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Judial–Smart Judicial Complaint Management System with AI-Powered Assistance

Prof V.S Jagtap[1], Swayam Bedarkar[2], Makarand Shirsat,[3] Abhishek Sule[4] Umashankar Ahirwar[5]

*1 prof, Department Computer Engineering, TSSM's Bhivarabai Sawant College of Engineering and Research, Narhe, Pune-41.

*2345Students, Department Computer Engineering, TSSM's Bhivarabai Sawant College Engineering and Research, Narhe, Pune-41.

Abstract - The judicial complaint portal is an essential digital platform aimed at enhancing access to justice and streamlining the legal complaint process. The impact of such portals on the judicial system can vary depending on several factors, such as the legal framework, the level of technological integration, and the country's governance structure. Each country has unique legal systems and institutional setups that influence how judicial effectiveness in improving access to justice. In recent years, significant advancements in LegalTech have led to the development of online platforms that reduce the burden on traditional judicial processes, making it easier for citizens to file complaints, track case progress, and engage with legal authorities. The evolution of these digital solutions has also contributed to greater transparency, efficiency, and security in the legal system This paper is divided into two parts: the first section provides a review of the development of judicial complaint portals globally, including an overview of key technological advancements and innovations in the legal field that have led to the emergence of these platforms. The second section examines several studies on the role of AI chatbots, data privacy, digital governance, and user-centered design in enhancing the efficiency and effectiveness of judicial complaint portals, exploring their potential to accelerate the process of legal redress and contribute to the broader goals of justice accessibility and legal empowerment.

Key Words: Dataflow Diagram, Er Diagram, Use Case Diagram.

1.INTRODUCTION

For centuries, legal systems across the world have sought ways to provide justice and maintain order, navigating the complexities of societal disputes, criminal offenses, and civil conflicts. Courts and judicial bodies have played an essential role in resolving issues ranging from family matters to financial fraud. However, with the rise of digital technology, the judicial process is transforming, with an increasing focus on accessibility and efficiency. Filing complaints, categorizing legal issues, and guiding citizens through the judiciary process have traditionally been time-consuming, often overwhelming for individuals unfamiliar with the legal system. In recent years, advancements in artificial intelligence and data security have enabled the development of smart systems capable of streamlining complex workflows. By integrating these technologies, a judicial complaints portal can now assist users in identifying the nature of their legal problems, categorizing them into appropriate domains—such as civil, criminal, or family law—and routing them to the correct legal authorities. Such platforms also promise heightened security and privacy, essential for compliance with legal standards and protection of sensitive user data. As a response to these advancements, Judial: Smart Judicial Complaint Management System with Powered Assistance leverages automated processes and AI-driven assistance to simplify complaint filing and guidance for users. Through a secure and intuitive platform, Judial seeks to enhance public access to legal systems, offering a more approachable and effective means for citizens to engage with judicial services.

2. OBJECTIVE

The judicial complaints portal allows users to file complaints in various legal categories (e.g., civil, criminal, family law). The portal categorizes complaints, routes them to appropriate authorities, and includes an AI-powered chat bot for user assistance. A machine learning component processes user complaint data to generate location-based charts, depicting crime rates and types by region, providing insights for both users and legal authorities.

3. LITERATURE SURVEY

[1]. Katsh, E. & Rifkin, J. (2001) – "Online Dispute Resolution: Resolving Conflicts in Cyberspace" Explores Online Dispute Resolution (ODR) platforms for resolving conflicts without traditional court proceedings. Supports the concept of a digital platform for filing complaints and resolving legal disputes efficiently. Valid foundational reference in LegalTech for online legal services.

[2]. Susskind, R. (2019) –"Tomorrow's Lawyers: An Introduction to Your Future "Discusses the role of AI and machine learning (ML) in automating legal tasks, including complaint categorization and legal assistance. Directly applicable to AI chatbots in your portal for guiding users and classifying complaints. Highly accurate for LegalTech and AI-driven legal services.

[3]. Vaswani, A. et al. (2017) – "Attention is All You Need" Introduces the Transformer model for advanced natural language processing (NLP) tasks like chatbot interaction. Essential for building an NLP-based legal chatbot to assist users with filing complaints and understanding legal language. True and highly relevant for AI chatbots in the legal domain.

[4]. Goodman, M., & Lichtenstein, R. (2020) – "Artificial Intelligence and Privacy in Legal Technology "Examines data privacy challenges in legal technology and compliance with GDPR and other privacy laws. Provides guidelines for ensuring data privacy and security in your portal's handling of sensitive legal data. Valid and essential for ensuring privacy compliance in legal portals.

