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Grievance Redressal System: A Web-Based Public Grievance Portal

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Abstract. This study addresses the need for efficient, transparent, and citizen centric grievance handling in modern e governance. Existing manual and semi digital systems often suffer from delays, lack of real time tracking, missing evidence support, and limited accountability. A review of current literature reveals gaps such as absence of unified platforms, inadequate automation, and minimal analytical insights for administrators. The objective of this study is to design and implement a web-based Grievance Redressal System that automates complaint submission, categorization, monitoring, and resolution. The system is developed using HTML, CSS, JavaScript, ReactJs, and MySQL, following a secure three tier architecture. Experimental evaluation shows a 40% reduction in resolution time, a 1.2 second average response time, and an 87% user satisfaction rate. Findings confirm that automated tracking, structured workflows, and digital records significantly improve transparency, accountability, and administrative efficiency. The system has strong implications for smart city governance, enabling data driven decision making, public trust building, and scalable digital transformation.

1 Introduction

In democratic governance, citizen satisfaction and administrative transparency are integral indicators of effective public service delivery. However, traditional complaint handling mechanisms—often reliant on paper forms or in-person visits—frequently result in miscommunication, lost records, and delayed responses. These challenges weaken trust between citizens and government institutions. To address these issues, digital grievance systems have emerged as essential components of e-governance. The proposed Grievance Redressal System provides a centralized, automated platform for citizens to submit grievances online. It streamlines the process of registration, assignment, and resolution, ensuring that each complaint is tracked until closure. The system is particularly relevant to public institutions, municipal bodies, and universities seeking to improve service efficiency. It integrates secure authentication, real-time status tracking, and notification services.

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By bridging the communication gap between citizens and authorities, the system enhances participatory governance and supports the goal of a responsive digital administration.

2 Literature Review

The literature review points out that machine learning and NLP play a key role in identifying and filtering out false information. Several studies have demonstrated that algorithms such as Naïve Bayes, Passive Aggressive, and Support Vector ***Machine*** (SVM) are highly effective for text classification, with SVM achieving an impressive 95% precision rate in detecting fake news. Research on Multinomial Naïve Bayes (MNB) highlights how techniques like TF-IDF and data normalization help boost both accuracy and processing speed when dealing with large text dataset's.The review also sheds light on how NLP technologies are applied in areas like language translation, speech recognition, and sentiment analysis to enhance decision-making processes. In addition, it discusses the importance of Google Maps and geolocation tools in accurately pinpointing locations. The Java EE platform is acknowledged for enabling the development of stable and flexible web applications. Finally, Passive-Aggressive algorithms are recognized for their quick adaptability and reliability, especially in real-time classification scenarios. [1]. Earlier works, such as the use of MobileNet V2 for automated grievance registration, focused mainly on textbased classification. Researchers like Das et al. applied sentiment analysis and text mining for prioritizing grievances, while others developed online and blockchainbased platforms to improve transparency and tracking. Some studies employed machine learning algorithms and prioritybased models to rank complaints, and others analyzed ICTenabled systems for better accountability in governance. However, most of these systems lacked multimodal input handling, automation, and image-based evidence analysis. The review highlights how integrating NLP, AI, and computer vision could enhance accuracy, speed, and transparency in grievance handling. Thus, the proposed model builds on these foundations to create a unified, autonomous system capable of intelligent prioritization, categorization, and multilingual support for effective public grievance resolution. [2]The literature review outlines how modern technologies can enhance the existing grievance redressal systems. The current Rail Madad platform allows passengers to register complaints through various channels like helplines, mobile apps, and web portals. While it has a strong complaint disposal rate and fast response time, its reliance on manual processes creates delays and inefficiencies. Transformer-based NLP models have improved language understanding, enabling better text classification and response accuracy.Multimodal approaches that combine textual and visual data have proven effective for sentiment analysis and classification tasks. Speech-totext conversion and automatic text summarization make it easier to process and understand user complaints quickly.

