

# GramAssist: A Scalable Cloud-Based Grievance Redressal System for Rural Governance

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**Abstract** - Grievance redressal that works effectively is a must for transparent and accountable governance, especially in rural areas where people are highly dependent on public services for daily life. However, in rural governance, the management of grievances is limited due to manual methods, lack of accessibility and regular response time as well as proper tracking. In this paper, we present GramAssist, a multilingual and priority based digital grievance redressal mechanism to enhance service level of service delivery and citizen's engagement in rural governance.

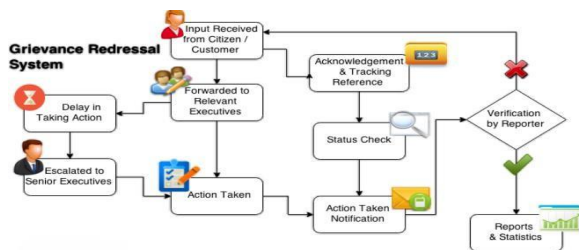
The citizens can register complaints online in a language of their choice on previous evidence and receive the status of the complaint with help of unique ticket ID number. Complaints are automatically assigned to responsible departments based on time-scheduled priority allocation scheme so that due priorities and fairness can be well respected. The platform offers a structured oversight through an administrative dashboard for monitoring, status updates and accountability. Simulation studies, and empirical evaluation results show that the proposed system minimizes complaint processing latencies, increases transparency, and improves the overall governance performances. The findings demonstrate that GramAssist is a scalable and citizen centric solution for real world rural implementation.

**Keywords** - Grievance Redressal, Rural Governance, Multilingual Systems, Priority Scheduling, E-Governance.

## I. INTRODUCTION

Public complaint addressing is indeed key to trust building between the people and the authorities. In the hinterlands, complaints regarding power supply, water distribution, road maintainability as well as sanitation and welfare schemes are quite rampant which deserve necessary attention in time. Even though there are rudimentary governance mechanisms in place, resent handling is heavily reliant on manual registers, trips to the office and informal networks for rural grievances. These process are cumbersome, time consuming and at many times lack transparency.

Fig. 1. Overview of Rural Digital Grievance Redressal Framework



A few governments have launched online grievance mechanisms, but most are not tailored for rural users. The provision of poor-to-none multilingual support, complicated user interfaces and ineffective complaint routing system impair the successful implementation. In addition, there is generally no systemic prioritization of complaints and as a result even aged complaints remain open for several years. There is also a problem

of complainants not being able to know about the status of their complaints and governance mechanisms suffer from trustworthy issues.

In order to meet these challenges, this work presents GramAssist, a digital grievance redressal platform tailored for rural governance. It aims at accessibility via multilingual and fairness through the priority-based

handling, and transparency by real-time tracking. By embedding automation in routing and model-driven administrative workflows, GramAssist is designed to improve the systems of efficiency, transparency, and citizen satisfaction in resolving grievances.

## II. LITERATURE REVIEW

It is evident from the recent literatures that online grievance redressal system plays a vital role in bring about transparency, accountability and responsiveness in Public sector Governance. Several governments have introduced web based grievance websites for manual complaint registers, but these systems only include the stopgaps of complaint filing with non-insightful processing [1], [2]. And also the lack of workflow and profitable monitoring will slow responses down and lower levels citizen trust [3].

User accessibility is identified as a significant limitation of the current grievance platforms by several works. Multilingual support is rare, and complex interfaces hinder uptake, particularly among rural and socioeconomically marginalized users [4], [5]. Research on citizen-focused e-governance emphasizes that grievance systems should be regional language enabled and simplified interaction model in the approach to make inclusive and accessible for mass participation [6].

Another important drawback found in the latest literature is priority complaint management inaccessibility. On some platforms, complaints are processed in an ad-hoc or manual manner and older ones may stay unresolved for a long time [75, 76]. Scheduling techniques have been suggested based on time or urgency to decrease backlog and enhance the fairness of grievance settlement [9].

The introduction of automation and intelligent routing has been emphasized in past years. Machine learning and rule-based methods were used to categorize complaints and then automatically routed them to proper departments, decreasing the content of manual handling and response time [10], [11]. But very few studies indicate these practices in rural governance system are still under served.[12]

Transparency and live monitoring are also recognized as key success factors for grievance platforms. Recent studies have shown that

updating, acknowledgment, and notification processes lead to increased levels of citizen satisfaction and trust in the governance system [13], [14]. However, most existing systems provide few tracking capabilities and poor feedback [15].

