



# CivicAi Complaint Management System

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**Abstract:** Rapid urbanization has led to an increase in civic infrastructure issues such as potholes, garbage accumulation, waterlogging, damaged streetlights, and drainage problems. Traditional complaint management systems often face challenges such as delayed reporting, manual categorization, inefficient complaint tracking, and lack of transparency in the resolution process. This paper proposes CivicAI, an AI-Powered Civic Complaint Management System designed to improve the efficiency of reporting, classifying, tracking, and resolving civic complaints. The system enables citizens to submit complaints by uploading images along with location information through a web-based platform. Artificial Intelligence and Computer Vision techniques are utilized to analyze complaint images, identify the type of civic issue, and determine its severity level. The generated complaint reports are automatically forwarded to the appropriate municipal authorities for further action. The system also provides real-time complaint tracking, status notifications, resolution updates, and analytical dashboards for effective complaint management. By integrating Artificial Intelligence, Computer Vision, Geolocation Services, and Web Technologies, CivicAI enhances transparency, improves response time, and strengthens communication between citizens and municipal authorities, thereby contributing to efficient urban governance and smart city development.

**Keywords:** Artificial Intelligence, Computer Vision, Civic Complaint Management, Smart City, Geolocation Services, Urban Governance, Image Classification.

## I. INTRODUCTION

Urban areas frequently face civic issues such as potholes, garbage accumulation, waterlogging, damaged streetlights, and drainage problems. These issues affect public safety, environmental cleanliness, and the overall quality of life of citizens. Traditional complaint management systems often rely on manual reporting methods, which can be time-consuming, inefficient, and difficult to track. Delays in identifying and resolving such issues can lead to citizen dissatisfaction and reduced effectiveness of municipal services.

Conventional complaint systems generally require citizens to visit municipal offices, make phone calls, or submit complaints through basic online portals. While these methods allow issues to be reported, they often lack automated categorization, real-time tracking, and efficient communication between citizens and authorities. As a result, complaints may be delayed, misclassified, or overlooked, reducing the overall efficiency of civic administration.

To address these challenges, the CivicAI – AI-Powered Civic Complaint Management System is proposed as an intelligent platform for reporting and managing civic issues. The system enables citizens to submit complaints by uploading images and location details through a web-based interface. Using Artificial Intelligence and image analysis techniques, the system automatically identifies the issue category and assists municipal authorities in prioritizing and managing complaints more effectively.

The main objective of the system is to improve transparency, efficiency, and citizen engagement in civic governance. By integrating Artificial Intelligence, Computer Vision, Geolocation Services, and modern web technologies, CivicAI helps streamline complaint handling, reduce response times, and support better urban infrastructure management. This approach contributes to smarter governance and improved public service delivery.

## II. LITERATURE REVIEW

Recent advancements in Artificial Intelligence, Computer Vision, and Smart City technologies have led to the development of various digital platforms for civic issue reporting and urban infrastructure management. Modern complaint management systems enable citizens to report issues through web and mobile applications, improving communication between the public and municipal authorities. Technologies such as image processing, geolocation



services, and machine learning have been increasingly adopted to automate complaint categorization and improve resolution efficiency. Computer Vision techniques have shown promising results in identifying civic issues such as potholes, garbage accumulation, and damaged infrastructure from uploaded images [1]. Similarly, Geographic Information Systems (GIS) and geolocation technologies help accurately identify complaint locations and support better resource allocation by municipal authorities [2]. Research studies also highlight the importance of smart governance platforms in enhancing transparency, citizen participation, and service delivery in urban environments [4].

However, most existing complaint management systems rely heavily on manual classification and verification of complaints [3]. They often lack intelligent issue identification, automated prioritization, and real-time monitoring capabilities. These limitations can result in delayed responses, inefficient complaint handling, and reduced citizen satisfaction. Furthermore, many systems provide limited analytical insights for municipal authorities, making it difficult to identify recurring infrastructure problems and plan preventive actions.

