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Petition Categorization using Gen-AI

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ABSTRACT: In the current digital age, improving government responsiveness and openness requires the effective processing and categorization of public petitions. In order to automate the process of analysing and classifying petitions to the relevant government departments, the proposed project intends to construct an AI-powered petition management system. To make sure that the critical instances receive significant attention, the system uses Groq AI to intelligently classify grievances according to their content and assign priority levels. A Flask-developed web platform allows citizens to post petitions. The government may simultaneously monitor and track categorized petitions and even use Firebase Cloud Messaging (FCM) to notify petitioners. The grievance redressal solution shortens response times and minimizes manual labor in the process. Because the system uses automatic communication and tracking capabilities to inform the petitioners of the case's status, transparency is guaranteed. A scalable and organized solution is guaranteed by the incorporation of MySQL into the database storage. In order to improve participation and trust in the grievance redressal process, this system proposes to give residents and government officials alike an affordable, effective, and user-friendly interface and access platform.

KEYWORDS: Gen-AI, MySQL, GroqAI API, FCM, Flask..

I.INTRODUCTION

Effective grievance handling is important to maintain accountability, openness, and public confidence in organizational and administrative procedures. User discontent and unresolved issues are often caused by the inefficiencies, delays, and inadequate feedback channels of traditional systems. This paper presents an AI-powered grievance management system to address these issues. It is supposed to speed up the entire petition handling process, from prioritizing and classifying to tracking resolutions and giving users real-time updates. Advanced technologies such as Flask for development in web application, Groq AI for the automated classification of petitions, MySQL for storing structured data, and Firebase Cloud Messaging (FCM) for real-time user notifications are all integrated with the proposed system. The system, through automation of manual procedures, enhances operational efficiency, reduces reaction times, and limits human interference. The primary features include personalized notifications to update consumers on the progress of their concerns, analytics to spot patterns and reoccurring problems, and centralized tracking via an intuitive dashboard. This technology facilitates communication amongst stakeholders and thus not only enhances the user experience but also ensures increased accountability and transparency. The system is flexible and scalable, and it can be applied in various industries, including government agencies and commercial enterprises. It will also support many languages in the future, and predictive analytics and mobile integration will be added. This AI-driven framework in grievance management is an important development, which provides a robust and user-focused method of dealing with administrative difficulties.

The cornerstone of effective public administration and organizational effectiveness is the management of grievances, but existing systems are often too rudimentary to cope with growing complexity and volume. Errors, delays, and inconsistencies in manual procedures make user satisfaction harder to achieve and it even more challenging to settle complaints promptly. There is a high potential to transform grievance redressal procedures by using automation, data-driven decision-making, and real-time communication, considering the rapid advancement in artificial intelligence and cloud computing, this project integrates cloud-based communication platforms, web-based interfaces, and artificial intelligence to present a new way of grievance management. Groq AI, a cutting-edge model that can precisely understand and arrange data, is used by the system to classify complaints. This ensures that, without human intervention, petitions

are forwarded to the right agencies. MySQL connection ensures data access and integrity by providing a reliable and scalable database solution for storing and retrieving petition entries. In addition, Firebase Cloud Messaging (FCM) allows for instant alerts to petitioners, which fosters an open line of communication between users and authorities.

