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VillTech : The Smart Management System for Municipal Services

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Abstract: In India, due to the lack of direct and efficient communication between the government and citizens, it often takes a long time to solve issues. The proposed web-based application aims to bridge this gap by providing citizens, especially in rural areas in the state of Maharashtra at the Gram Panchayat level, with the opportunity to raise their grievances with the concerned government authorities. The application will allow citizens to communicate effectively with the government, which will result in transparency and prompt response to their issues. The proposed application will cater to three main stakeholders: Users, Officers, and Admins. Users will be able to register, login, submit complaints, track their complaint history, escalate their complaints if not resolved, and provide feedback. Similarly, Officers will be able to view complaints, address the issues, and Admin will manage the entire process to ensure transparency. To improve the accuracy of the application, Google Maps API will be used to locate the user's precise location. Additionally, SMS will be used to update citizens about the status of their complaints and scheduled meetings with officers. The proposed application will improve the efficiency of grievance redressed mechanisms by removing bureaucratic hurdles and promoting transparency between citizens and government authorities. In the future, voting can be implemented to allow villagers to vote for their representatives to promote transparency in governance.

Keywords: Grievance Redressal System, E-Governance, Gram Panchayat, Rural Governance, Citizen Complaints, Transparency, Accountability, Google Maps API, SMS Notifications, Public Administration, Digital India, Local Government, Web-Based Application, Civic Engagement, Maharashtra

I. INTRODUCTION

In today's digital age, good communication between citizens and local governments is necessary to keep urban services up to par. Visiting municipal offices or writing down complaints are examples of traditional ways to file complaints that are often time-consuming, ineffective, and not very clear. An Online Complaint Management System (OCMS) for municipal services is a modern, tech-based way to make it easier to file, track, and resolve complaints. Residents can use an Online Complaint Management System to report problems with city services like trash collection, water supply, street lighting, road maintenance, and sanitation through a web or mobile platform that is easy to use. This system not only makes it easier for people to voice their concerns, but it also helps city departments deal with complaints in a more organized way. Automated tracking and feedback systems make sure that communication happens in real time, problems are solved faster, and people are more accountable. Municipalities can improve transparency, speed up the process, and build public trust by making the complaint management process digital. In the end, putting such a system into place leads to better governance, better service delivery, and the growth of smart, responsive cities.

II. LITERATURE REVIEW

A. AI-generated Web complaint management system with Risk Analysis

The study in paper [1] proposes an intelligent web-based complaint management framework that leverages machine learning techniques for automated complaint classification and risk assessment. The system utilizes Multinomial Naïve Bayes and Aggressive Classifier algorithms to categorize complaints and detect potentially fraudulent or duplicate submissions. By incorporating automated risk analysis mechanisms, the system improves operational efficiency and reduces manual intervention in complaint processing. Experimental evaluation demonstrated an accuracy of 89%, indicating the feasibility of AI-driven solutions in managing large volumes of complaint data. However, the system's performance is highly dependent on dataset quality and requires further optimization for real-world large-scale deployment.

B. Automated Text to Audio conversion using OCR

The work presented in paper [2] focuses on the development of an automated text-to-audio conversion system aimed at improving accessibility for visually impaired users. The proposed framework integrates Tesseract OCR for text extraction from images and scanned documents, while image preprocessing is performed using OpenCV and Pillow to enhance recognition accuracy. Extracted textual data is then converted into speech using Google Text-to-Speech technology. The system demonstrates the effectiveness of combining computer vision with speech synthesis to build assistive technologies. Despite promising results, challenges such as recognition accuracy under poor image quality and multilingual text extraction remain open research issues.

C. Multilingual Speech and Text Translation for Indian Regional Languages

In paper [3], the authors present a multilingual speech and text translation framework tailored for Indian regional languages, addressing the linguistic diversity challenge in natural language processing applications. The system employs the IndicTrans2 deep learning model implemented in PyTorch to perform machine translation tasks across multiple languages. Additionally, gTTS (Google Text-to-Speech) is utilized for speech generation from translated text. The integration of speech recognition, machine translation, and speech synthesis enables seamless multilingual communication. Experimental evaluation confirms the system's capability to facilitate cross-lingual interaction; however, scalability and computational efficiency remain significant concerns for real-time deployment.

D. Predicting consumer complaints disputes in Finance using ML

The research presented in [4] investigates the application of machine learning techniques to predict dispute outcomes in consumer financial complaint datasets. The proposed pipeline employs multiple classification models, including Support Vector Machine (SVM), Long Short-Term Memory (LSTM), Multilayer Perceptron (MLP), and Bidirectional LSTM networks, to analyze historical complaint data and identify patterns associated with dispute escalation.

Among the evaluated models, deep learning-based architectures demonstrated superior predictive capability, achieving an accuracy of 94%. This predictive framework enables financial institutions to proactively identify high-risk complaints and implement early intervention strategies. Nevertheless, the model requires extensive labeled datasets and may face challenges related to data imbalance and interpretability.