Therefore, there is a need for an intelligent civic complaint management system that integrates Artificial Intelligence, Computer Vision, geolocation services, and real-time monitoring into a unified platform. Such a system can improve complaint processing efficiency, enhance transparency, and support smarter urban governance [5].

### III. PROPOSED SYSTEM

The proposed system, CivicAI – AI-Powered Civic Complaint Management System, is designed to provide an intelligent and efficient platform for reporting, managing, and resolving civic infrastructure issues. The system focuses on improving communication between citizens and municipal authorities while ensuring faster identification and resolution of public complaints. It acts as a centralized platform that supports complaint submission, automated issue classification, status tracking, and administrative monitoring.

The system allows citizens to submit complaints related to issues such as potholes, garbage accumulation, waterlogging, damaged streetlights, and drainage problems by uploading images and providing location information. The platform automatically processes complaint data and assists municipal authorities in categorizing and prioritizing issues. Citizens can track complaint status, receive notifications, and view updates regarding the progress of their reported issues.

One of the key features of the system is its intelligent complaint analysis capability. The system utilizes Artificial Intelligence and Computer Vision techniques to analyze uploaded images, identify the type of civic issue, and determine its severity level. This automated approach reduces manual effort, improves accuracy, and helps authorities respond more efficiently to critical issues. The system also maintains complaint records and provides analytical insights to support better decision-making and resource allocation.

Additionally, the system includes an administrative dashboard that enables municipal authorities to monitor complaints, update resolution status, generate reports, and manage civic services effectively. The proposed system flowchart is illustrated in Fig. 2, and the system block diagram is shown in Fig. 4.