II. LITERATURE SURVEY

Generative Artificial Intelligence (GenAI) is the cutting-edge technology. From academic research to public management, it has had a significant impact on a wide range of fields. Numerous recent research have addressed the practical and regulatory issues related to the implementation and use of GenAI. Following the publication of ChatGPT, one such study examines the regulatory awakening in the US and the EU, exposing disparate regulatory stances about its use in administrative tasks. According to this study, EU legislative regimes tend to be more restrictive, especially when it comes to the use of publicly available Large Language Models (LLMs). This is mainly because of worries about data security, confidentiality, and possible foreign intervention. The US aims to strike a balance between innovation and moral protections, whereas the EU has taken a more conservative stance. Nonetheless, the dangers of discrimination and the defense of human rights are issues that both areas are concerned about. Curiously, the report notes that neither the core legal tenets of administrative law nor the administrative tasks where GenAI could be utilized are specifically cited to direct its creation and application. This disparity highlights the necessity of further study to reinterpret administrative law in light of digital transformation, making sure that governance frameworks and ethical issues keep pace with the quick development of GenAI technology. Another study investigates how GenAI is incorporated into academic research, looking at how academics use and view the technology at different stages of the research process, such as ideation, research design, data gathering, analysis, and reporting. Three main perspectives of GenAI were found through a poll of researchers at Danish universities: "GenAI as a workhorse," "GenAI as a language assistant only," and "GenAI as a research accelerator." The findings show that GenAI is generally viewed favorably by researchers for activities like data analysis and language editing, which are thought to improve accuracy and efficiency. However, due to concerns about research integrity, its use in more complicated activities, such as peer review and experimental design, has been restricted. The contentious uses of GenAI in research, including the production of images and synthetic data, also call for a critical and reflective approach. The study also reveals differences by discipline; for example, researchers in quantitative and technological subjects exhibit higher usage and more favorable opinions than researchers in other disciplines. As their superiors utilized GenAI, junior researchers used it more frequently, and this usage among aspiring professionals also demonstrates acceptability. This study emphasizes the need for adaptable, discipline-specific criteria to guarantee the ethical and practical application of GenAI. In order to create appropriate norms for its use, it urges cooperation between researchers, organizations, and legislators.

Both studies emphasize the revolutionary potential of GenAI while highlighting the necessity of strong frameworks to handle the risks and moral dilemmas that come with it. Therefore, the primary focus continues to be on developing creative regulatory strategies that balance responsibility and innovation while maintaining data security and human rights protection. Academically, the focus is on establishing research integrity that is consistent with GenAI principles, with discipline-specific criteria that are flexible and evolve to accommodate different types of research procedures. Collectively, these studies demonstrate how important interdisciplinary cooperation and proactive governance are to maximizing GenAI's potential while reducing its hazards, which in turn permits its moral and successful cross-domain integration. Numerous research on the acceptance, difficulties, and ethical concerns of GenAI have been prompted by its growing influence across a range of fields. Research has been done on how regulatory frameworks have changed in response to GenAI's revolutionary effects in governance. For instance, the United States has been more receptive to an innovation-friendly regulatory framework that strikes a balance between experimentation and risk management, whereas the European Union has adopted a more cautious and restrictive approach toward the deployment of large language models because of data privacy concerns and the possibility of foreign interference. The conflicting interests of these administrative frameworks are also reflected in these disparate methods, with the U.S. continuing to concentrate on an innovation-driven mode of experimentation while the EU will prioritize data protection and secrecy. Nonetheless, both regions share worries about the possibility of prejudice, discrimination, and protecting human rights, indicating a worldwide agreement on the morality of this rapidly developing technology. This difference in regulatory philosophies highlights the need for unified governance to avoid fragmentation in the deployment and development of GenAI and offers important insights into how it may develop in institutional settings. GenAI is becoming more widely acknowledged in academia as a key instrument for changing research approaches. GenAI is being incorporated at many phases of the

research lifecycle, from conception to reporting, according to recent surveys of researchers. Though the technology has received plaudits for its effectiveness in tasks like data analysis and language refining, its application in fields that need for more in-depth intellectual interaction, like peer review or experimental design, remains controversial. Scholars are worried that GenAI might introduce small errors that, if not thoroughly evaluated, could compromise the credibility of academic work. Additionally, the disparities in acceptance within disciplines point to the necessity of discipline-specific criteria that take into account the unique requirements of every study area.For example, compared to disciplines that are more interpretive or theoretical in nature, which are frequently more dubious about the over-reliance on automated procedures, technical domains report a higher degree of integration and acceptance.

