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Civic Connect-AI Powered Civic Problem Monitoring and Resolution Platform

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Abstract-- With the increased rate of urbanization and digital transformation, civic issue management has turned out to be a major issue for governments and civic administrations. The existing complaint management system has been inefficient, ineffective, and not transparent, leading to a delay in resolution of complaints and civic dissatisfaction. In this paper, we propose a Civic Connect system, which uses Artificial Intelligence for civic problem management. This system will increase efficiency, accuracy, and transparency in civic complaint management. In Civic Connect, users can report civic issues by uploading images or videos, which will be automatically tagged based on their location. Advanced Artificial Intelligence algorithms such as BLIP and BERT are used for image analysis and text classification. The system has been developed using the MERN Stack technology.

Keywords-- Civic Management, Artificial Intelligence, Computer Vision, Complaint System, MERN Stack

I. INTRODUCTION

Considering the rapid growth of urbanization and the ever-increasing population, civic problems such as potholes, waste disposal, water leakages, damaged streetlights, and drainage problems are becoming more prominent. These problems are directly linked with the safety, environment, and overall quality of life of citizens. Efficient resolution of these problems is crucial for the development of sustainable and smart cities.

The traditional civic complaint handling process is mostly inefficient and outdated. In most cases, citizens complain by either calling the authorities or submitting applications. Even nowadays, citizens complain through simple online portals. This process is not efficient because the citizen does not receive information regarding the status of the complaints. This creates dissatisfaction and mistrust between citizens and the authorities. In addition, it is difficult for the authorities to handle a large number of complaints, eliminating duplicates, and prioritizing urgent complaints.

The other major drawback of existing systems is that there is no automation or intelligence in the complaint handling process. The complaints are handled manually, which increases the time for responses and also affects the accuracy of the responses.

Duplicate complaints about the same problem increase the workload for the civic issue management system. Similarly, false or irrelevant complaints further decrease the efficiency of the system. Moreover, there is no proper mechanism for analyzing the complaints for better decision-making.

With the introduction of Artificial Intelligence (AI), Machine Learning (ML), and mobile technology, there is a significant opportunity for improving the civic issue management system. Smartphones allow users to capture real-world problems using images or video recording capabilities. Similarly, GPS technology is used for location tracking.

The research introduces a new AI-based system for the monitoring and resolution of civic problems. The system is named Civic Connect. Using the system, the citizen can report the civic problem by uploading the image/video along with the location. The system will incorporate the latest AI algorithms like BLIP for image recognition and DistilBERT for text classification. The system will have various features like duplicate complaint identification, fake complaints detection, and priority-based classification.

The system will have a central dashboard for the authorities to monitor the complaints. The authorities will be able to perform the task assignments in real-time. The citizen will be able to view their complaints. The system will incorporate AI, web technology, and real-time communication. The system will be efficient, intelligent, and user-friendly

II. RELATED WORKS

Civic complaint management systems have undergone extensive evolution as the need for efficient urban administration and smart cities became increasingly prevalent. The initial stages of development were characterized mainly by systems that involved complaint registration processes either manually or via the web, which allowed users to input their complaints and monitor the progress of the complaint resolution process from a centralized system.

While this offered significant improvements in terms of convenience and transparency when compared with conventional procedures, the reliance on manual processes led to inefficiencies and time wastage. In order to overcome such drawbacks, studies started exploring the use of machine learning technology in complaint handling systems. For instance, Kormpho et al. [3] designed an intelligent complaint system that used machine learning algorithms to categorize and detect duplications in complaints. It was shown that using prediction models helped increase efficiency and decrease reaction time. Nevertheless, such technologies were mainly oriented toward processing structured data without the option to analyze image data, which is critical when dealing with civic complaint issues. The development of mobile complaint systems provided users with an opportunity to report problems using their mobile phones with GPS localization support. Ray et al. [4] created a system with real-time tracking and cloud computing capabilities that allowed users to report problems together with multimedia data. Also, Prabhakar et al. [6] created a location-based Android application that guaranteed authenticity through the use of real-time pictures. Recent developments involved incorporating AI and computer vision technology into civic issues reporting platforms. Walwadkar et al. [7] suggested an advanced civic issue reporting model that leveraged machine learning and image processing to classify and prioritize complaints automatically. The significance of hybrid models was emphasized in their work. On the other hand, Kumar et al. [1] designed a system known as CivicFix, which used AI and geolocation technology to streamline complaints routing and enhance decision-making processes. Such platforms were quite efficient in dealing with civic issues but failed to address the issue of fake and duplicated complaints adequately. In the development of digital transformation platforms, Android-based and web-based complaint reporting systems played crucial roles. Some of these include the models proposed by Jenifa et al. [5] and Saranya et al. [8]. Although such complaint reporting systems facilitated users in submitting reports, they were not very efficient in intelligent data processing and prioritizing complaints. Even with all these improvements, most of the existing systems operate using text-based models or simple rule-based models and fail to harness the power of multimodal data like images and textual descriptions in combination. Besides, most of the available systems lack advanced functionalities like automatic duplicate detection, automatic removal of fake complaints, and intelligent prioritization depending on the severity of the issue reported.