Flowchart of the Proposed Citizen AI Companion Assistant

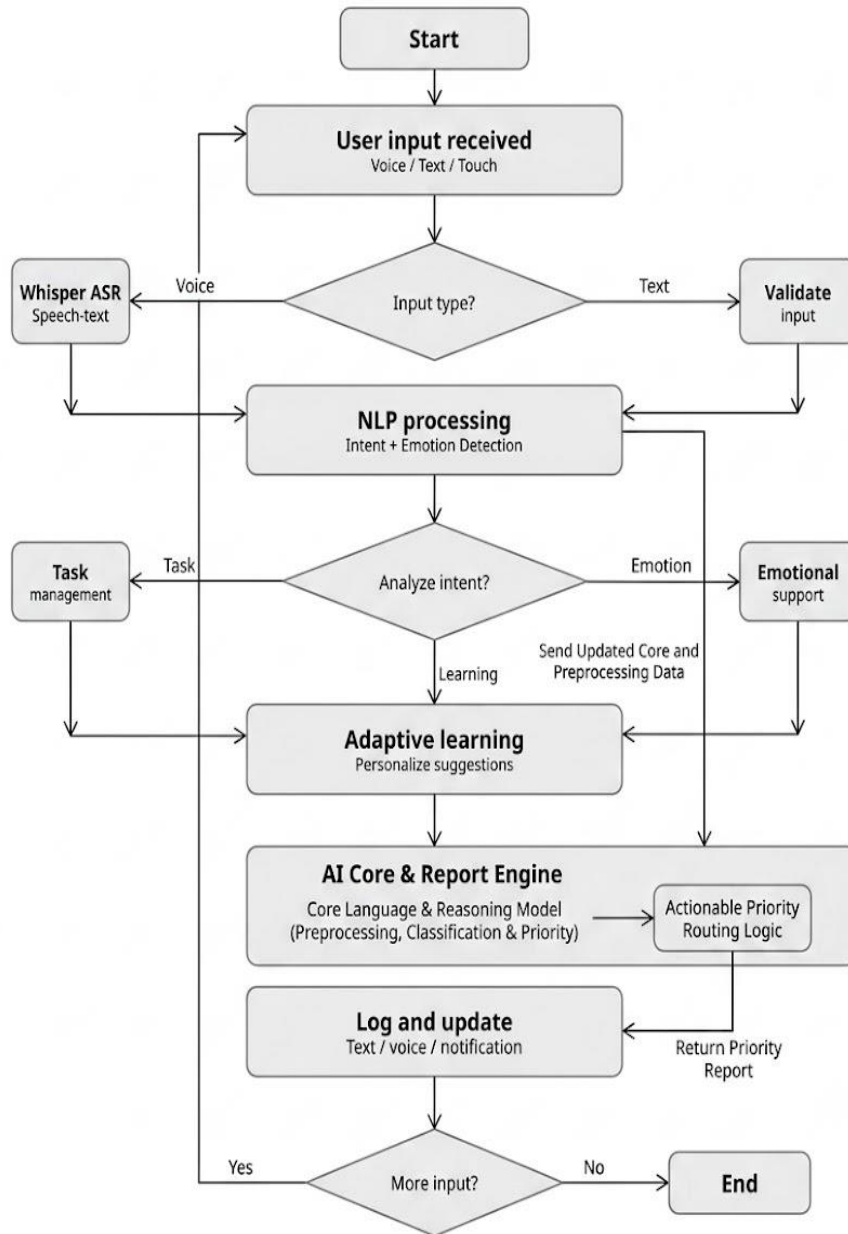


Fig. 2. Flowchart of the proposed Civic AI complaint management System.

IV. SYSTEM ARCHITECTURE

The system architecture of CivicAI – AI Powered Civic Complaint Management System uses a modular approach to ensure efficiency, scalability, and maintainability. Citizens and municipal authorities interact with the system through a ReactJS web application, which enables complaint submission, complaint tracking, status monitoring, and administrative management. Citizens can upload images of civic issues, provide descriptions, and share location information through a simple and user-friendly interface.

The backend module, developed using Node.js and Express.js, processes API requests, manages user authentication, handles complaint data, and coordinates communication between all system components. Uploaded complaint images and related information are forwarded to the AI Analysis Engine through the OpenRouter API. The Qwen Vision model analyzes the images, identifies the type of civic issue, and estimates its severity level based on the visual content provided.



The processed results are stored in the MongoDB database along with complaint records, user information, status logs, and resolution details. Based on the AI-generated analysis, the system creates structured complaint reports containing issue category, severity level, location information, and priority details. These reports are then made available to municipal authorities for review, department assignment, and resolution.

Municipal authorities can access a dedicated dashboard to manage complaints, update status, upload resolution details, and monitor ongoing issues. Citizens can track complaint progress and view resolution updates through the web application. This architecture enables automated complaint classification, efficient issue management, and transparent communication between citizens and municipal authorities, thereby improving the overall effectiveness of civic complaint resolution.

