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Smart Grievances Portal

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Abstract

Efficient complaint resolution is vital for good governance and administration of services in both the public and the private sector. In traditional grievance management systems, the process tends to be manual, paper-based, and lengthy, resulting in slow response time, inadequate tracking systems, limited transparency, and low consumer satisfaction. As a result of these challenges, there is a need for a more advanced technology-based application that can be used to handle complaints in a structured, secure, and intelligent way. This research proposes the creation of a Smart Grievances Portal that integrates the use of automation, artificial intelligence (AI), and natural language processing (NLP) to improve overall efficiency in the grievance management process. The proposed Smart Grievances Portal will allow users to secure registration, submit online complaints with attachments, and have access to a real-time status update of their complaint via a dedicated dashboard. An AI-based classification module will use text processing methods, such as tokenization and keyword identification, to analyze complaint descriptions and accurately categorize and prioritize them based on the results. The complaint will be routed to the appropriate department through an automated assignment process, minimizing the possibility of manual intervention and reducing the time taken to process the request. The portal will also include a priority management system that will allow for a quick turnaround on urgent complaints and provide a feedback mechanism for evaluating the quality of services provided and the satisfaction of users. The Smart Grievances Portal will utilize a centralized relational database management system (RDBMS) for all client data and complaint information to ensure that clients can have a single source for client data and complaints. Using a centralized relational database management system (RDBMS) to hold, manage, protect, and track data throughout the lifecycle of a complaint will create a structured way to store that data. Advanced reporting and analytic capabilities can then produce the data needed to make informed decisions about performance using statistical analysis as well as key performance indicators (KPIs). Using secure mechanisms like encryption, role-based access to information, and secure channels of communication, you will be able to protect the data contained within your complaint system while remaining compliant with laws regarding data confidentiality and privacy. The integration of intelligent technologies into grievance redressal systems has resulted in improved transparency, operational efficiencies, accountability, and increased citizen engagement. The Smart Grievances Portal is an example of how governments can begin their digital transformation of processes involved in delivering services via electronic means.

KEYWORDS: *Smart Grievances Portal (SGP), Grievance Redressal System, E-Governance, Digital Government, Artificial Intelligence (AI), Natural Language Processing (NLP), Machine Learning, Automated Complaint Classification, Complaint Management System, Online Complaint Tracking, Complaint Prioritization, Data Analytics, Predictive Analytics, Relational Database Management System (RDBMS), Role-Based Access Control (RBAC), Secure Authentication, Data Security and Privacy, Service Quality Assessment, Citizen-Centric Services, Digital Transformation.*

1. Introduction

Grievance redressal systems are crucial to having meaningful communication between the users of services and those that provide the services. Users or customers of public services and infrastructure facilities regularly experience issues that relate to how the organisations that provide the services operate. Effective grievance management systems help the user to successfully have their grievance addressed.

Grievance management systems have traditionally been manual-based and paper-based; therefore, the user must attend the office to physically file a complaint or they must submit a written complaint. This can result in delays and lack of efficiency. The manual management of the records of the complaints increases the risk that a complaint is lost, duplicated and/or improperly monitored. In addition, users do not receive continual updates on the status of the complaints which creates a lack of transparency and confidence in the system.

With advancements made using digital technologies the trend has been for organisations to move to use online-based complaint management systems. Users can lodge a complaint via a website or a mobile application. Although digital-based grievance management systems result in greater ease of access, many of the complaint management portals that exist today do not have capabilities such as intelligent grievance categorisation, automatic routing of grievances, or real-time tracking of grievances; therefore, grievances are still resolved slowly and there is an excessive amount of work created for the reviewing authorities.

The Smart Grievances Portal has been developed to improve this situation by providing a state-of-the-art grievance management system using automation and artificial intelligence and will allow the user to lodge their grievances online by using a user-friendly interface.

Using Natural Language Processing algorithms to analyse descriptions of complaints and classify them automatically, the system assigns complaints to relevant departments, based on the category of the complaint and the urgency with which it has been lodged. Users will be notified of their complaint's status through an email or SMS notification and will be able to view the status of their complaint through its corresponding dashboard. With improved transparency, diminished manual workload, and greater efficiency in

resolving complaints, the Smart Grievances Portal will provide organizations with an improved level of service quality and support their digital transformation efforts with respect to grievance management systems.