[5]. Mayer-Schönberger, V., & Cukier, K. (2013) –"Big Data: A Revolution That Will Transform How We Live, Work, and Think "Discusses how big data and analytics can transform decision-making and visualize legal trends (e.g., crime data).Useful for implementing a crime chart feature that visualizes complaint data and trends for users and law

enforcement. True and relevant for data visualization in the portal.

4. BLOCK DIAGRAM

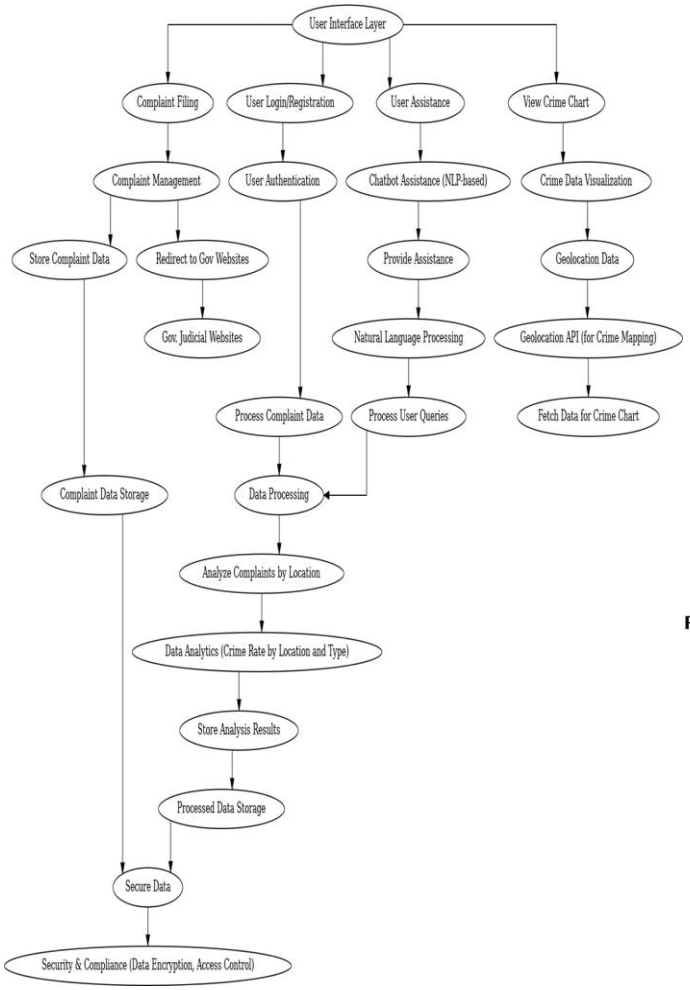

Fig 1. Block Diagram

5. ER DIAGRAM

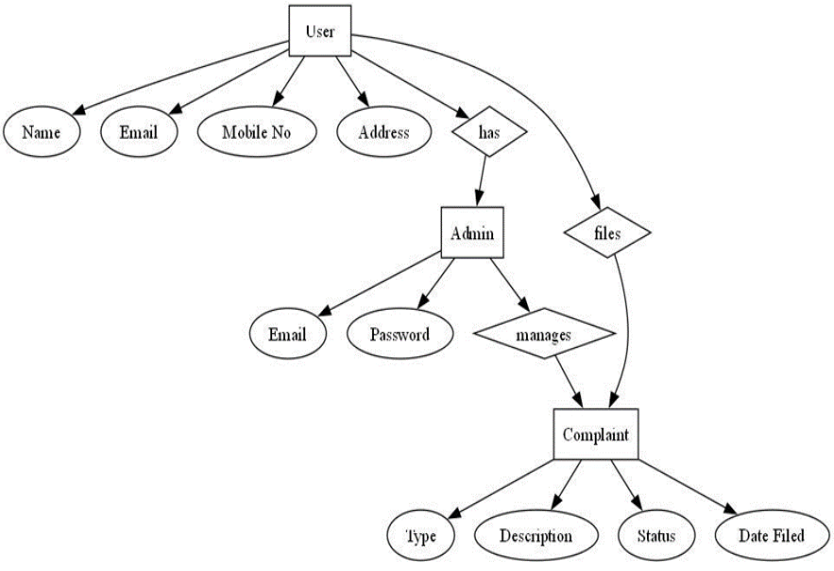

Fig 2. Er Diagram

An Entity-Relationship (ER) diagram is a visual representation of the structure of a database, showing how entities (objects) relate to each other. Key components include:

1.Entities: Objects or things (e.g., "Customer", "Order"), represented as rectangles.
2.Attributes: Properties of entities (e.g., "Name", "Address"), shown as ellipses.
3.Relationships: How entities are linked (e.g., a "Customer" places an "Order"), depicted as diamonds.
4.Cardinality: Specifies the number of entity instances that can be related (e.g., One-to- Many, Many-to-Many).
5.Primary Key: A unique identifier for an entity, usually underlined.
6.Weak Entities: Entities that depend on another for identification, shown as double rectangles.

