these changes ensures that majority of the concerns are acknowledged, leading to an overall enhancement of urban life for all.

2 Literature Review

Literature Review was conducted based on the following themes:

Research shows, the rise in online complaint systems which allow users to fill forms and receive updates from department. Berezsky (2025) further reported that even educational institutions like ours have implemented online platforms for maintenance requests and accelerating the complaints process [1].

Ferreira dos Santos et al. (2025) and Kuang (2024) examined the implementation of machine learning and artificial intelligence in civic management systems. Their system takes the complaint, then categorize it according to the urgency of the issue. intervention [14]. Krishna Chandar (2025) showed that big organizations such as the RBI have also adopted AI-based solutions to improve transparency and complaint tracking. This will also inspire other governments to improve the system. [2].

Ferreira dos Santos et al. added that when problems are not solved properly and follow-up is weak, it makes citizens unhappy. [14].

Till date we have reviewed the research done on civic management and concluded that there is a urgent need for automated system that may register civic issues and quick work will be done by government authorities.

The reliability of labeled datasets for training models remains a big concern, as inconsistencies and biases can low detection accuracy [16]. Gupta demonstrate this validation of public datasets, show misclassifications that affect partial results, similar to potential labeling errors in civic complaint images/texts.

3 Proposed System

Civic issues like collecting garbage , cleaning water , and health services work properly, everything going well in our society. but when problems occurs , civilians face different issues. so the government should check these services regularly so our country can grow and develop more efficient manner. Simple daily works like picking garbage on time , providing clean water to every citizen , and keeping health services active will make life better for each of us and also upcoming generations.

Online complaints management systems make process very simple and changed how normal people get support, making the process more easier , giving real-time updates and allowing access over different government departments [12]. Digital initiatives, such as the Queensland Ombudsman's framework for public sector reviews, point out how managing complaints at multiple levels increases transparency and improves the response by the government [9].

Technological importance becomes very clear with advanced technology in machine learning and the artificial intelligence for solving different civic problems [14]. Sentiment analysis and the automatic classification these methods help in setting the right priority for complaints and solving them more faster. This makes city management more data-driven and focused on citizens. In the financial sector, the Reserve Bank of India's shift towards AI-based grievance systems shows how predictive analytics is being widely used to increase more transparency and rebuild public trust [8,2]. Predictive modeling has also shown good results in identifying possible disputes in consumer finance, and these ideas can be applied to city complaint systems to improve resource usage and management of it.

4 System Modules

The system consists of various connected modules that improves the management of various civic complaints.

4.1 Civic Complaints Dashboard

Our main idea was to make this reporting system simple like texting message on WhatsApp. if any body see some civic issue like broken streetlight , pile of garbage , damage sewer , you can just click the photo , write a short comment and submit on the portal. later on you can come back and check the status about your complain progress. for city workers , this kind of dashboard keeps every complain in one place , so no issue ignore or lost. it was nice that all civic problems from people coming together in one spot .

4.2 User Interface

We made our system very simple and the user friendly ,with multi-lingual support system and no extra confusing stuff. when user login , user only seen the stuff that matter to the user , like user own complaints .

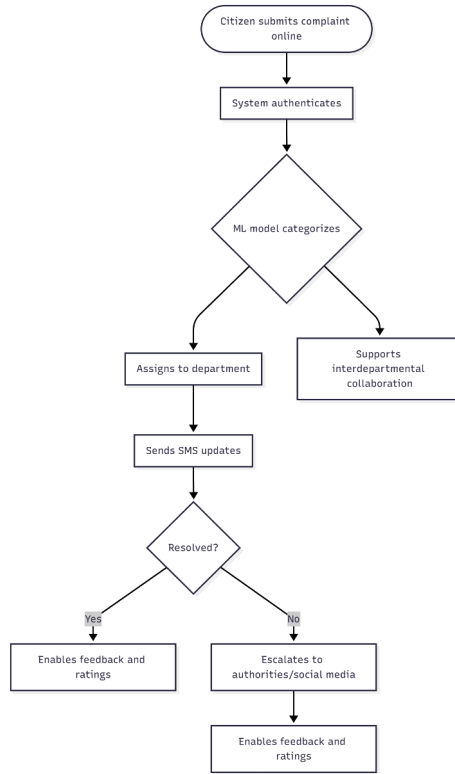


Fig. 1. Workflow of the civic complaint management platform

4.3 Complaint Processing & Assignment

When someone sends a complaint. It reads the details and finds the right department to fix the problem, then sends it there right away. Once, during testing, someone reported a drainage problem, and the system correctly sent it to the sanitation team instead of the roads team.