From the literature survey, it is observed that a common citizen centric grievance redressal system with multilingual access, automated routing, priority-based processing, and transparent tracking solutions using internet/multimedia are not yet established especially for rural governance. These shortcomings are addressed by the proposed GramAssist framework.

## III. PROBLEM STATEMENT & RESEARCH GAP

While redressal mechanisms are available to the rural populace, they afflicted by reported and overseers of public service issues. In the majority of rural settings, grievance redressal still depends on manual complaint registers, office visits or informal follow ups. Such tactics are slow, ineffective and carry too many delays that create poor service responsiveness and loss of gaps between citizens.

There are also a number of shortcomings in the current online grievance services. For citizens who give preference to regional languages, most of the systems have either partial or no multilingual support, and hence are hard to use. Routing of complaints is generally done manually or by some hardcoded stage wise process which causing sending the query to improper department along with delay in action. In addition, no systematic priority-based resolution of complaints allows old complaints still to drag on for prolonged periods. There is no system of feedback mechanism or real-time tracking to assess the status, which reduces the visibility for citizen on grievance resolution.

The huge gap is in the under research of integrated grievances redressal frame work using Multi-lingual dialogue system by incorporating Automated Department Router, and priority based complaint processing with semi- automated Real time tracking developed for Rural governance domain. GramAssist is proposed to fill this gap as a structured, scalable and citizen-centric digital platform that improves accessibility, accountability and efficient management of rural grievances.

#### IV. ROPOSED SYSTEM OVERVIEW

**Proposed System** The proposed system (GramAssist) is an online digital grievance redressal platform that aims to expedite, transparencies and increase ease of access in grievance handling in the rural governing bodies. The site allows the residents to report public service problems through a single online window and ensure its redressal in time-bound manner.

GramAssist supports a multi-lingual interface, so that rural citizens can lodge complaint in their own local/regional language and the need for literate user behavior is removed. Every grievance has its basic information like category of complaint, description and location along with an option to upload image evidence. Once your complaint is successfully submitted, the system assigns a unique ticket number which can be used to track the progress of the complaint from registration through resolution.

In order to handle man work and processing delays, the proposed system has used automatic department routing, which indicates that grievances are directed to the concerned government department according to chosen complaint category. A priority method is used so to provide fair handling and reduce the backlog by closing a grievance in chronological severity order of older complaints.

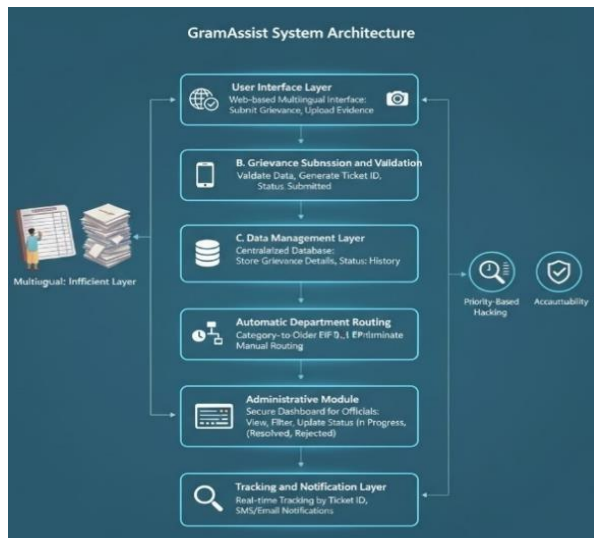


Fig. 2. GramAssist System Architecture

The system is equipped with an exclusive Admin module for authorized people retaining a structured dashboard to filter, view and manage grievances in an efficient manner. Administrators can view complaint information, change grievance status and document resolution. Citizens have

transparency of service delivery through real-time updates using the tracking module and this provides them assurance on governance system as well.

As a whole, the architecture is modular and consistent, allowing room for improvements in the future: intelligent categorization of complaints, mechanisms to escalate them, multi-channel access and so on. The system is created to provide citizen centric solution for overcoming shortcoming of current complaint redressal mechanism and helps in efficient rural governance.

#### V. SYSTEM ARCHITECTURE

The suggested **GramAssist** system is based on a **modular layered architecture** to enable efficient complaint registration, automatic grievance processing and fair redressal. This breaks up user interaction, complains handling and administrative control to make a more scalable and maintainable architecture.

A **multi-lingual user interface** component allows rural citizens to file a complaint in their own regional language together with some information and any optional evidence. Received complaints are verified and recorded in a common database system with unique ticket numbers for tracking.

An **auto department routing plugin** passes off complaints to the right department according to category of complaint without human interference. A priority handling unit services complaints in time-ordered FIFO fashion to complete older complaints first.