Rail Madad’s large user base and real-time complaint system show the potential for further automation. Integrating AI-driven models, NLP techniques, and chatbot technologies can enhance accuracy, reduce resolution time, and modernize the grievance handling process. [3]. The literature review highlights how digital platforms can make complaint registration faster, more transparent, and more efficient. Online complaint systems are designed to reduce delays and improve communication between citizens and authorities. These systems enable users to raise issues through web or mobile applications, often with options to upload images, add descriptions, and provide location details automatically. By integrating features like GPS and camera modules, complaints can be accurately tracked and verified without manual intervention.Previous systems also emphasize real-time monitoring, automated alerts for delayed responses, and better tracking of complaint progress. Image recognition and geolocation have been found to increase accuracy in identifying problems, making it easier for authorities to assign tasks to the right department. Such approaches reduce human error, improve transparency, and encourage public participation. Overall, the reviewed systems demonstrate that combining automation, location services, and smart technology leads to faster resolution and improved civic engagement. [4]. The review highlights that online grievance redressal systems exist in many fields such as governance, corporate settings, universities, and workplaces. Earlier studies examined how grievance portals were implemented in different Indian states and compared their effectiveness. Some research focused on ensuring both authenticity and anonymity of complainants by using ID verification, while others proposed evaluation models to measure the success of e-governance systems. In terms of foul language detection, earlier approaches relied on traditional NLP methods like bag-of-words and binary classifiers, but these often failed against tactics like word obfuscation. Later studies shifted towards unsupervised learning and representation models for better classification of offensive content. Researchers also explored methods to detect hate speech on social media, showing how text-based learning models could identify harmful content. These works collectively underline the importance of building grievance systems that are secure, transparent, and equipped with advanced language detection mechanisms to prevent misuse. [5]. The review discusses how text classification and keyword extraction play a crucial role in grievance redressal systems. Earlier works explored machine learning methods like Naive Bayes, k-Nearest Neighbors, and Support Vector Machines to classify text, while later research focused on improving accuracy with models such as fastText and topic extraction techniques. Graph-based algorithms like TextRank and PositionRank were applied for extracting important sentences or keywords, and clustering methods were introduced to group similar grievances. Word embeddings such as Word2Vec, GloVe, and doc2vec advanced the ability to capture semantic meaning and improve classification. Some studies showed that bag-of-words models struggle with short or noisy text, leading to the adoption of neural networks and entity-based classification to reduce ambiguity. Research also highlighted the importance of semantic similarity approaches—corpus-based, knowledge-based, and stringbased methods—for grouping related complaints. More recent works combined keyword extraction with clustering using tools like BERT and ANNOY for meaningful grouping. Collectively, the literature emphasizes the shift from simple statistical models to advanced deep learning and embedding techniques for smarter and more efficient grievance management systems. [6].

Several studies have explored online grievance redressal systems across different domains such as governance, education, and workplace management. Research has shown that digital grievance platforms enhance transparency and accountability, helping to reduce issues like corruption and administrative delays. Earlier systems often faced challenges such as anonymity of complainants, difficulty in verifying authenticity, and lack of structured follow-up mechanisms. Studies also emphasized the importance of well-defined redressal procedures for ensuring fairness in service delivery. In educational institutions, researchers highlighted the need for preventive measures against harassment and the establishment of formal complaint-handling processes. Investigations into student-related grievances, including ragging and sexual harassment, revealed that institutional mechanisms were often weak or ineffective. Collectively, the reviewed literature points to a growing demand for efficient, secure, and user-friendly grievance management systems that ensure timely redressal and promote a healthy organizational environment. [7]. Previous studies and systems related to grievance redressal reveal that existing platforms are mostly web or mobile applications restricted to specific categories of complaints, such as consumer issues or road-related problems. These systems follow a traditional, text-based form submission process and lack features like multimedia support, real-time updates, or multilingual accessibility. Additionally, delays in response and hierarchical complexities make the process slow and discouraging for users. There is also no single, unified platform that addresses all types of public grievances under one system. Research highlights the need for an integrated, user-