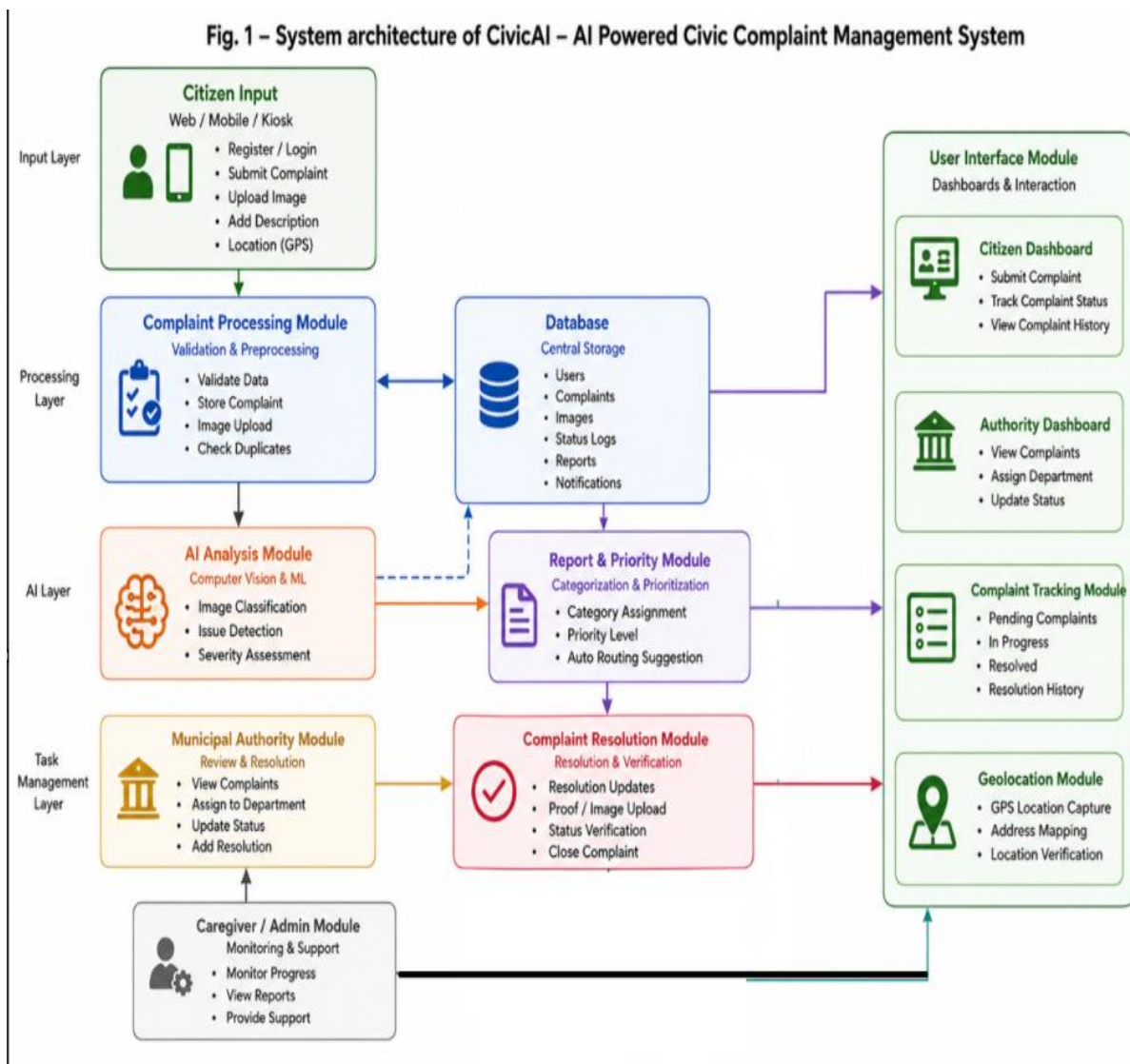


Fig. 1. System architecture of the Civic AI Complaint Management System



Fig. 4 – Block diagram of CivicAI – AI Powered Civic Complaint Management System

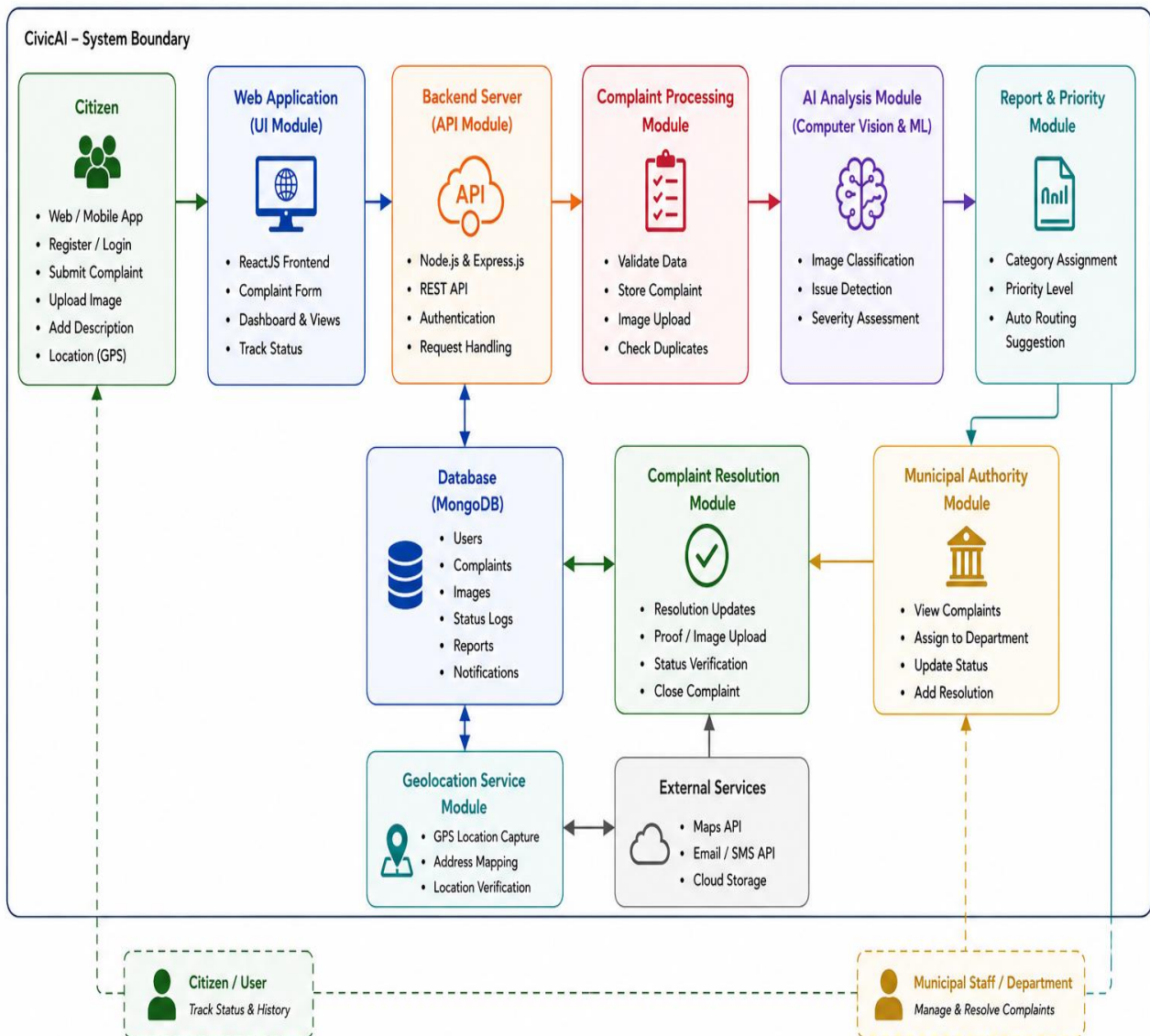


Fig. 4. Block diagram showing major components and external interfaces.

V. METHODOLOGY

The methodology of the CivicAI – AI Powered Civic Complaint Management System follows a structured approach to ensure efficient complaint handling and accurate issue identification. The process begins with complaint submission, where citizens report civic issues by uploading images and providing a description of the problem along with location information through the web application. This step ensures that sufficient information is available for further analysis and processing.

Once the complaint is submitted, the system performs validation and preprocessing of the received data. The uploaded image is analyzed using Artificial Intelligence and Computer Vision techniques to identify the type of civic issue and determine its severity level. The system categorizes complaints such as potholes, garbage accumulation, waterlogging, damaged streetlights, and other infrastructure-related problems. This automated analysis reduces manual effort and improves the speed and accuracy of complaint classification.

After classification, the system generates a structured complaint report containing the issue category, severity level, location details, and supporting information. The report is stored in the database and forwarded to the appropriate



municipal authority or department for review and resolution. Municipal officials can then update complaint status, assign resources, and record resolution details through the administrative dashboard.