However, the proposed model, named Civic Connect, will be equipped with advanced computer vision and natural language processing technologies that make use of multimodal complaint analysis. In the process, image analysis using BLIP and text analysis using BERT/DistilBERT will enable the model to perform automatically and efficiently.

III. METHODOLOGY

The proposed system is based on an artificial intelligence-based methodology for automating the process of handling citizen complaints. The process entails submitting a complaint, AI analysis, classification, and monitoring the process of complaint resolution.

A. System Architecture

The system has been mainly divided into six modules, as shown in Fig.1

1) User Module:

- Allows users to register and submit complaints
- User can upload image/video .
- Enables real-time status tracking

2) Duplicate Detection Module:

- Identifies repeated complaints
- Uses hash-based comparison
- Reduces system redundancy

3) AI Processing Module:

- Uses BLIP for image captioning
- Uses DistilBERT for text classification
- Detects fake complaints
- Classifies issues into categories

4) Complaint Management Module:

- Stores complaint data in MongoDB
- Tracks complaint lifecycle

5) Notification Module:

- Sends alerts to users and authorities
- Provides real-time updates

6) Authority Module:

- Displays complaints dashboard
- Enables status updates and prioritization

B. Technology Stack

- Frontend: React.js, Bootstrap
- Backend: Node.js, Express.js
- Database: MongoDB
- AI Models: BLIP, DistilBERT



C. Working Step

- User submits complaint with image/video
- System captures GPS location
- processes input
- Duplicate detection
- Complaint is classified and prioritized
- Authorities receive and resolve issues
- User receives status updates

IV. IMPLEMENTATION AND RESULT

A. Implementation Setup

The designed system called Civic Connect is developed using MERN Stack, including MongoDB, Express.js, React.js, and Node.js. For designing the frontend interface, the software uses React.js along with Bootstrap. On the other hand, for designing the backend system, Node.js and Express.js are used. They help in managing all API requests along with processing any type of complaints and implementing the system's logic. For the purpose of storing all the data including user data, complaints, notifications, and logs, MongoDB is used. Artificial Intelligence Models have been incorporated within the backend system for adding further functionalities. These include the use of the BLIP (Boot- strapping Language- Image Pre-training) Model to create textual descriptions from images while BERT/DistilBERT is utilized to classify these texts. Moreover, the mechanism for detecting duplicates is added in the system. In addition, real-time notifications can also be implemented to notify the relevant parties about their complaints' status.

The system is designed to be used on an average computer with the following specifications:

- Processor: Intel i5 / AMD Ryzen 5 or higher
- RAM: 8 GB or more
- Storage: 256 GB SSD
- Internet: Stable connection

B. Dataset

The system uses the data sets that have been made publicly available by Kaggle and include image data about urban civic issue photographs and text data about complaints. The data set includes a variety of urban problems such as pothole problem images, garbage accumulation problem images, water leakage problem images, streetlight problem images, and drainage problem images. These data sets are appropriate for training both image classifiers and text classifiers. The image data set will be used to train BLIP for descriptive caption generation on the uploaded complaint images. The text data set will be used to train Distil- BERT for complaint classification based on their content.

System Walkthrough

The proposed system is accessible through a web-based interface that enables both citizens and authorities to interact with the plat- form efficiently. The user begins by registering and logging into the system through secure authentication pages. Once logged in, the citizen is redirected to the dashboard, where they can navigate to the Report Issue section to submit a new complaint.