6. DATAFLOW DIAGRAM

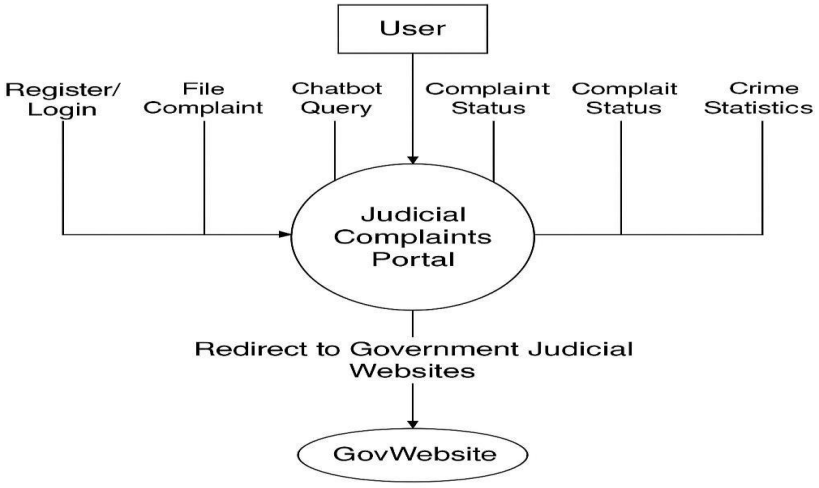

Fig 3. Dfd Level 0

DFD Level 0: High-Level Overview

- User: The end-user who registers, logs in, files complaints, and interacts with the system.
- Judicial Complaints Portal: The central system where users submit complaints, access a chatbot, and view crime statistics.
- Data Flows:
- Register/Login: The user registers or logs into the portal.
- File Complaint: Users can submit complaints on various legal issues.
- Chatbot Query and Response: Users interact with a chatbot that guides them through the complaint process.
- Crime Statistics: The user can view statistical data based on existing complaints.
- Redirect to Government Websites: Links to external government judicial sites for additional resources or filing options

DFD Level 1: Detailed Breakdown

• Register/Login: Handles user authentication.
• File Complaint: Collects detailed information on the user's complaint.
• Chatbot Assistance: Provides guidance to users through an interactive chatbot, using NLP to understand queries.
• Complaint Categorization: Categorizes the complaint type (e.g., civil, criminal) for efficient processing
• Route to Gateway: Routes the categorized complaint to the appropriate judicial gateway (e.g., family law, criminal justice).
• Store Complaint Data: Stores complaint data securely in a database.