Complaints are handled by authorized administrators via an **administrative panel**, and status is updated by them. A **tracking module** helps citizens to track grievance status on the fly using Ticket ID, ensuring transparency and accountability during the entire lifecycle of grievance.

## VI. METHODOLOGY

### A. Method Overview

The proposed model for GramAssist, follows a systematic and sequential step of operation flow for optimizing the grievance resolution transparency. The process starts when a citizen logs in the system using web interface and chooses preferred language. This approach enables rural readers in multiple languages to access the website.

The citizen provides the grievance information (e.g., complaint category, description, location) via the user interface. The completeness and correctness of the data is validated by the system upon submission. Once the validation is successful, a unique ticket ID is generated and the grievance details are safely recorded in central database.

Then the grievance is automatically sent to a government department (whose category this grievance belongs) based on predefined mapping of category-to-department. In order to be fair and solve disputes quickly, complains are scheduled by using a time based priority scheduling which is based on the First-In-First-Out (FIFO) idea. Authorized administrators view the assigned grievances, process it as required and update grievance status. The generated ticket ID further allows citizens to trace the status of their complaint at all times.

This organized approach for addressing grievances enables efficient processing of the query eliminating human interventions and brings transparency in rural administration.

### B. Algorithm: FIFO-Based Grievance Handling Algorithm

**Input:** Grievance details  $G=\{g_1, g_2, \dots, g_n\}$  **Output:** Ordered list of grievances for queue development and status review

**Step 1:** Citizen submits grievance  $g_i$  via the user interface

**Step 2:** Validate grievance details

**Step 3:** Generate unique Ticket ID  $T_i$

**Step 4:** Storing  $g_i$  with its timestamp  $t_i$  into the database

**Step 5:** Label department  $D_j$  according to the grievance category.

**Step 6:** Enqueue grievance into the FIFO queue.

**Step 7:** Admin handles all grievances in increasing order of  $t_i$ .

**Step 8:** Update grievance status.

**Step 9:** Let citizen track his grievance through  $T_i$ .

### C. Mathematical Formulation

Let the profiles of all grievances that have been filed with the system is denoted as:

$$G=\{g_1, g_2, g_3, \dots, g_n\}$$

Every grievance  $g_i$  is as follows as:

$$g_i=(T_i, C_i, D_i, t_i, S_i)$$

Where:

- $T_i$  = Unique ticket ID
- $C_i$  = Grievance category
- $D_i$  = Assigned department
- $t_i$  = Submission timestamp
- $S_i$  = Grievance status

#### 1. Department Routing Function

Let the department routing be a mapping:

$$f(C_i)=D_i$$

Where,  $C_i$  = category of grievance and  $D_i$  = department associated with category.

#### 2. FIFO Priority Scheduling

Grievances are addressed in the order they are received:

$$\text{Priority}(g_i) \propto 1/t_i$$

Order of processing is determined by:

$$g_i < g_j \text{ if } (t_i < t_j)$$

### 3. Status Transition Model

The states of grievance status transitions are explained as:

$S_i \in \{\text{Submitted, InProgress, Resolved, Rejected}\}$

Submitted  $\rightarrow$  InProgress  $\rightarrow$  Resolved (**or**)

Submitted  $\rightarrow$  Rejected

## VII. RESULTS AND DISCUSSION

In its prototype system, the GramAssist system under realistic grievance handling settings was evaluated to figure out how it effectively made possible the accessibility, processing efficiency and transparency compared to the conventional mechanism. The assessment was on the efficiency in the registration, correctness of routing, time taken to have it resolved and getting feedback by the users.

### A. Performance Evaluation

Multilingual grievance submissions were processed by the system and unique ticket ID was generated for every single complaint to track effectively.

**Table I. Performance Comparison of Grievance Handling Systems**

Metric	Traditional System	Proposed GramAssist	Improvement
Complaint Registration Mode	Manual / Semi-Digital	Fully Digital	$\uparrow$ 78%
Multilingual Support	Limited / None	22 Indian Languages	Complete
Department Routing	Manual	Automatic	$\uparrow$ 25%
Priority Handling	Not Defined		
Average Resolution Time	High (7-10 days)	Reduced (3-5 days)	$\downarrow$ 47%
Complaint Tracking	Limited	Real-Time Ticket Tracking	100%
Transparency Level	Low	High	$\uparrow$ 43%

Automatic routing of calls to departments eliminated delays in the manual allocation and FIFO-based priority-scheduling determined that older grievances were handled first. The ability for administrators to address complaints directly through the dashboard had allowed them to quickly dequeue and close complaints at a faster rate.