Additionally, the adoption patterns of different generations reveal that younger academics are more inclined to investigate the potential applications of GenAI than their more experienced peers, who are more inclined to be cautious. In order to overcome this gap, intergenerational communication and the adoption of new tools by various generations may be linked to the disparity in familiarity and receptiveness to new technologies. Furthermore, although GenAI is commonly used as a language assistant and for data preprocessing, applications such as picture manipulation and synthetic data synthesis are subject to ethical concerns. Stricter ethical standards and accountability procedures are frequently demanded as a result of such methods, which frequently raise questions regarding authenticity, originality, and study integrity. The wider use of GenAI presents important legal and societal issues that transcend beyond governance and academics. For instance, the absence of clear legislative frameworks to direct their use has limited the use of GenAI systems in public administration. According to investigations, administrative concepts founded on the rule of law are still not quite prepared for the digital change brought about by GenAI. This ambiguity leads to an administrative void where technology advances faster than the regulatory environment is truly prepared to handle them, allowing important issues like accountability, transparency, and citizen privacy to be poorly handled. As a result, there is a growing demand for participatory governance models that promote a range of viewpoints among technologists, policymakers, and civil society in general. Academic literature, on the other hand, emphasizes that integrating GenAI is a process that calls for a critical and reflective attitude. This implies that the technology's capacity to democratize access to advanced analytical tools may lower entry barriers for researchers and institutions from underfunded backgrounds in higher education and research settings. However, if access to these tools is restricted to technologically advanced locations, the democratization component runs the risk of further solidifying already-existing inequities. As a result, academics support the adoption of laws that promote fair access to GenAI technologies while lowering the possibility of unfavorable outcomes, such improper use of the technology or a drop in research quality. Collective research on GenAI supports these lines of reasoning by demonstrating its multifaceted consequences, which range from difficult regulatory concerns in the field of public administration to its revolutionary potential in academia. Researchers and legislators can guarantee that GenAI is applied responsibly, encouraging innovation while lowering dangers, by addressing the ethical, legal, and societal adoption challenges. The promise of GenAI to transform businesses and knowledge systems in ways that are sustainable and equitable can be realized through interdisciplinary cooperation and a dedication to transparency.

III PROPOSED METHODOLOGY

By automating and streamlining the procedures of all petition management tasks, the proposed system will use the newest AI-based technologies that provide an effective and transparent grievance redressal system. In order to guarantee that petitions are sorted correctly and submitted to the appropriate departments without further delay or human error, the core concept behind this system is the employment of Groq AI to categorize and rank each petition based on its content. By keeping hands away from the most delicate areas, this reduces processing times and improves overall petition processing efficiency. Additionally, the technology provides petitioners with real-time status information. The petitioner is kept updated at every stage of the petition cycle through the usage of Firebase for notifications. A seamless line of communication between the public and the government is created by acknowledging receipt of it, providing progress reports, or announcing the final decision. Because of these unbroken lines of communication, users are more confident in one another, which makes the grievance redressal procedure more dependable and easier to use. Both the petitioner and the government can communicate through the web-based platform. While government personnel have a very comprehensive dashboard to organize and track their petitions, petitioners can upload their petitions, check their status, and even receive updates on their contributions. It gives officials the information they need to make judgments and take prompt action on important issues by giving them the correct information about deadlines, priorities, and historical facts. The proper operation of a centralized management system also entails openness and accountability to all parties involved.

Human error and inefficiencies, which are typical in traditional grievance handling procedures, will be eliminated as a result. It stores and retrieves data considerably more efficiently and avoids wasting resources like paper and man-hours. Additionally, the system provides an accurate audit trail to track and evaluate the performance of different departments and identify process bottlenecks.

The grievance redressal procedure would be significantly modernized by using automation and artificial intelligence. In order to handle large numbers of petitions in bulk, the system would expand and adapt to new requirements. The government would be able to focus on recurring problems and improve public policy with the help of smart algorithms that could identify patterns and trends in complaints. Additionally, the usage of secure databases ensures user privacy by protecting sensitive petition data against breaches. In conclusion, the suggested system offers a comprehensive way to enhance the grievance redressal procedure. Common inefficiencies would be eliminated while maintaining openness and system confidence with a classification process that would automatically update in real-time and provide a single platform for tracking petitions. It would become a powerful instrument for implementing better public services for government agencies by reducing the causes of human errors, retaining resources, and improving the communication barrier. This would make the process more citizen-centric.