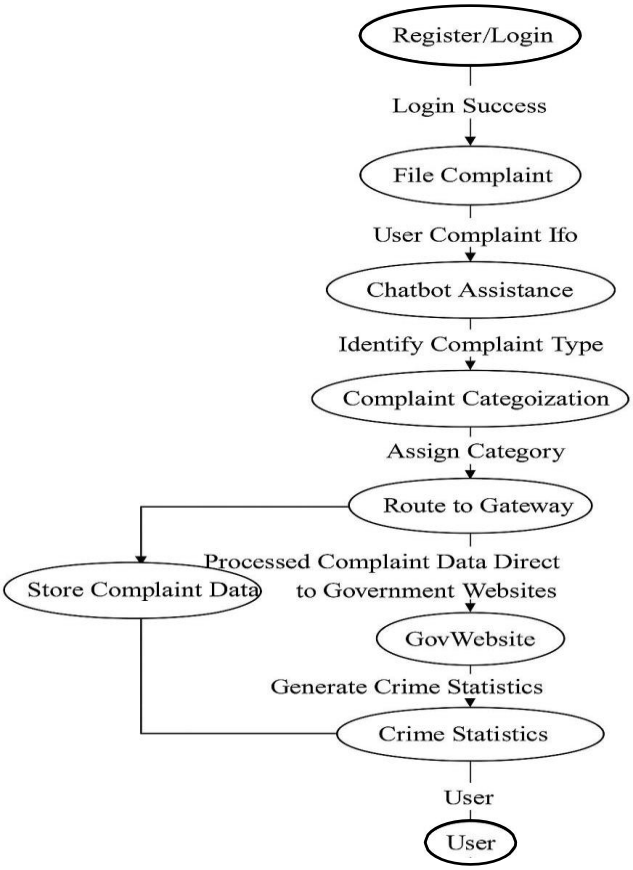

Fig 4. DFD Level 1

7. USE CASE DIAGRAM

The Use Case Diagram illustrates the primary interactions between the User and the System within the Judicial Complaints Portal.

Actors:

• User: The person who registers, logs in, files complaints, interacts with the chatbot, views crime charts, and logs out.
• System: The backend system responsible for processing user queries, categorizing complaints, and supporting chatbot responses.

Use Cases:

• Register: Users create an account to access the portal.
• Login: Authenticated users log in to access portal features.
• File Complaint: Users can submit complaints across various legal categories.
• Chatbot Assistance: Provides interactive guidance, answering user queries and guiding them through the complaint process.
• Complaint Categorization: The system categorizes complaints based on type (e.g., civil, criminal) for appropriate processing.
• View Crime Chart: Users can view statistical data derived from previously filed complaints to understand trends.
• Logout: Users end their session securely.

Relationships:

• The User interacts with all main use cases (Register, Login, File Complaint, Chatbot Assistance, View Crime Chart, and Logout).
• The System supports Chatbot Assistance and Complaint Categorization.

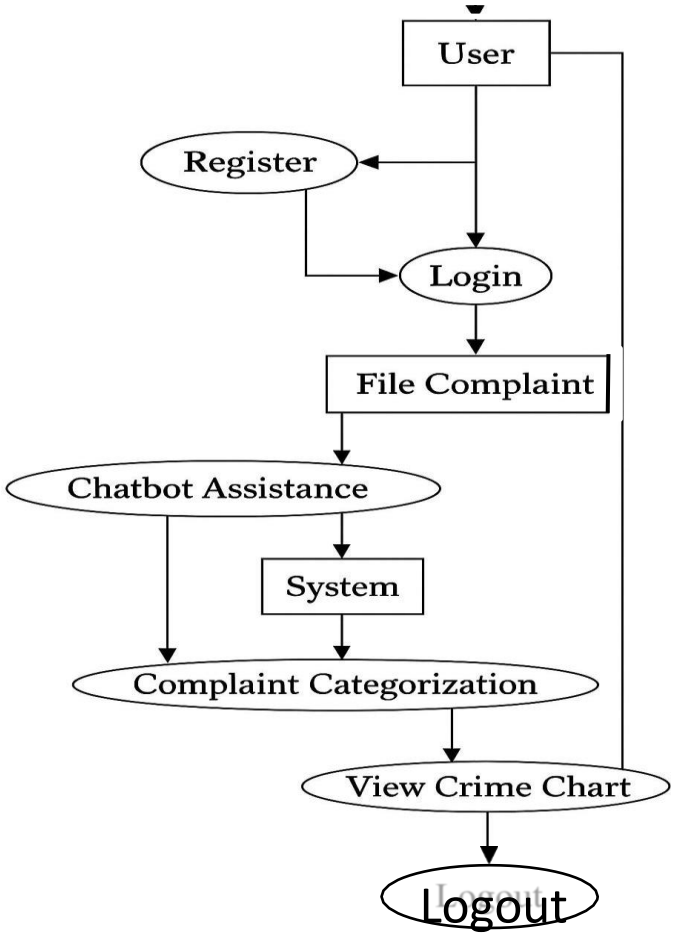

Fig 5. Use Case Diagram

8. ACTIVITY DIAGRAM

This activity diagram illustrates the user flow within the Judicial Complaints Portal, detailing how users interact with various features of the system.

• Start Node: Represents the entry point where a user accesses the portal.
• User Enters Portal: The user accesses the main interface of the portal.
• Register/Login: Register: New users register an account.
Login: Existing users enter their credentials to access the portal.
• Decision Node: If the login is invalid, the flow branches off, stopping further progress. If valid, the user can continue exploring the portal.

• Explore Government Websites: The user can check out linked government judicial websites for more information.