4.4 Status Tracking & Notification

Our system notifies users at every stage that is you will receive a message when we get your complaint and when it starts being addressed and even when it is resolved. No more waiting without information.

4.5 Escalation & Resolution

Certain problems can prolong the process hence we designed the system to escalate open tickets to supervisors or even generate social media alerts in case there is no response. During testing some issues remained unresolved for a few days and a notification was automatically sent to a senior team without any prompts.

4.6 Inter-Department Communication

Most of the time genuine civic issues require collaboration from multiple teams. For example when streets are flooded both drainage systems and road maintenance need to work together. Rather than making numerous phone calls our platform allows departments to communicate and monitor progress collaboratively. it work as a digital platform that gather everyone to discuss in person.

4.7 Reporting & Analytics

In every industry data-driven insights are very useful. officials have often a desire for data-driven insight but they find the long spreadsheets to be hard to read. so this our system provide visual representations such as bar-charts trends - like is garbage complaints are increasing this moths or which departments are fast in responding and deliver the results.

4.8 Citizen Feedback & Rating

Once the registered complaints is resolved , user (citizens) have the chance to rate the experience and provide genuine feedback . in system testing phases , we received message and the comments from the citizen who felt acknowledged , even if their problem took some time to address. This feedback is share with the authority to ensure it is taken into consideration. We truly believe this process bring authentic progress.

5 System Architecture

While building our Intelligent Complaint Management System, our main goal was to make something simple and robust for both user and the authority , not complex web app. For the frontend we use the React19 and for backend apart we sue the node.js and express and made sure everything works smoothly from one server. here's a look of complain system. First, we focused on how normal users would access a website that feels simple and easy to use. It became clear that the system needed to work properly on both mobile phones and laptops. We wanted the sign-up process to stay secure but not complicated, so email verification was included. on the other hand , some of our users may not want to share their personal details, so we also implement issue submission by anonymous users , with email verification kept optional for security reasons.

Easy-Access Citizen Portal:The user interface was designed to keep simple and easy to use . one crucial point is that account security is maintained through email and phone verification. after logging in , users able to report issues such as a pothole or a leaking tap by uploading a photo and adding a short note .

Smart Login and Verification: Smart Login and Verification: system verify the email and the phone number of the users using SMS and the opt . to

make sure that the reported issues are genuine . we also implement the an option to submit issues as an anonymous user. by providing this method , everyone can still raise concerns freely while feeling secure.

Getting Departments Talking: We observed that, in many cities, issues were often left unattended because responsibility shifted between departments. So we designed a system where different teams, such as water, waste, road, and sewage, can work within the same platform. Each team receives its own set of issues, which means they do not have to keep exchanging emails just to identify who should handle a problem.

- The Road Department deals with complaints connected to road conditions and other infrastructure-related issues.
- the sewage department handle the drainage system and the swage related problems in the city .
- the garbage department take care of matters that linked to waste management and collection.
- the drinking water department addresses complaints related to water supply. these issues are usually raised when supply or quality is affected.

Staff Workspace, Not Just a Dashboard: Staff workforce , not just a dashboard . we designed user-friendly dashboards for the city staff and the authority officials that help them in daily work. new complaints seen instantly , and each civic complain is tagged with the three priority levels - high , medium, low. so the authority can quickly see which problem need more attention . each civic problem also includes an SLA(Service Level Agreement) timer, which help to ensure it gets solved within a give time frame. this system made easy to track progress and also pushed faster action. during the testing time , we observed that the most repeated feedbacks was, "finally we don't have to go through five different emails".

Admin Oversight For the Big Picture:

Admin side was designed to give overall view of what is going in the city. we observed that city administrators need a single portal that is easy to access, where they can notice patterns , and see which departments are overloaded , and identify issues that keep repeating. this setup makes it easier to respond quickly and take appropriate action.