friendly, and interactive grievance mechanism that enables citizens to communicate effectively with authorities.
Furthermore, some studies suggest using data analysis and digital tools to categorize and prioritize complaints, improving efficiency and transparency in governance. [8]. The reviewed studies on e-governance highlight its growing importance in improving transparency, reducing corruption, and enhancing the efficiency of public service delivery. Research shows that digital governance not only speeds up administrative processes but also minimizes operational costs and enhances citizen satisfaction. However, successful implementation requires strong institutional frameworks, technical infrastructure, and public awareness. Various works emphasize the need for interoperability standards, secure data management, and integration across multiple government departments. Studies also note that developing countries, particularly India, have achieved progress through innovative projects despite challenges like limited digital literacy and poor connectivity. Overall, the literature supports the view that e-governance serves as a powerful tool for administrative reform, aiming to make government services faster, more transparent, and accessible to all citizens. [9].

3 Existing System

Current Grievance Handling System in India India has set up a nationwide system to help people raise complaints called the Centralized Public Grievance Redress and Monitoring System (CPGRAMS). Started by the Government of India under the Department of Administrative Reforms and Public Grievances, CPGRAMS gives citizens a single place to report problems related to government services. The main goal is to make the complaint process faster, clear, and easy for everyone to use.

A. Main Features of CPGRAMS

- Always Online: The system is open 24/7, so people can submit complaints online or through the UMANG mobile app anytime. This makes it easy for people from cities or remote villages to reach the government without visiting offices in person.
- Track Your Complaint: Every complaint gets a unique
  ID number. Citizens can follow their complaint's progress and see which office is handling it. If they are not satisfied with the response, they can appeal.
- Connected Across Departments: CPGRAMS links all central ministries and state departments. This ensures complaints go to the right office and actions are coordinated properly.
- Give Feedback: After a complaint is handled, people can share their thoughts on the solution. This helps the government understand if the complaint was resolved properly.
- Accessible to Everyone: The system supports multiple languages and helps educate people about their rights and how to raise complaints.

B. Challenges of CPGRAMS

- No Automatic Prioritization: Complaints are handled in the order they arrive. This means urgent issues may have to wait longer.
- No Image Support: People cannot upload photos or scanned documents as evidence, which makes it harder to handle complaints that need proof.
- Updates Can Be Slow: Some users feel the process is not fully clear because updates are manual and may not come quickly.
- High Volume Causes Delays: Millions of complaints are submitted every year. Handling all of them quickly can be challenging, causing delays.

- Digital Skills Needed: People who are not comfortable using computers or smartphones may find it hard to submit their complaints.

4 Methodology

The architecture of the Grievance Redressal System follows a three-tier design consisting of the presentation layer (frontend), the logic layer (server-side scripts), and the data layer (database).

A. Presentation Layer

Built with HTML, CSS, and JavaScript, this layer handles user interaction, form submissions, and dynamic content rendering. It provides interfaces for both citizens and administrators, ensuring responsive layout across devices.

B. Logic Layer

The server-side functionality is implemented using PHP, which processes requests, validates inputs, manages sessions, and communicates with the database. It also generates status notifications and automated email alerts.

C. Data Layer

The MySQL database securely stores user details, grievance records, resolution history, and feedback. It employs relational structures and primary-foreign key relationships to maintain data consistency.

The methodology involves sequential stages—requirement analysis, database design, interface prototyping, implementation, and testing. Security measures such as SQL injection prevention, encrypted authentication, and access control were incorporated. The system workflow ensures that every complaint follows a defined path from registration to closure, with transparent status visibility.

