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PUBLIC PREFERENCE SMART COMPLIANCE SYSTEM

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Abstract

In today's dynamic and fast-paced world, efficiently addressing public grievances is essential for ensuring effective governance, improving service management, and fostering public trust. Traditional complaint resolution methods often suffer from inefficiencies, lack of transparency, and delays, leading to dissatisfaction among citizens. To overcome these challenges, the Public Preference Smart Complaint System is designed as a web-based platform that streamlines the process of lodging, tracking, and resolving complaints while simultaneously promoting legal awareness. This system is built using modern web technologies, including React.js for the frontend, Express.js and Node.js for the backend, and SQL for database management. The combination of these technologies ensures scalability, performance, and ease of maintenance. The platform allows users to register, log in, submit complaints, and monitor their status in real time. The system maintains transparency by providing clear updates on each complaint's progress, categorized as Pending, Resolved, or Rejected based on administrative actions. A distinguishing feature of this platform is its integration of Indian Penal Code (IPC) sections, which provides users with direct access to legal information related to their grievances. This helps users understand their rights and available legal courses of action, thereby fostering legal literacy and reducing misinformation. Additionally, the system incorporates a social media-like environment, enabling users to post and track general complaints occurring in day-to-day life. This public engagement

feature promotes collective problem-solving and allows users to discuss issues affecting their communities. The Administrator Dashboard facilitates structured complaint management, prioritization, and resolution. Administrators can categorize, validate, and resolve complaints efficiently while ensuring role-based access control for secure data handling. The system follows a modularized architecture, where API routes are well-structured to enhance performance and maintainability. By offering an interactive, transparent, and legally informative space for grievance redressal, this project aims to reduce manual effort, improve response times, and empower citizens with legal knowledge, ultimately leading to efficient public service delivery.

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***Key Words*:** Complaint Management System, Public Grievance Handling, Legal Awareness, Indian Penal Code (IPC) Sections, Social Complaint Tracking, User Authentication, API Integration, Efficient Public Service, Real-Time Complaint Monitoring.

1.Introduction

Public grievance handling is a crucial aspect of effective governance, ensuring transparency, justice, and efficient service delivery. Addressing complaints in a timely and structured manner helps build public trust and enhances the overall quality of services provided by various government and non-government organizations. However, traditional complaint-handling methods often suffer from inefficiencies such as lack of tracking, poor accessibility, and minimal legal awareness, leading to delays in resolution and dissatisfaction among citizens. Many individuals remain unaware of their legal rights and the appropriate authorities to approach when facing issues, further complicating the grievance redressal process. To overcome these challenges, the Public Preference Smart Complaint System is developed as a web-based platform that streamlines the lodging, tracking, and resolution of complaints while also promoting legal awareness. This system is built using modern web technologies, including React JS for the frontend, Express JS and Node.js for backend development, and SQL for structured data management. The combination of these technologies ensures a seamless user experience, real-time tracking, and a scalable architecture that enhances performance and maintainability. The platform enables users to register, submit complaints, and monitor the progress of their grievances with clear status updates. Complaints are categorized based on their nature, and users are notified when their issues are resolved. The system ensures transparency by maintaining status records such as Pending, Resolved, or Rejected, allowing users to stay informed throughout the resolution process. Administrators play a key role in managing complaints, categorizing them efficiently, and ensuring prompt resolution. The role-based access control mechanism ensures secure data handling, preventing unauthorized modifications. A unique feature of this platform is its integration with Indian Penal Code (IPC) sections, providing users with legal information relevant to their complaints. This feature helps users understand their rights and legal options, empowering them with legal literacy and guiding them toward appropriate action. Additionally, the system functions as a social media-like platform, enabling users to share and discuss general complaints occurring in daily life. This fosters community engagement, allowing

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individuals to address and resolve common concerns collectively. By incorporating real-time complaint tracking, automated notifications, legal education, and efficient issue resolution, this system enhances public service efficiency and accessibility. The project aims to bridge the gap between public grievances and legal awareness, ensuring a smart, transparent, and user-friendly complaint resolution process that benefits both citizens and administrators.