• Chatbot Assistance: Users can interact with a chatbot that helps them identify their legal issues and guides them through the complaint process.
• File Complaint: Based on chatbot guidance, the user files a complaint.
• Route to Appropriate Gateway: The system routes the complaint to the relevant legal or judicial authority for further processing.
• View Crime Chart: Users can view a statistical chart of existing complaints, which provides insights based on previously submitted data.
• Logout: Users end their session, completing their interaction with the portal.
• End Node: Indicates that the process flow has concluded.

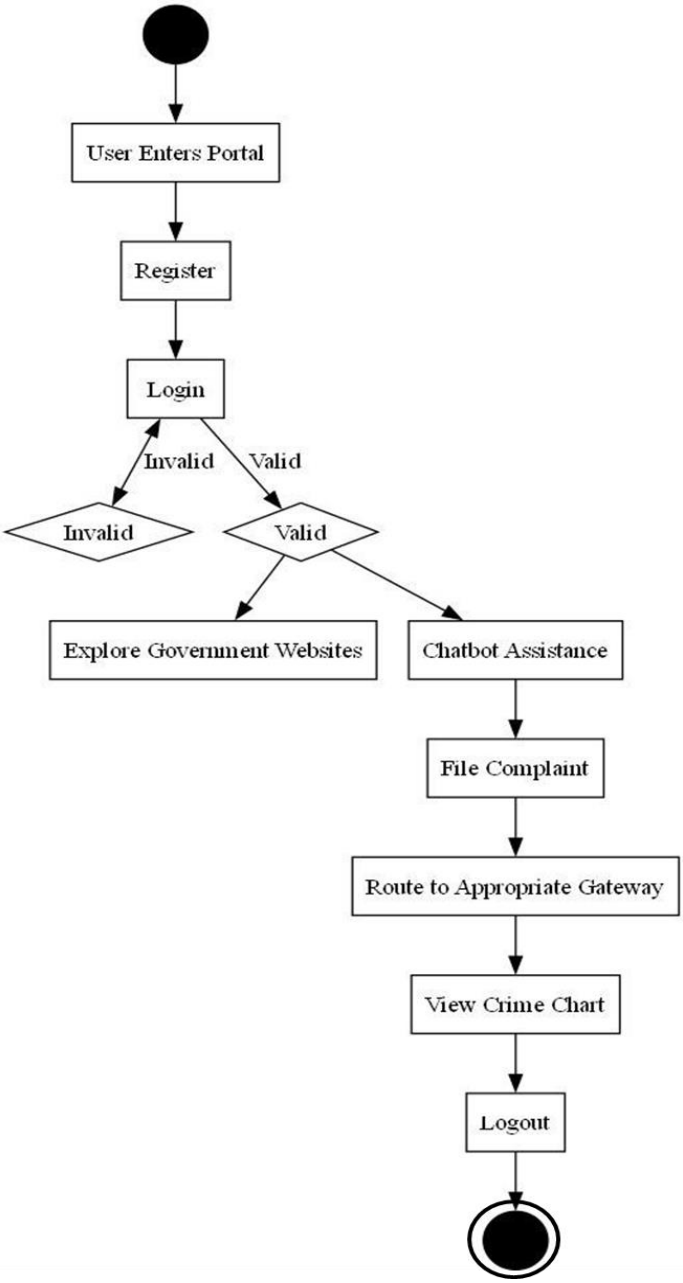

Fig 6. Activity Diagram

9. CLASS DIAGRAM

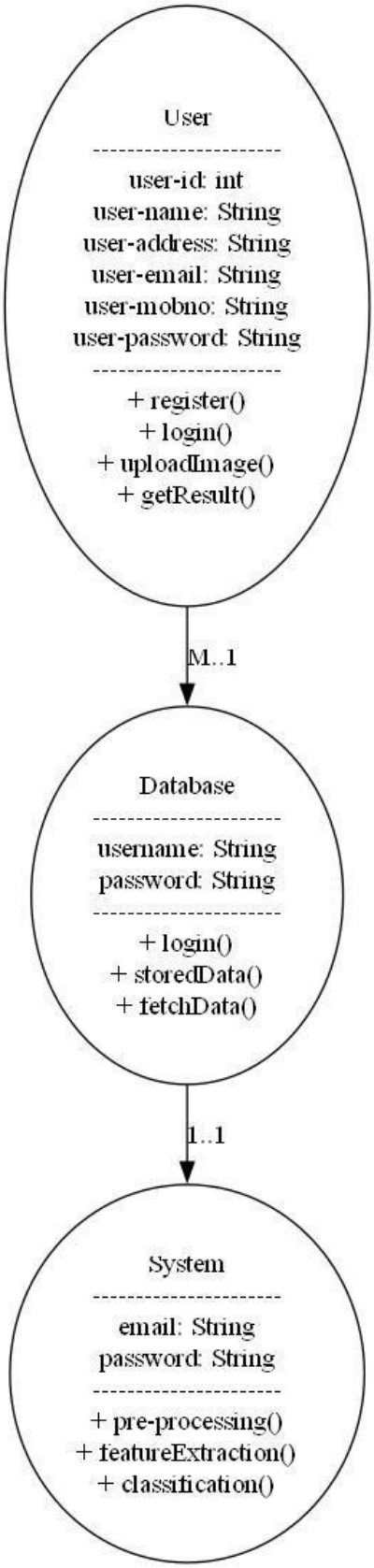

Fig 7. Class Diagram

This class diagram represents the architecture for a Judicial Complaints Portal. It visually outlines the main components and their relationships within the system. Here's a brief explanation of the diagram:
Classes and Their Roles:
User Class:
• Attributes: Contains user information such as user-id, user-name, user-email, etc.
Methods:
• register (): Allows a new user to register in the system.
• login (): Handles user authentication.
• upload Image (): Enables the user to upload images related to their complaints.
• get Result (): Retrieves results or responses from the system.
Database Class:
•Attributes: Includes username password for authentication purposes.
Methods:
• login (): Authenticates users against stored credentials.
• stored Data (): Saves user and complaint data.
• fetch Data (): Retrieves data for processing and display.
System Class:
•Attributes: Manages email and password for internal system operations.
Methods:
• pre-processing (): Prepares data for analysis, including cleansing and formatting.
• feature Extraction (): Extracts relevant data features to assist in categorizing complaints.
• classification (): Classifies the type of complaint to route it to the correct legal category.

10. ADVANTAGES

- Accessibility and Convenience
- Categorized Complaint Management
- Enhanced Security and Data Privacy
- Social Awareness and Education

11. FUTURE SCOPE

The proposed Judicial Complaints Portal will serve as an essential tool for citizens to file complaints, navigate legal issues, and access judicial resources. As technology and legal processes evolve, the future scope of this system can expand significantly. Here are several areas of potential growth and enhancement:
1.Integration with Advanced AI and Legal Technologies
2.Cross-Border Legal Complaint Management
3.Blockchain for Transparency and Security