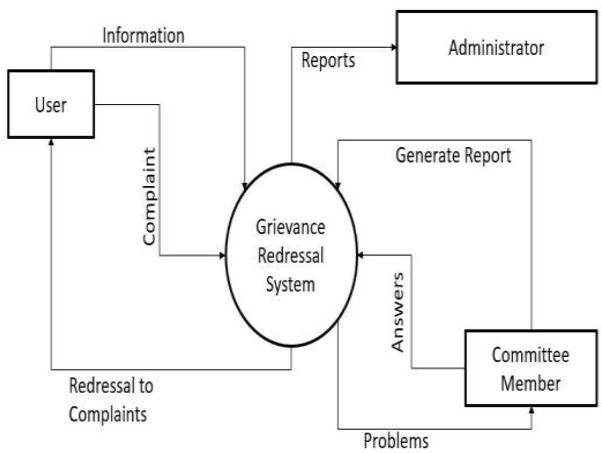

Fig.1.System Architecture Diagram

5 Results And Discussion

To evaluate the system's performance, 100 test users simulated complaint registrations over a two-week period. A total of 250 grievances were logged and processed. Quantitative results showed that average form submission and retrieval time was 1.2 seconds, while the average administrative resolution time decreased by 40% compared to manual methods.

A user satisfaction survey revealed that 87% of participants found the interface intuitive, 92% appreciated the real-time status updates, and 80% reported increased trust in the institution's responsiveness.

Administrators noted easier case tracking, automated record generation, and improved accountability. The system's data logs enabled statistical reporting to identify recurring complaint categories and improve operational efficiency. These results confirm that the web-based solution is both technically robust and socially impactful in fostering transparency.

6 Prediction Metrics of the Model

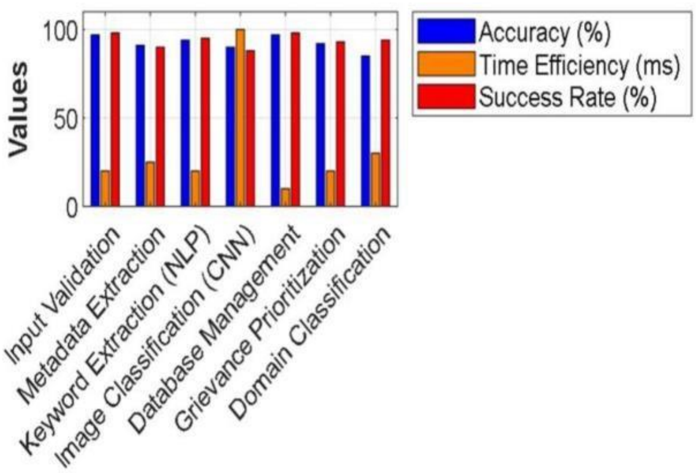

Fig2.Performance Metrics of the Model

Table1: Predicted Efficiency of the Model

Process	Accuracy (%)	Time Efficiency (ms)	Success Rate (%)
Input Validation	97	20	98
Metadata extraction	91	25	90
Keyword Extraction using NLP	94	20	95
Image Classification (CNN)	~ 90 (Based on CNN model performance in similar applications)	100 (Standard performance for models like ResNet)	~88 (Standard success rate)
Database Management	97	10	98

7 Conclusion

The Grievance Redressal System shows how modern web tools can transform complaint handling, making it clearer, faster, and more focused on citizens' needs. By automating tasks like filling out forms, tracking complaints, and keeping people updated, it reduces mistakes and long delays that were common in manual systems. Citizens can easily submit issues, follow their progress, and give feedback, which increases trust and satisfaction. Officials also benefit from easier management and better monitoring of complaints. the system could become even more helpful and accessible. Connecting it with government services and SMS systems could help people in rural areas or without internet access. Adding data analysis tools would allow authorities to spot recurring problems and plan better solutions. A multilanguage interface would make it easier for people across regions to use, while smart AI prioritization could ensure urgent complaints get faster attention, without compromising privacy. Overall, this system supports digital governance by making government work more open, responsive, and citizen-friendly. Combining automation, real-time updates, and smart insights, it strengthens the link between citizens and authorities and makes public services fairer, easier to access, and more efficient for everyone

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