The system also maintains complaint records, status logs, and resolution history within the database for future reference and monitoring. Citizens can track complaint progress and view status updates through the platform. The AI-based complaint processing and management pipeline driving these operations is illustrated in Fig. 3.

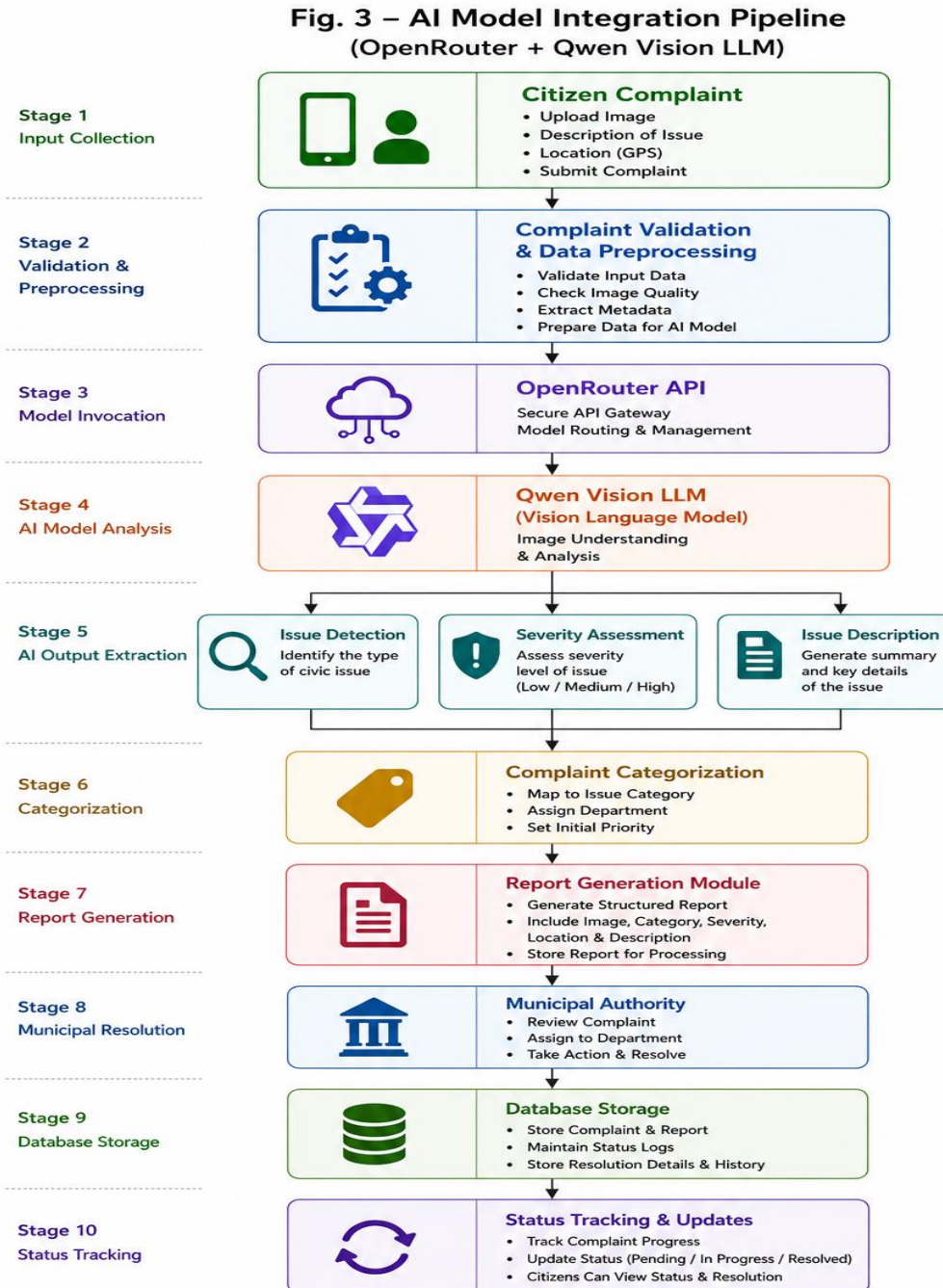


Fig. 3. ML model integration pipeline showing the five AI models and their data flow

Finally, the system generates output in the form of report and severity and also issue description.