4.Integration with Government and Court Systems
5.Digital Evidence Management
6.Expanded Legal Services and Education

12. CONCLUSION

The proposed judicial complaints portal offers many benefits, especially in terms of accessibility, data organization, and user guidance. However, it faces challenges in terms of initial setup costs, privacy concerns, and user support limitations. Addressing these disadvantages through careful planning and investment in advanced technology and user education would be essential for the portal's success and reliability.

13. REFERENCES

[1]. Complaint Management and Judicial Systems
• "e-Justice: Using Information Communication Technologies in the Court System" by Agusti Cerrillo i Martinez and Peter Parycek
• This book explores how ICT tools can support court systems, covering digital complaint management, case categorization, and routing systems in judicial contexts. It's a foundational reference for understanding the integration of technology in justice systems.
• "Handbook of Digital Public Administration" edited by Alex Ingrams, Andrew B. Whitford, and Daniel P. Carpenter
• This handbook provides insights into the development and management of public sector digital platforms, including legal and judicial applications. It also discusses transparency, data management, and user interaction within government websites.

[2]. Data Privacy and Security
• A comprehensive guide on data privacy laws, especially relevant if the portal operates within or deals with users in the European Union. It covers compliance with the General Data Protection Regulation (GDPR), data security measures, and the handling of sensitive information.
• "Cybersecurity for Executives: A Practical Guide" by Gregory J. Touhill and C. Joseph Touhill
• Though aimed at executives, this book provides a solid understanding of cybersecurity measures, data encryption, secure authentication, and compliance—critical elements when designing a judicial complaints system.

[3]. User Interface and Web Development
• "Don't Make Me Think: A Common Sense Approach to Web Usability" by Steve Krug
• A widely respected book on user-friendly web design, it provides principles to ensure that the portal is easy to navigate, with intuitive flows for logging in, using the chatbot, and accessing various services.
• "Designing UX: Prototyping: Building Better Products Through Better User Experiences" by Kathryn McElroy
• This book emphasizes creating user experiences through prototyping and testing, which is beneficial for designing features like registration, crime chart access, and chatbot interactions in a judicial context