Fig.1 Working Model of Smart Grievances Portal

2. Literature Review

The development of grievance redressal has changed markedly with the emergence of digital governance and e-governance initiatives. Most grievance management systems were manual in nature and required citizens to visit government offices to submit their grievances. Due to inefficient use of public resources, long wait times, and lack of transparency, the previous methods proved ineffective. E-Governance researchers have shown that the use of digital platforms increases access for citizens to submit grievances, provides citizens with more accountability from government agencies, and encourages higher levels of citizen engagement within the public sector. The change from previously existing systems to internet-based grievance management has allowed citizens to submit complaints via the internet, be able to track their complaint, and receive feedback from a government agency in a timely fashion. Research focused on the transition from traditional forms of service delivery to digitally transformed services has provided evidence that incorporating the use of technology into the delivery of public services improves the efficiency of operations and builds greater levels of trust between citizens and government.

A number of researchers have investigated the design and implementation of web-based grievance management systems. In general, these systems consist of three modules: the grievance submission module; an administrative dashboard; and a grievance tracking module. Although the use of web-based grievance systems reduces the amount of paper used to document grievances and improves records management, most of these systems continue to rely heavily upon the manual classification and transmission of grievances to a responsible party. Manual classification increases the workload of administrative staff and retards the speed of resolution. In addition, researchers have found that there is an increasing need to automate the process for the classification and routing of complaints in grievance systems to decrease human involvement and to reduce errors. Automatic routing can be much quicker than manual routing as the staff can decrease the number of manual tasks and respond to grievances faster.

Recently, the incorporation of AI (Artificial Intelligence) and NLP (Natural Language Processing) into grievance management systems has become significantly more common. NLP techniques like: tokenization, keyword extraction and text classification allow for the examination of complaint descriptions written in natural language, thereby enabling the grievance management system to better interpret and analyze complaint descriptions written in this format. Machine learning models such as Support Vector Machines and Neural Networks are widely used for machine-generated text classification and include many different types of models that assist with identifying categories of complaint, detecting urgency levels of complaints and effectively prioritizing cases. Classification via AI/take less time to process and will also enhance the accuracy with which complaints are assigned to the correct department, thereby reducing the time taken to assign a complaint to a department. The use of AI in machine-based text classification is supported by research into text mining and sentiment analysis and will allow information to be extracted from complaints that are both meaningful and actionable.

Research being conducted into data analytics and predictive analysis is also an area of interest with regard to grievance management systems. Organizations are able to monitor key performance indicators (KPIs) in grievance management systems through the use of analytical dashboards e.g. average resolution time, number of outstanding complaints & department, etc. Uses of trend analysis in identifying recurrent pattern types of complaints, which results in the implementation of preventative measures by the organization. In addition, organizations may use predictive analytics to identify possible service failures and respond prior to a service failure becoming catastrophic. Intelligent systems support both operational improvements and strategic decision making in the governance process.

The literature reflects that security and privacy are a significant part of grievance portals. Since grievance portals deal with very sensitive personal data, researchers point out that the portal's secure authentication mechanisms, encryption methods, and role-based access control are crucial to ensure security and privacy. Cybersecurity practices and web security frameworks are necessary in order to protect sensitive user information from unauthorized access and cyber threats. Additionally, providing data protection and compliance with privacy regulations will help to establish user trust in online grievance management systems.

While many online grievance management systems are being developed, existing systems often lack the integration of AI capabilities, advanced analytics, structured systems for capturing feedback, and the ability to send notifications to a user in real time through a single unified system. Most systems provide only basic functions related to registering complaints and tracking their status. The Smart Grievances Portal addresses these limitations, by providing in a unified single product, AI powered

categorization, automated routing of complaints, real-time status tracking, priority management, analytic dashboards, and mechanisms to evaluate user feedback. Through the integration of intelligent technology with the principles of digital governance, the proposed system will assist in increasing transparency, efficiency, accountability, and citizen satisfaction within the grievance redressal process.

3. Research Methodology

The Smart Grievances Portal adopts a systematic method for efficiently resolving each complaint.