E. Cooperation of Human and Active learning-based AI for Fast and Precise Complaint Management

The study in [5] introduces a human-in-the-loop machine learning framework that integrates active learning techniques with expert feedback for complaint classification. The system iteratively improves model performance by selectively requesting human annotation for uncertain predictions. This collaborative approach significantly reduces complaint processing time by approximately 86%, thereby enhancing operational efficiency. However, the classification accuracy reported in the study was relatively low (37%), indicating limitations in feature representation and model generalization. Future improvements may involve integrating advanced NLP models such as a transformer-based architecture to enhance classification performance.

F. Dynamic NLP enable chatbot for Rural India

In [6], the authors propose a Natural Language Processing (NLP)-enabled conversational chatbot designed to provide digital information services in rural regions. The system leverages Dialogflow and deep learning-based NLP models to interpret user queries and generate contextually relevant responses. The chatbot architecture supports multilingual interactions and can be applied in domains such as healthcare, agriculture, and government services. Experimental evaluation reported an accuracy of 95%, demonstrating the effectiveness of conversational AI in enhancing accessibility to information services. However, real-world deployment may require improvements in contextual understanding and handling of complex queries.

G. Commodities Price prediction using various ML methods

The study presented in [7] explores the application of machine learning algorithms for forecasting commodity prices based on historical market data. The proposed predictive framework utilizes Linear Regression, Random Forest, and Decision Tree algorithms to analyze price trends and generate future predictions. Among these methods, ensemble learning techniques such as Random Forest demonstrated improved predictive performance. The system achieved an accuracy of 93%, indicating the potential of data-driven models in supporting decision-making for farmers and traders. Nevertheless, the model's predictive capability may be influenced by external economic factors that are not captured in the dataset.

H. Multilingual translation end-to-end speech

In [8], the authors developed an intelligent voice-based assistant for Internet of Things (IoT) systems using machine learning techniques for natural language recognition. The system enables users to control IoT devices through voice commands without relying heavily on cloud-based infrastructure. The proposed architecture improves privacy and reduces latency by performing processing locally. Experimental evaluation reported an accuracy of 87%, demonstrating the feasibility of deploying local voice assistants in IoT environments.

I. Investigation and development of intelligent Voice assistant for IoT using ML

The work presented in [9] proposes a multilingual end-to-end speech translation architecture based on sequence-to-sequence neural networks. The system integrates Recurrent Neural Networks (RNN), Bidirectional Long Short-Term Memory (BLSTM), Neural Machine Translation (NMT), and Automatic Speech Recognition (ASR) components to perform direct speech translation across multiple languages. The proposed universal sequence-to-sequence framework significantly outperforms conventional bilingual translation pipelines by reducing intermediate processing steps. The study highlights the effectiveness of deep learning architectures in enabling real-time multilingual communication, although computational complexity and large training data requirements remain key challenges.

III. CONCLUSION

Improving the way complaints are handled at the rural municipal level is the main objective of the Smart Complaint Management System developed for this project. Many complaint systems these days are either slow or challenging to use, which results in delays. In an attempt to expedite the process, the proposed system makes use of an AI-based voice interface and a complaint tracking tool. It is now easier for users with basic IT skills to raise complaints. A user can independently track the status of a complaint once they have filed it. Users can verify the system's status without having to go to offices or keep asking for updates. As a result, both parties save time and effort. Another advantage of the method is its capacity to provide clarity. Each complaint is precisely recorded and tracked, making it easier for the municipal authorities to manage them. It also guarantees that complaints are neither ignored or neglected. It will also decrease response time and organize the complaint process better. It will facilitate communication between residents and the government. Users can listen to official messages in their mother tongue as the system is multilingual. Municipal departments can use these services to improve public service and handle complaints in a more structured, easier and faster way.

REFERENCES

- [1] T. Prinya et al., "AI-based system integrating geolocation for risk classification and automatic banning of false complaints," *International Journal of Advanced Computer Science and Applications*, 2025.
- [2] C. Hennebold et al., "Active learning prototype for reducing complaint processing time and improving classification accuracy," *Journal of Intelligent Systems Research*, 2022.
- [3] E. V. Polyakov et al., "A method for local, cloud-independent voice assistant development for IoT applications," *IEEE Internet of Things Journal*, 2018.
- [4] S. Dhawale et al., "Machine learning models analyzing soil and weather data for optimal crop prediction," *Agricultural Informatics Journal*, 2023.
- [5] R. Jondhale et al., "Machine learning pipeline for predicting disputed financial complaints," in *Proceedings of the International Conference on Data Science and Applications (ICDSA)*, 2024.
- [6] Ashwini S et al., "MedChat: A multilingual NLP-based healthcare chatbot for rural India," *International Journal of Artificial Intelligence and Healthcare Systems*, 2022.
- [7] Shilpa Rani et al., "Machine learning model for future commodity price prediction," *International Journal of Computer Applications in Agriculture*, 2022.
- [8] S. M. Kamali et al., "Automated text-to-audio conversion system using optical character recognition," *International Journal of Computer Vision and Image Processing*, 2025.
- [9] H. Inaguma et al., "Multilingual end-to-end speech translation," in *Proceedings of the Annual Conference of the International Speech Communication Association (INTERSPEECH)*, 201



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