1.1 Background of the work

Public grievance redressal is a crucial aspect of governance and service management, ensuring that citizens' concerns are addressed in a timely and efficient manner. However, traditional complaint-handling mechanisms often involve manual processes, bureaucratic delays, lack of transparency, and limited awareness of legal rights. Many citizens are unaware of the Indian Penal Code (IPC) sections that govern their grievances, leading to confusion and inefficiency in reporting and resolving issues. With the rise of digital transformation and smart governance, online platforms have been increasingly used to streamline complaint registration, tracking, and resolution. Several government and private-sector initiatives have introduced grievance portals, but many still lack an interactive, user-friendly approach that engages citizens actively. Additionally, most existing platforms focus only on issue reporting rather than educating users about legal regulations or enabling community-driven discussions on social concerns. To address these challenges, the Public Preference Smart Complaint System is designed as a comprehensive, web-based solution that not only allows users to lodge and track complaints but also raises awareness about IPC laws and regulations. Inspired by social media platforms, this system enables users to share, discuss, and track common complaints occurring in day-to-day life, fostering a more collaborative and informed society. The system leverages modern web development technologies such as React JS, Express JS, Node.js, and SQL to create a scalable, modular, and secure complaint management platform. By integrating role-based access control, structured data handling, and a real-time tracking mechanism, it ensures efficient issue resolution while reducing manual intervention. The inclusion of legal awareness through IPC sections further empowers citizens to understand their rights and take informed actions. This project serves as a technological advancement in public grievance handling, promoting a more transparent, accessible, and legally aware society while enhancing the efficiency of complaint redressal processes.

1.2 Motivation and Scope of the Project

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Efficient public grievance redressal is crucial for transparency and governance, yet traditional complaint-handling systems often suffer from delays, lack of accountability, and ineffective tracking. Many citizens remain unaware of their legal rights under the Indian Penal Code (IPC), limiting their ability to seek justice. Additionally, there is a growing need for community-driven discussions on common societal issues. The Public Preference Smart Complaint System is motivated by the need for a modern, interactive, and legally informative platform that not only allows users to report and track complaints but also educates them on relevant laws. By integrating social media-like engagement, the project aims to empower citizens with knowledge, improve accessibility, and enhance complaint resolution efficiency.

The system serves as a scalable and user-friendly web-based platform with multiple functionalities. Users can register complaints, track their status in real-time, and access IPC sections related to their grievances, promoting legal awareness. Additionally, it acts as a forum-like platform where users can discuss and track general complaints occurring in daily life. The system employs role-based access control, ensuring secure and structured complaint handling by differentiating user and admin functionalities. Built using React JS, Express JS, Node.js, and SQL, the platform follows a modular API architecture, enabling scalability and future enhancements. By combining complaint management, legal awareness, and social engagement, this project provides an efficient, transparent, and legally aware grievance redressal system, fostering better public participation and governance effectiveness.

2. Methodology

The Public Preference Smart Complaint System follows a structured and systematic methodology to ensure effective complaint management, legal awareness, and user engagement. The development process involves multiple stages, ensuring that users can register complaints, track them, receive legal guidance, and get real-time updates on complaint resolution. The system is designed using a modular approach, allowing efficient handling of different functionalities, such as user authentication, complaint submission, tracking, and administrative actions. The methodology follows a logical flow, starting from user authentication, complaint filing, and status tracking to administrative review and final resolution. The overall workflow is depicted in the system's flowchart, outlining the interaction

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between users, administrators, and the database.

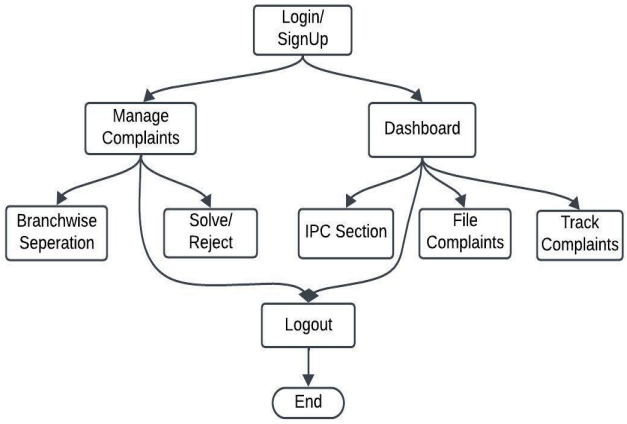

Fig -1: Flowchart

2.1 User Authentication

User authentication is a crucial feature to ensure secure access to the system. Since the platform involves sensitive data such as user complaints, personal details, and legal information, strong authentication mechanisms are implemented.