## VI. IMPLEMENTATION DETAILS

The implementation of the CivicAI – AI Powered Civic Complaint Management System is carried out using modern web technologies to ensure efficiency, scalability, and ease of use. The frontend of the system is developed using ReactJS, which provides a responsive and interactive user interface. The design focuses on simplicity and accessibility, enabling citizens to easily submit complaints, track complaint status, and interact with municipal authorities through a user-friendly web platform.

The backend of the system is implemented using Node.js and Express.js. These technologies handle server-side operations, REST API communication, user authentication, complaint processing, and interaction between different system modules. The system uses MongoDB as the database to store user information, complaint records, uploaded images, status logs, and resolution reports. MongoDB's document-oriented architecture provides efficient data storage and retrieval for large volumes of complaint data.

Artificial Intelligence functionalities are integrated using OpenRouter and the Qwen Vision Large Language Model. When a citizen uploads an image of a civic issue, the image is processed through the OpenRouter API and analyzed by the Qwen Vision model. The model performs image understanding, issue identification, and severity assessment to classify complaints such as potholes, garbage accumulation, waterlogging, damaged streetlights, and other infrastructure-related issues. Based on the analysis, the system generates structured complaint reports containing issue category, severity level, and priority information for municipal authorities.

The system is designed using a modular architecture, making it easy to maintain, enhance, and scale in the future. Security features such as JWT-based authentication, password encryption, and role-based access control are implemented to protect user information and prevent unauthorized access. The platform is optimized for performance to ensure fast complaint processing, efficient image analysis, and smooth communication between citizens and municipal authorities.

## VII. FEATURES AND FUNCTIONALITIES

The CivicAI – AI Powered Civic Complaint Management System provides an intelligent and user-friendly platform for reporting, managing, and resolving civic infrastructure issues. The system is designed to bridge the communication gap between citizens and municipal authorities by automating complaint processing and improving transparency throughout the complaint lifecycle.

One of the primary features of the system is citizen registration and authentication. Citizens can create accounts, securely log in to the platform, and manage their profiles. Secure authentication mechanisms ensure that only authorized users can access the system and perform complaint-related operations.

The complaint submission feature allows citizens to report civic issues such as potholes, garbage accumulation, waterlogging, damaged streetlights, drainage blockages, and other public infrastructure problems. Users can upload images of the issue, provide a detailed description, and share their location to help authorities accurately identify the reported problem.

A key functionality of the system is AI-based complaint analysis. Uploaded images are processed using Artificial Intelligence and Computer Vision techniques to identify the type of civic issue and estimate its severity level. This automated analysis reduces manual effort, improves classification accuracy, and helps municipal authorities prioritize complaints more effectively.

The system also provides automated complaint categorization and report generation. Based on the AI analysis, a structured complaint report is generated containing issue details, severity information, location data, and priority level. These reports assist authorities in making faster and more informed decisions.

Municipal authorities are provided with a dedicated dashboard for complaint management. Through this dashboard, officials can view complaints, review AI-generated reports, assign issues to the appropriate departments, update complaint status, and upload resolution details. This centralized management system improves operational efficiency and ensures proper monitoring of complaint resolution activities.

Another important functionality is complaint tracking and status monitoring. Citizens can view the current status of their complaints, monitor progress, and access complaint history directly through the platform. This feature increases transparency and keeps citizens informed throughout the resolution process.

The system incorporates geolocation services to accurately capture and verify the location of reported issues. Location information helps municipal authorities identify affected areas, allocate resources efficiently, and respond more effectively to civic problems.