3.1. User Registration & Identification

This module helps individuals register for the system and creates secure accounts by entering essential information, including their name, email address, mobile number, and password. The system will also perform validation checks when registering to ensure the entered information is both accurate and unique. Verification of emails, use of OTPs, and/or verification through other means of authenticating users to establish that they are not fake accounts and do not represent duplicate accounts are used in registering users on the Smart Grievances Portal (SGP). Use of password encryption to secure authentication credentials also protects user data from unauthorized individuals accessing that information or credentials. Once a user has successfully registered, they can use their credentials to access the Smart Grievances Portal. The authentication system manages secure sessions and permits access to the complaint submission and tracking functions only to verified users. A user maintains their own profile for personal information and complaint history, which promotes accountability and transparency; therefore, the foundation for building trust and confidence in the Smart Grievances Portal has been established by this module.

3.2. Submitting Complaints

Users have the ability to submit complaints (grievances) by completing a form in the complaint module (structured form). Users will select the complaint category that applies to them and provide a detailed description of the problem they wish to report. The user interface will be simple and easy to use for anyone regardless of their level of technical knowledge. This will make it easier for individuals to submit their complaints without having to worry about the technicalities. Additional supporting documents (images/files) may be attached to any submitted complaint to help clarify the issue for the admins reviewing the complaint. When a complaint has been successfully submitted, it will be assigned a unique complaint identification number (complaint ID) that will aid in tracking and managing a particular grievance. The submission date of the complaint, the time of the complaint, and the category of the complaint will be recorded in the central database to facilitate tracking. This structured way of submitting complaints will help eliminate paperwork, save time, and provide a sufficient documentation trail for monitoring and referencing in the future.

3.3. AI-Based Complaint Categorization

By making use of Artificial Intelligence (AI) and Natural Language Processing (NLP), the Smart Grievances Portal is able to automatically categorize complaints that have been submitted via the portal. The AI module will review the text of each complaint that was submitted to the portal, and will analyze that text by searching for keywords and/or phrases as well as the meaning in context of each word or phrase; this way, using various types of text processing techniques (e.g., tokenizing, keyword matching) it will provide a correct categorization of each complaint into one of the categorized complaints as previously defined. Automated categorization of complaints will help reduce the number of complaints processed manually; thus speeding up, the processing of those complaints. This system will also provide a priority level (high, medium, or low) for each complaint based upon the urgency value assigned to the complaint based on the particular keywords included in the text description provided within the complaint. For example, if the text description of a complaint contains at least one keyword associated with emergencies, it will be assigned a high-priority level. The goal of this intelligent process of categorizing complaints is to improve the overall efficiency of the entire operation by reducing the amount of time it takes for a complaint to be reviewed and for that same complaint to reach the correct department without delay.

3.4. Complaints Assignment

After categorization, complaints are sent to the relevant department via an automatic assignment process. Complaints are matched with their respective department by their category and sent to the correct department. The department administrator has a dashboard where they can view the details of the complaint, including the description of the complaint as well as any attachments and the priority level assigned to the complaint. This assignment process allows for the systematic and equitable distribution of all complaints among all departments responsible for handling the complaints. Complaints that are marked as urgent will be assigned an appropriate priority to make sure the complaint will be acted upon immediately. The assignment process will minimize the amount of manually processing the complaint; helps to improve the communication between the departments and allows for the faster resolution of all grievances. When all complaints are assigned appropriately, there is greater operational efficiency, as there is less of a chance that a complaint will be overlooked or missed altogether.

3.5. Tracking Complaints and Notifications

The complaint tracking module or application offers users a way to track their complaint and see the status of the complaint in real time. The user can log into the application and view the following stages of the complaint:

3.5.1. received
3.5.2. under review
3.5.3. in progress
3.5.4. resolved

This way the user can see that his/her complaint is being acted upon, which provides transparency and builds the user's trust and improves communication between the user and the service provider. The complaint tracking application also provides a mechanism for sending automated notifications (via SMS or email) to the user whenever the status of the user's complaint changes. As a result, the user will always know the status of his/her complaint without having to continually check the

application. This will improve the user's level of satisfaction with regard to the complaint tracking process as well as the interaction between the citizen and the service provider.