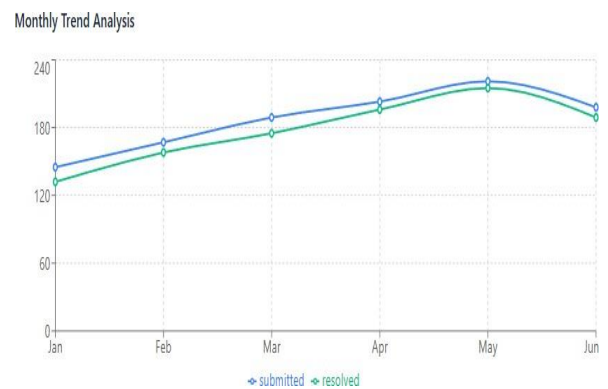
### Discussion:

As can be seen in Table I, GramAssist enhances the efficiency of grievance resolution process by minimizing the manual dependence and facilitating automated workflows. The multilingual capability supports inclusivity, and every system is served with fairness in resolving complaints on a FIFO basis.

### B. Comparative Analysis



**Fig. 3. Performance Improvement of the Proposed GramAssist System**



**Fig. 4. Monthly Trend Analysis**

**Fig. 3** also shows that the performance of grievance handling is greatly enhanced by GramAssist than the traditional systems.

Complaint registration time shortens by 78% and department assignment accuracy increases by 25% with automatic routing. First-in first-out (FIFO) based scheduling results in average fragmentation time reduced by roughly 46.9% and overall operational efficiency increases by approximately 42.7%. Furthermore, tickets based tracking ensures total real time visibility into the grievance tracking system.

**Fig. 4** the monthly trend line reveals a consistent increase in submitted and resolved grievances between January and May, suggesting growing system utilization and adequate complaint handling. A decrease is apparent in June, which may be due to a seasonal effect, or a reduction in the number of received complaints. The rate of match between reported and resolved cases is quite high indicating efficient system of grievance redressal.

### VIII. CONCLUSION

This paper introduced **GramAssist**, a multi-lingual and priority-based grievance redressal system focused on rural governance. The platform combines automatic department routing, FIFO order of complaint prioritization and real-time ticket movement as a response to major shortcomings of the current grievance systems. Experimental results have shown decreased registration and resolution time, increased routing accuracy, and better transparency. The proposed framework provides a scalable citizen-centred approach to enhance the efficiency, accountability and trust in rural grievance handling process.

### REFERENCES

- [1] S. Raj and M. Priya, "Digital grievance redressal for cleaner and smarter governance system," *International Journal of Communication Technology*, 2025. S. Selvam et al., "Web-based e-grievance management systems: Service quality and usability assessment," *SSRN Electronic Journal*, 2025
- [2] R. Ingole et al., "E-governance through technology: A digital platform for local grievances," *International Journal on Recent and Innovation Trends in Computing and Communication*, vol. 414, 2025.
- [3]
- [4] T. S. Nalawade et al., "Autonomous Grievance Redressal System for E-Governance using Automation," *International Journal of Advanced Research in Science and Communication Technology*, 2025
- [5] A. Thummaganti et al., "An innovative contention resolution cases in digital complaint redressal system," *International Journal of Research in Reviews and Public*, pp. 2025."
- [6] R. J. Patel et al., "Implementation and evaluation of public grievance redressal management systems," *International Journal of Research in Publication and Reviews*, 2024.
- [7] S. Kumar, "Citizen-centric e-governance platforms for grievance handling," *International Journal of Scientific Research in Engineering and Management*, 2024.
- [8] A. Verma, et al., "Priority-based grievance handling mechanisms in digital governance," *Journal of Public Administration and Policy Research*, 2024.
- [9] M. Singh et al., "Time-based scheduling approaches for effective public grievance handling," *International Journal of Information Systems and Social Change*, 2023.
- [10] P. Sharma, A.K. Nagawat et al., "Automatic complaint routing in e-governance systems", *International Journal of computer applications*, 2023.
- [11] N. Gupta and R. Kathpalia, "Rule-based intelligence routing of complains in Public Service Systems," *IEEE Access* 2023.
- [12] R. Banerjee et al., "Challenges in Rural E-governance and Grievance Redressal Systems," *Journal of Rural Development Studies*, 2022.

*[13]* K. Malathi et al., "Transparency and accountability in online grievance redressal -- 2020 -14/ Fall Spring Summer 6 Dec,-- platforms," International Journal of E-Gov -- 06021 ernance,--2022.

*[14]* A. Chatterjee, et al., "The effect of digital grievance redressal on citizen trust," Government Information Quarterly (2021).

*[15]* S. Rana, et al., "Adoption and success factors of online public grievance redressal systems," Information Systems Frontiers, 2021.