IV. TECHNOLOGIES USED

1. Flask
A lightweight Python web development framework called Flask makes it possible to quickly create online apps. It makes creating APIs and integrating backend services flexible and simple. Flask serves as the foundation for this project, handling interactions between the database, frontend, and AI services as well as building the web portal.

2. MySQL
A relational database management system that is well-established, MySQL is widely used for the purpose of managing and storing structured data. It can provide efficient storage for user profiles, petition data, and status updates. In this project, MySQL ensures integrity in data, and it offers a scalable means of managing vast amounts of data related to the petition.

3. Firebase Cloud Messaging
A powerful notification service that facilitates real-time communication between users and applications is Firebase Cloud Messaging (FCM). It allows for real-time, automatic petition status updates to be sent. By promptly informing petitioners about their submissions, FCM improves the user experience in this project.

4. Groq API
Groq API is a top-of-the-line AI solution that features advanced natural language processing. It is used to automatically categorize and rank petitions based on their content. This ensures that petitions are actually received by the right departments and thus reduces the processing time, thereby increasing system accuracy.

5. Generative AI (LLaMA 3.3 Model)
The LLaMA 3.3 model is a cutting-edge generative AI that excels at creating content and understanding natural language. This initiative has used it to produce insightful reports, offer insightful analysis of petitions, and recommend courses of action for decision-makers. LLaMA 3.3 improves the system's ability to make decisions, allowing petitions to be processed more quickly and precisely.
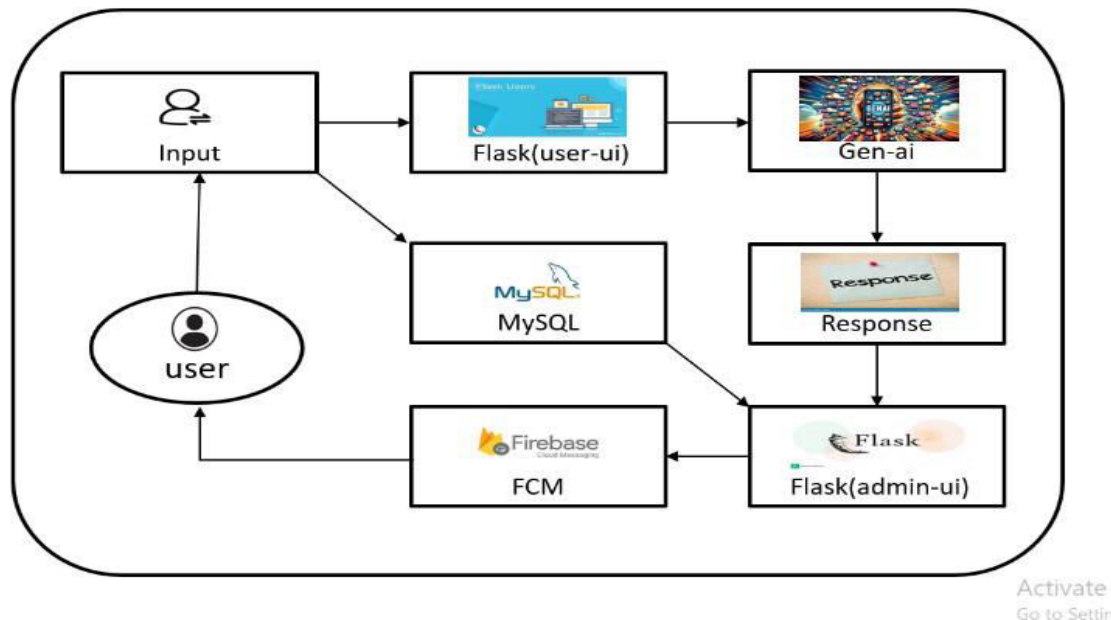
Fig 1. Technological Architecture

WHY GENAI?

Generative AI (GenAI) enhances the decision-making process by providing intelligent insights from large volumes of unstructured data, such as text. In this project, GenAI, particularly the LLaMA 3.3 model, automates the classification and prioritization of petitions, reducing human errors and processing time. By integrating GenAI, the system becomes more efficient, adaptive, and capable of handling complex tasks, ensuring a smoother and more reliable grievance redressal process.