3.6. Feedback Mechanism

After a complaint has been resolved, the feedback mechanism is implemented. The purpose of the feedback mechanism is to assess service quality (the quality of the service delivered to the user) and user's satisfaction with that service. When a complaint is resolved, users will be asked for a rating and written comments on their experience so that we can determine if the service was provided in an effective manner and in a reasonable time frame. The response from users to the feedback mechanism is then stored in the database for further evaluation of how each department is performing. Through this analysis, authorities are able to investigate patterns of problems, delays in service, and necessary improvements to be made. The feedback mechanism is an important tool for providing accountability, facilitating continuous improvement, and ensuring that the Smart Grievances Portal and its services are responsive to and focused on the citizens.

Implementation details-The relational database management system (RDBMS) integrated into the Smart Grievances Portal is a centralized database that stores and manages the entire life-cycle of all complaint information, including: user details, complaint information, information about the department that received the complaint, history of status changes of each case, and the user's feedback. Each complaint has an assigned (and unique) complaint ID that ties the various records together, preserves data integrity, and maintains traceability throughout the life-cycle of the database. Data normalization techniques are utilized in the Smart Grievances Portal database in order to reduce data redundancy and to ensure that the data is consistent throughout the database. User roles restrict data access to the complaint records to only authorized administrators; therefore, they alone can modify the records. Confidential and sensitive data is further secured by the use of periodic backups and encryption of data to prevent unauthorized access. Data normalization also allows for faster execution of queries, reliable storage of data, and good performance of the database as the number of complaints increases.

This section describes the Admin module which administers the entire grievance redressal process. The Admin has access to a central dashboard displaying high-level statistics for each of the complaints, department performance, total pending complaints and the total number of resolved complaints. In addition, the Admin may manage user accounts, modify complaint categories, and view activity logs related to the grievance redressal system. Departmental officials will have limited access to the system based on their user roles. Each department official will only be able to view complaints that are assigned to their department, update the status of any complaints assigned to their department, upload their department's resolution report(s) for each of the complaints, and communicate with the other officials within their respective departments. Role Based Access Control ensures that users can only access portions of the system which pertain to themselves, thus increasing overall system security and accountability.

The Priority Management System provides a way to prioritize complaints (i.e., manage complaints on the basis of urgency and severity). Complaints are categorized into different levels of priority (high priority, medium priority, low priority) and high-priority complaints (e.g., emergency services and public safety issues) are flagged for immediate attention. A priority level may either be assigned automatically through the use of an AI-based keyword detection algorithm or manually updated by an administrator, as necessary. By creating a structured way of prioritizing complaints allows for the timely resolution of high-priority complaints but also enables systematic processing of routine complaints. As a result of the priority management system, response times are greatly improved and overall efficiency has increased.

The Reporting Module is used to generate statistical reports and graphics of complaint data. The system is able to analyze trends in complaints by category, location, department and duration of the complaint. The reporting module will assist authorities in determining what issues occur frequently and what service gaps exist. Data visualization dashboards will display Key Performance Indicators (KPIs) such as average time to resolve complaints, number of complaints pending, and user satisfaction ratings. The analytical insights of this module will allow better decision-making and provide direction for the strategic planning process. This module provides value to Governance through the transformation of raw complaint data into actionable information in order to improve services and the quality of those services. The Smart Grievances Portal contains significant elements for security. The portal provides secure communications through HTTPS between users and servers, including the encryption of passwords, the use of secure login sessions, and the use of a firewall to protect the transmission of confidential information. The use of role-based access control ensures no one other than authorized users have access to records of grievances. The system also meets data protection compliance standards through limiting the exposure of data and maintaining the confidentiality of such data. Regular auditing of the system and security monitoring is also carried out to identify possible vulnerabilities and prevent potential malicious attacks.

The Smart Grievances Portal will go through extensive testing prior to deployment by going through unit testing, integration testing, and system testing to ensure that all elements of the system will work properly and efficiently without errors. User acceptance testing will also occur to ensure that the system meets the expectations of users in usability and functionality requirements. The system will be deployed on a secure web server after successful testing. The system will be monitored continuously and maintained regularly to ensure that the system operates smoothly. As a result of user feedback, periodic updates will be made to improve system performance and to provide enhancements based on user feedback.