6 Implementation and Results

6.1 System Development

We have to build the smart complaint system for the city so we decided to be on technologies we were already comfortable with. by keeping the entire setup on the cloud, we observed that the website remained stable even when many users will access it at the same time. One important point to be noted is that this decision reduced the risk of crashes during heavy usage . during testing our website with large number of users, we have made the website such that even

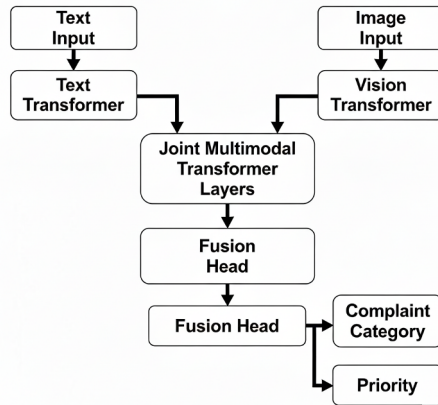


Fig. 2. Model architecture of the proposed system

teammates without a strong technical background could understand why this approach mattered

6.2 Testing Results

When we finally tested the system, We felt satisfied, when we observed how smoothly it performed. Nearly 90 percent of the features behaved exactly as we had expected. Most users were able to submit their complaints within a few minutes, which became possible because the website remained simple to use and included secure email and phone verification. The AI-based feature stood out during the testing phase. We observed that complaints were automatically routed to the correct department without any manual involvement.

6.3 Performance Metrics

When we analyse the new system how it actually performing . we observed some important positive changes, especially when we compared it with the existing process or systems. it become clear that system overall experience had improved in practical ways.

- **Complaint registration became much faster:** Existing system , the process could take much times like hours and in some cases people even had to visit the authority office in person. Now using that improved system these complaints (same task) is completed online within a few minutes.
- **No more confusion around department assignment:** If any complaint was filed , the system automatically routed it to the corrected department using their advanced classification feature. Important point to note is that

the work-flow ran very structure manner and smoothly without manual intervention.

- **Live status updates made a clear difference:**In testing phase test users likes the receiving real -time updates about the progress of their complaints. This help public to build trust in governance .
- **The escalation mechanism actually pushed things forward:**Any complaints delay , the system ensured that the concerned officials reviewed the issue promptly , before complaints could buildup.
- **Departments worked together instead of staying in silos:**Using that platform it is easier for teams to share updates and coordinate their efforts and work progress.

6.4 User Feedback

Once the system was launched , we track that feedback came in from the both users and the our own team . and the most of it was positive. They most appreciated being to track their complaints and receive real time updates. the real time updates and the options of the user feedback in our system help to people that their concerns were actually being noticed.

7 Discussion

7.1 System Benefits

When filing a complaint, we observed that they can now submit their concerns much faster than before. So, now staff can also respond more quickly as well, the reason is the organization of system. One important point to note is that the verification system helped removing wrong reports under control.

Enhanced Accessibility: Enhanced accessibility allows citizens to file complaints according to their time and preferred place. There is no need to stand in long queues at a government offices.

Improved Transparency: Improved transparency allows individuals to raise their grievances at any time and from almost any location. We observed that there is no longer a need to stand in long queues at city offices.

Automated Processing: We observed that the intelligent system automatically sorts and forwards each complaint to the right team. However, as shown in analyses of public ML datasets, label inconsistencies can propagate errors in classification pipelines [16] , emphasizing the need for validation in our civic complaint labels to ensure reliable department assignment and prioritization.

Accountability Mechanisms: One important point to note is that if a complaint stays unresolved for a week, the system triggers an automatic alert to supervisors. This helps ensure that the issue does not go unnoticed.

7.2 Impact on Urban Governance

Citizens and workers can now communicate more easily, and this removes many of the earlier complications we have observed. One important point to note is that feedback is now possible, and departments can now work together more closely.

7.3 Scalability and Future Enhancements

Since our system is cloud-based, it became clear that it can handle a growing number of users without much difficulty. Looking ahead, we have planned to introduce more advanced features, such as AI for identifying patterns and tools that rely on sensors deployed across the city to predict issues before they actually occur.

8 Conclusion

We started this project after observing how slow and frustrating traditional city complaint systems are. Earlier, reporting an issue often meant visiting a government office, standing in long queues, filling out multiple forms, and then waiting without any clear response. It became clear that many people found this process confusing, and in many cases, the effort did not lead to their solution.

What stood out during development was how the process could be organized more effectively. Once a complaint is submitted, the system automatically classifies it and routes it to the correct department, removing the need for manual forwarding. If an issue stays unresolved for too long, the escalation mechanism comes into play and pushes the complaint to senior authorities, such as the Chief Officer or the Mayor.[12]

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