2.1.1 User Registration and Login

Before accessing the system, both users and administrators must register by providing necessary details such as name, email, phone number, and password. The system uses SQL-based authentication, ensuring that only registered users can log in and utilize the platform. Password Security: Passwords are stored in a hashed format to prevent unauthorized access. Hashing algorithms like bcrypt are used to encrypt passwords before storing them in the database. Login Validation: During login, user credentials are validated against stored data, ensuring only authorized users gain access. If incorrect credentials are entered, the system provides an appropriate error message.

This authentication mechanism protects user data and prevents unauthorized access, maintaining the system's integrity and security.

2.2 User Dashboard

Once a user successfully logs in, they are directed to the User Dashboard, which serves as the central hub for all functionalities. The dashboard is designed with an intuitive user interface, allowing easy navigation.

2.2.1 Filing Complaint

Users can submit complaints directly through the dashboard. Complaints are categorized based on the type of issue, such as public safety, infrastructure problems, legal violations, or harassment. The system stores complaint details in the Complaint Table in the database.

2.2.2 Complaint Tracking

Users can monitor the progress of their complaints in real-time. The system updates complaint status as Pending, Resolved, or Rejected, based on

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administrative actions. Complaint status updates help users stay informed without needing manual follow-ups.

2.2.3 IPC Section for Legal Awareness

A dedicated section provides relevant Indian Penal Code (IPC) sections that apply to various complaints. Users can understand their legal rights and possible legal courses of action before filing complaints. This feature enhances public awareness and encourages legal literacy among users. By integrating these features, the User Dashboard ensures a seamless and transparent complaint management process.

2.3 Administrator Dashboard

The Administrator Dashboard is designed to help administrators manage complaints efficiently. Once logged in, administrators can view, categorize, and resolve complaints. The dashboard provides a structured interface for managing public grievances.

2.3. 1 Managing Complaints

Administrators can view all complaints submitted by users. Complaints are listed along with details, such as the complainant's name, complaint category, and status. This structured view allows easy identification and prioritization of issues.

2.3.2 Branch-Wise Categorization

Complaints are sorted branch-wise, ensuring that issues are directed to the relevant department. For example, complaints related to law enforcement are forwarded to legal authorities, while infrastructure-related issues are assigned to municipal offices. This categorization ensures that complaints reach the right department quickly, reducing resolution time.

2.3.3 Solving or Rejecting Complaints

Administrators can either resolve or reject complaints based on their validity. If a complaint is valid, it is processed for resolution, and the necessary actions are taken. If a complaint is invalid, it is rejected with a proper explanation. This prevents spam or unnecessary grievances from overloading the system.

2.3.4 Email Notifications for Users

The system automatically sends email notifications to users regarding their complaint status.
Users receive notifications when a complaint is:

- Registered (Confirmation Email)
- Resolved (Closure Email)

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- Rejected (Rejection Email with Explanation)

This feature enhances communication and engagement, ensuring that users remain informed. By providing efficient complaint management, automated notifications, and department-wise categorization, the Administrator Dashboard ensures effective governance and public service delivery.

3. Database Structure

The database structure of the Public Preference Smart Complaint System is designed to ensure efficient data management, security, and scalability. It consists of three primary tables: User Table, Complaint Table, and Admin Table, each serving a critical role in the system's functionality. The User Table stores essential user information such as User ID, Name, Email, Password, and Role (User/Admin). It ensures secure authentication and access control, allowing only registered users to log in and submit complaints. Passwords are securely hashed to enhance security and prevent unauthorized access. The Complaint Table is the core of the system, handling complaint details, user submissions, and tracking statuses. It includes fields like Complaint ID, User ID (Foreign Key), Category, Description, Status (Pending, Resolved, Rejected), Submission Date, and Resolution Date. This table enables users to track their complaints in real time, ensuring transparency and accountability. The Admin Table is responsible for managing complaints and ensuring a structured resolution process. It contains fields like Admin ID, Name, Email, and Role to distinguish different administrative levels. Admins can review, categorize, and update complaint statuses, ensuring efficient case handling. This well-structured relational database design improves query performance, data integrity, and system scalability, making complaint management streamlined and effective.