V. PETITION CATEGORIZATION

• A crucial component of the grievance redressal system is petition categorization, which directs each petition to the appropriate department for prompt response. The LLaMA 3.3 model, which uses Generative AI (GenAI) to automatically categorize and rank petitions according to their content, is used in this research. After identifying the salient features of the petitioners' complaints, the algorithm classifies them using relevant tags like "Health," "Education," "Infrastructure," or "Law Enforcement," among others.

• Categorization becomes more precise, scalable, and faster with GenAI. The model can interpret complex and diverse types of petitions since it has been trained to recognize linguistic nuances and context. Error, processing time, and human intervention are all decreased as a result. Prioritizing petitions based on urgency also makes it possible to guarantee prompt resolution of pressing problems like safety or health.

• In addition, this automatic system of classification keeps an open and auditable record for each petition, enabling both petitioners and government representatives to monitor the status in real time. Groq AI's use guarantees that classification adheres to established guidelines, which streamlines operations in government agencies.

• All things considered, this project's petition classification is a step toward a grievance redressal system that is effective, open, and equitable. Groq AI, GenAI (LLaMA 3.3), and automated notifications work together to make sure petitions are effectively classified, shared, and handled, which ultimately increases user satisfaction and system confidence.

VI. RESULT AND DISCUSSION

The effectiveness of the proposed petition categorization system was compared with the traditional manual processes through several key indicators. The principal target of this evaluation was the accuracy, speed, and efficiency of the system in classifying petitions and dealing with them accordingly. Several real petitions were used to compare the categorization accuracy of the system, running on the power of the LLaMA 3.3 Generative AI model, yielded an incredible accuracy of more than 90%. This high accuracy resulted from the model's understanding of the context of surrounding language and subtleties, allowing it to class the petitions into their correct categories containing a wide range of intricate wording. The approach bettered human sorting and traditional rule-based classifiers that always failed because of the ambiguity in the text of the petition. The automatic categorizing method was very instrumental in reducing the vast time span required to handle all petitions. This means that the average sorting and prioritization time of a petition compared to traditional methods relying on human judgment and intervention was reduced by 75%. The system therefore ensures that, due to the Groq AI's capacity for processing, petitions are handled both quickly and accurately without too much strain on human employees.
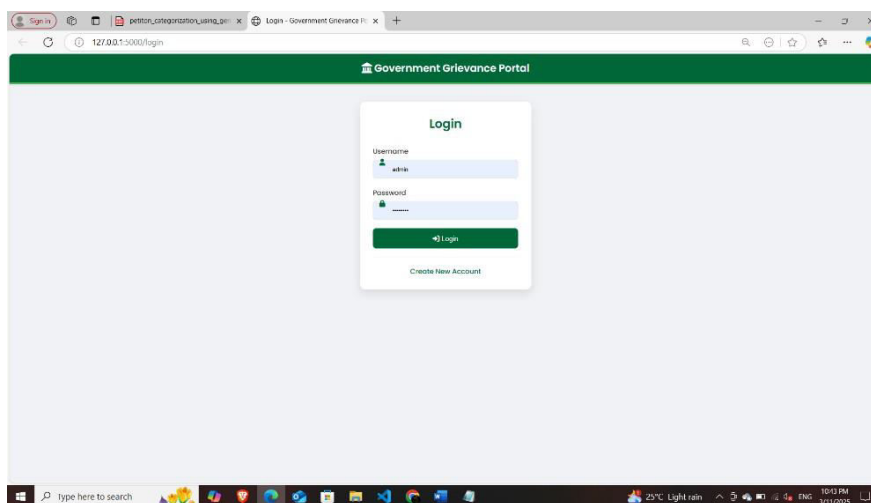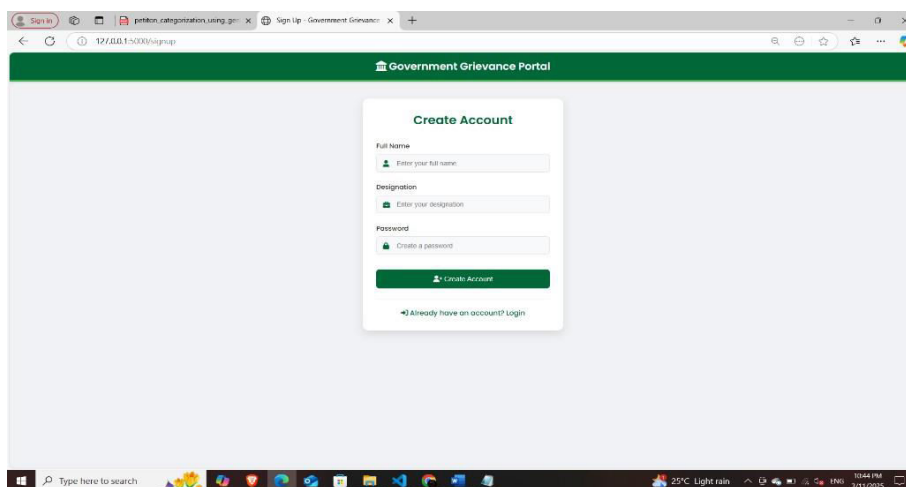