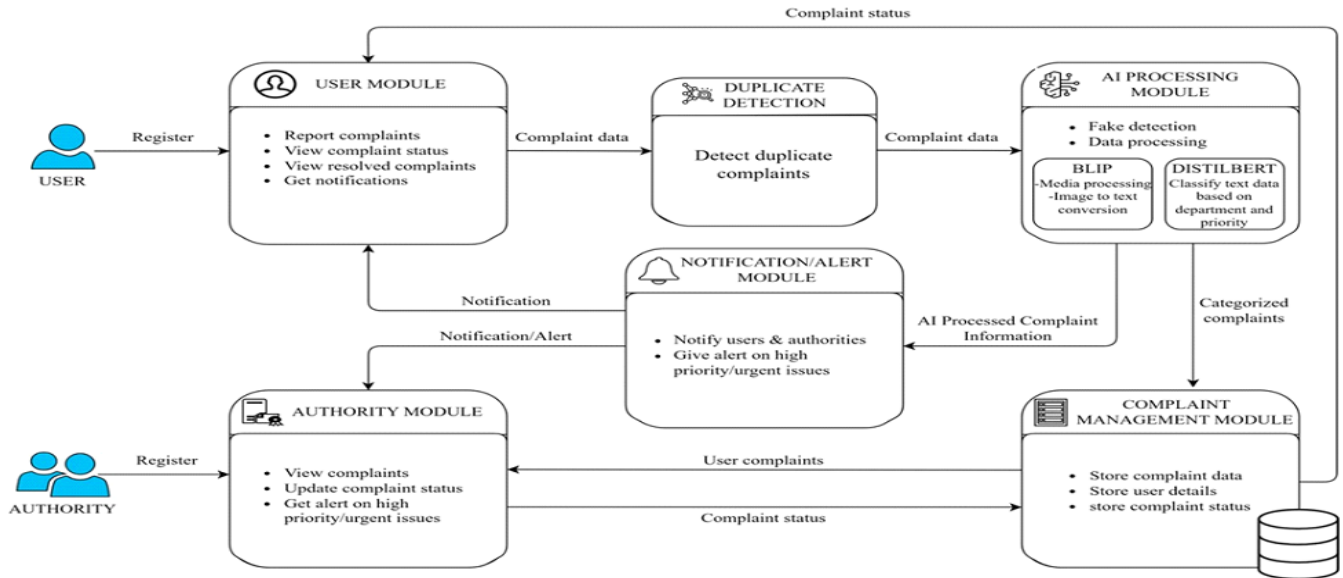


Figure 1: System Architecture

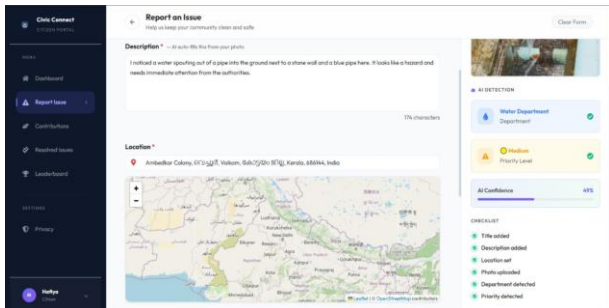


Figure 2: Citizen Dashboard

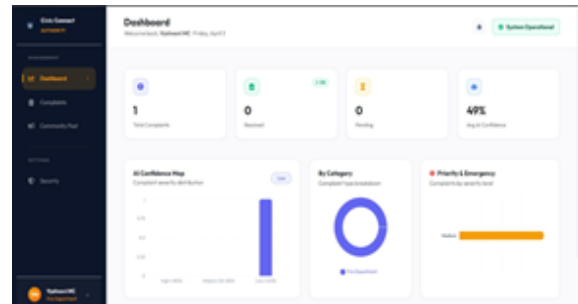


Figure 3: Authority Dashboard

As shown in Fig.2, the complaint submission interface allows the user to upload an image of the civic issue along with a textual description. The system also automatically captures the location using map integration, ensuring accurate geotagging of the complaint. The description field is partially auto-filled using AI-generated captions derived from the uploaded image, improving ease of use and reducing manual effort.

After submission, the system validates the input data and initiates the processing pipeline. The uploaded image is first analyzed using the BLIP model to generate a descriptive caption. This caption, along with the user-provided text, is then processed using the DistilBERT model to classify the complaint into the appropriate department, such as water, waste management, or electricity.

Simultaneously, the system performs duplicate detection by comparing the new complaint with existing records in the database. If a duplicate is detected, the system links it to the existing complaint instead of creating a new entry. The system also determines the priority level (e.g., low, medium, high) based on the severity of the issue.

The AI detection results, including department classification, priority level, and confidence score, are displayed on the right panel of the interface, as shown in Figure. A checklist is also provided to confirm that all required inputs such as title, description, location, and image have been successfully processed.

Once the complaint is submitted, it is stored in the database and made available to the authority dashboard. As illustrated in Fig.3, the authority interface provides a comprehensive overview of all complaints, including total complaints, resolved cases, pending issues, and average AI confidence score.

The dashboard also includes visual analytics such as category wise distribution, priority-based segmentation, and AI confidence mapping. These visualizations help authorities quickly identify critical issues and allocate resources effectively. Authorities can view individual complaints, update their status (pending, in progress, resolved), and manage them through a centralized system.

Real-time notifications are sent to users whenever there is a status update, ensuring transparency and continuous communication between citizens and authorities. The system also supports community engagement features such as contributions and leaderboards to encourage active participation.

Overall, the system workflow integrates user interaction, AI-based processing, and administrative control into a unified pipeline, enabling efficient, transparent, and intelligent civic issue management.

V. CONCLUSION

In conclusion, this paper proposes Civic Connect – an artificial intelligence-based platform for effective civic problem management. The platform utilizes AI models, web technology and real-time monitoring to overcome shortcomings of traditional complaints-handling approaches. The ability of the system to receive information about complaints with the use of images, text, and location is important to ensure high-quality submission.

To process submitted complaints and assign the right category to each one, the platform uses the latest AI models, including BLIP (for understanding images) and DistilBERT (for text analysis). Furthermore, the platform offers features that allow the system to identify duplicates and false complaints, which helps to increase its efficiency and usability. The use of the centralized dashboard that can be used by authorities for monitoring and making decisions makes it possible to handle problems faster and more effectively. The application is developed using the MERN stack and is scalable and flexible. It provides real-time notifications and status tracking for complaints. Thus, communication with citizens is enhanced significantly, which increases transparency of operations of the platform.

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