4. System Architecture

The Public Preference Smart Complaint System follows a three-tier architecture, consisting of the frontend, backend, and database layers, ensuring efficient complaint handling, legal awareness, and real-time tracking. The frontend, developed using React.js, provides an intuitive user interface that allows users to register, log in, submit complaints, track their status, and access legal information based on Indian Penal Code (IPC) sections. It communicates with the backend via RESTful APIs to fetch and update data dynamically. The backend, built using Node.js and Express.js, acts as the bridge between the frontend and database, handling

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user authentication, complaint management, and role-based access control. It is structured into separate API modules for managing different functionalities such as user authentication, complaint tracking, and administrative oversight, ensuring better scalability and maintainability.

The database, powered by SQL, stores structured information in three key tables:

- User Table: Manages user registration, login details, and OTP verification.
- Complaint Table: Stores user-submitted complaints, categories, timestamps, and status updates (Pending, Resolved, or Rejected).
- Admin Table: Maintains administrator roles, allowing them to categorize and resolve complaints efficiently.

Additionally, the system integrates real-time tracking and email notifications, ensuring that users remain informed about their complaint status. The modularized architecture enables efficient data retrieval, seamless interactions, and a scalable platform that can accommodate a growing number of users and complaints.

5. Security Measures

The Public Preference Smart Complaint System implements multiple layers of security to protect user data and prevent unauthorized access.

1. OTP Verification for User Authentication: To ensure that only legitimate users can register, an OTP (One-Time Password) verification system is integrated. Users receive a unique OTP during registration, adding an extra layer of security before account activation.

2. Role-Based Access Control (RBAC): The system enforces RBAC, restricting users to their complaints while granting administrators the ability to categorize and resolve cases. This prevents unauthorized access to sensitive information.

3. Secure Password Storage: User passwords are hashed using bcrypt, making them unreadable even if the database is compromised.

4. Secure API Communication: The system uses JWT-based authentication (JSON Web Tokens) to securely exchange user credentials between the frontend and backend. Additionally, all communications are encrypted using HTTPS, preventing man-in-the-middle attacks.

5. Input Validation and SQL Injection Prevention: The system sanitizes all user inputs and implements parameterized queries to protect against SQL injection and cross-site scripting (XSS) attacks.

6. Activity Monitoring and Audit Logs: The platform maintains detailed logs of user activities,

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helping detect suspicious behavior and unauthorized access attempts.

7. Automated Email Notifications: Users receive email alerts when complaints are updated or resolved, ensuring transparency and engagement.

These measures collectively create a secure, transparent, and reliable grievance-handling platform, protecting both user data and system integrity.

6. Result and Discussion

The Public Preference Smart Complaint System effectively streamlines complaint registration, tracking, and resolution while promoting legal awareness through IPC sections. Built using React.js, Node.js, Express.js, and SQL, the system ensures structured complaint management with role-based access control for users and administrators. Real-time tracking enhances transparency, reducing manual follow-ups and increasing trust in governance. Additionally, integrating legal provisions educates users on their rights. The platform fosters community engagement by allowing discussions on public issues. Future enhancements, such as AI-driven complaint categorization, multilingual support, and government integration, can further improve efficiency, accessibility, and scalability for better public grievance handling.

7. Conclusions

The Public Preference Smart Complaint System is a structured, efficient, and scalable platform designed to enhance public grievance redressal by integrating complaint management, legal awareness, and community engagement. Built using React.js, Node.js, Express.js, and SQL, it enables users to file, track, and manage complaints while providing access to Indian Penal Code (IPC) sections for legal awareness. With real-time tracking and role-based access control, the system ensures transparency and accountability. The admin panel streamlines complaint resolution through branch-wise categorization and decision-making (solve/reject). Additionally, its social media-like functionality fosters discussions on common societal issues.

This project significantly reduces manual efforts, response delays, and legal unawareness, making it an effective public grievance-handling solution. Future enhancements, such as AI-based complaint classification, multilingual support, and mobile app integration, can further improve accessibility and efficiency.

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