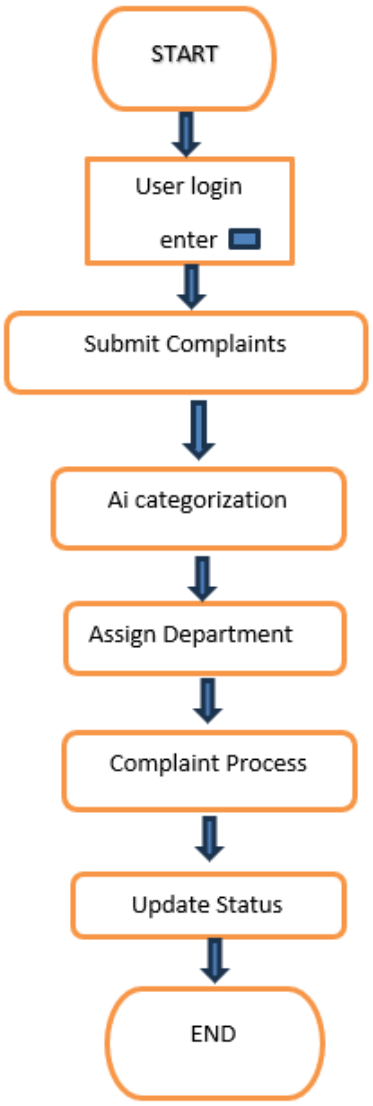

Fig.2 System Flowchart of Smart Grievances Portal

4. Result

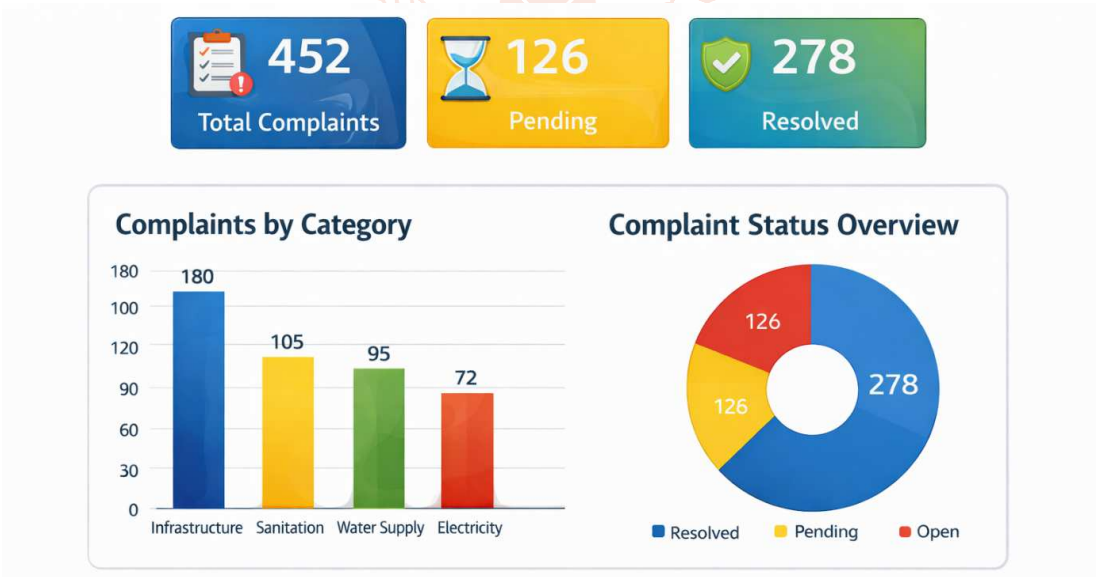

Fig.3 Complaint Dashboard Analysis

5. Conclusion

Smart Grievances Portal is a new approach to managing complaints effectively through automation and artificial intelligence (AI). The Smart Grievances Portal will improve how complaints are monitored by providing greater transparency for all parties involved in the complaint process while providing faster response times. Additionally, the Smart Grievances Portal will improve complaint

management by giving customers an easy-to-use method for submitting complaints, and will facilitate the ability for businesses to manage their complaints more efficiently.

According to results from this research, digital transformation is integral for successfully managing grievance resolution systems. By assisting in improving how organizations and users communicate, the Smart Grievances Portal will significantly enhance the level of service that organizations provide. The following enhancements are currently being considered: multi-language options; mobile applications; and increasing predictive analytical capabilities.

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