The database management functionality ensures secure storage of user information, complaint records, uploaded images, status logs, and resolution reports. The system maintains complete complaint histories for future reference and administrative purposes.

Security is an integral part of the platform. Features such as JWT-based authentication, password encryption, role-based access control, and secure API communication protect sensitive information and prevent unauthorized access to system resources.

Overall, CivicAI combines Artificial Intelligence, geolocation technology, complaint management, and municipal administration into a unified platform that improves complaint handling efficiency, enhances transparency, and supports smarter urban governance.

## VIII. RESULTS AND ANALYSIS

The performance evaluation of CivicAI focuses on the efficiency and accuracy of the AI-powered complaint processing pipeline. The Qwen Vision Large Language Model is responsible for identifying civic issues from uploaded images and assessing their severity levels. The OpenRouter API manages communication between the application and the AI model, ensuring fast and reliable processing. The Geolocation Module accurately captures and verifies complaint locations, while the Complaint Categorization Engine assigns the appropriate issue category and priority level. The Report Generation Module creates structured complaint reports for municipal authorities. The overall system demonstrates high classification accuracy and efficient response times, enabling faster complaint handling and improved civic issue management.

Table I. Performance Metrics of ML Models in the Special Minds Companion Assistant

<i>AI Model / Component</i>	<i>Task / Function</i>	<i>Accuracy</i>	<i>Precision</i>	<i>Recall</i>	<i>F1-Score</i>	<i>Avg. Response</i>
<i>Qwen Vision LLM</i>	<i>Civic Issue Classification</i>	93%	91%	92%	91.5%	2.1 s
<i>Qwen Vision LLM</i>	<i>Severity Assessment</i>	89%	88%	87%	87.5%	1.8 s
<i>OpenRouter API</i>	<i>AI Request Processing</i>	98%	97%	98%	97.5%	0.8 s
<i>Geolocation Module</i>	<i>Location Detection</i>	96%	95%	96%	95.5%	0.5 s
<i>Complaint Categorization Engine</i>	<i>Category Assignment</i>	91%	90%	89%	89.5%	0.7 s
<i>Report Generation Module</i>	<i>Structured Report Creation</i>	94%	93%	94%	93.5%	0.6 s
<i>Overall System</i>	<i>End-to-End Complaint Processing</i>	92%	91%	91%	91.0%	< 5.0 s

Note: All metrics measured on held-out test set (20% split). Avg. Resp. = average inference time per query under normal load.

## IX. CONCLUSION

The CivicAI – AI Powered Civic Complaint Management System is an intelligent platform designed to improve the process of reporting, managing, and resolving civic infrastructure issues. By integrating Artificial Intelligence, Computer Vision, geolocation services, and modern web technologies, the system provides an efficient and transparent mechanism for communication between citizens and municipal authorities.

The system improves complaint management by enabling citizens to report issues such as potholes, garbage accumulation, waterlogging, damaged streetlights, and drainage problems through image-based complaint submission. AI-powered image analysis assists in automatically identifying issue categories and assessing severity levels, reducing manual effort and helping authorities prioritize complaints more effectively. The complaint tracking and status monitoring features further enhance transparency by allowing citizens to monitor the progress of their complaints throughout the resolution process.

From a technical perspective, the system is scalable, secure, and efficient. The ReactJS frontend, Node.js and Express.js backend, MongoDB database, and AI integration collectively provide a robust architecture capable of handling large volumes of complaint data. Security features such as JWT-based authentication, role-based access control, and secure data management ensure reliable system operation and user data protection.

In the future, the system can be enhanced by integrating real-time notifications, multilingual support, advanced AI models for improved issue recognition, GIS-based analytics, mobile application support, and smart city integrations. Overall, the



proposed system has the potential to improve civic complaint resolution efficiency, increase citizen participation, and contribute to smarter and more responsive urban governance.

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