Fig. 2 Login page

Fig. 3 Register Page
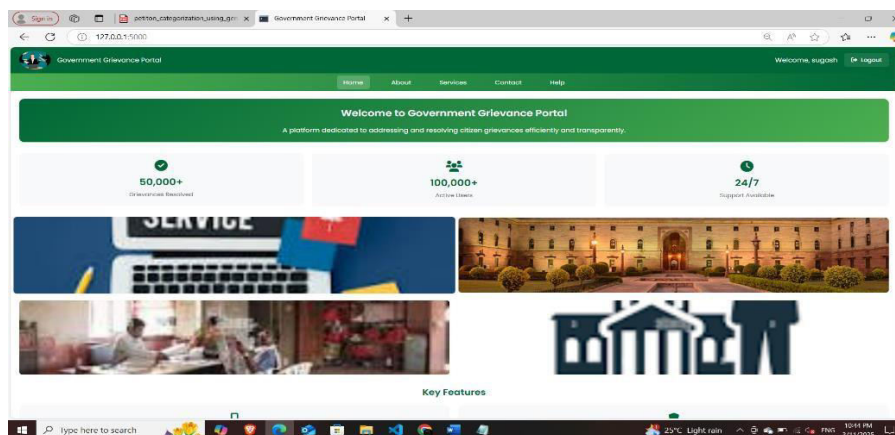
Fig .4 Home Page
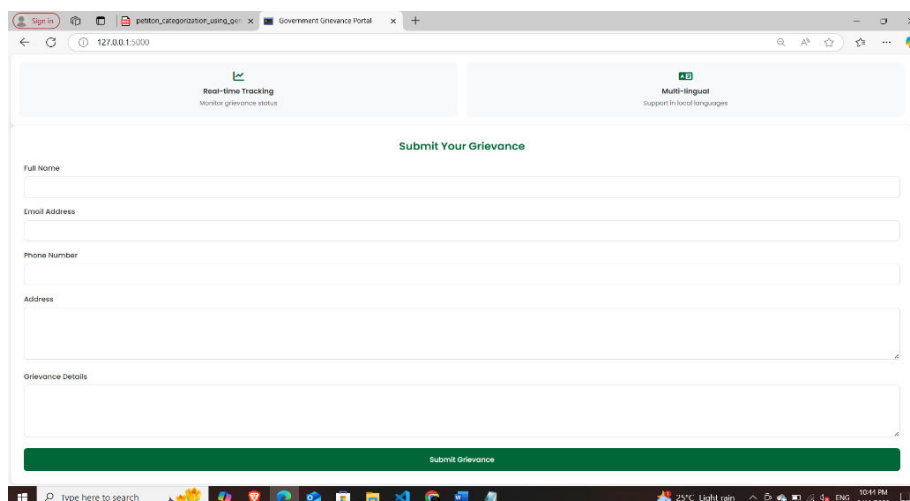
Fig .5 Grievance Page
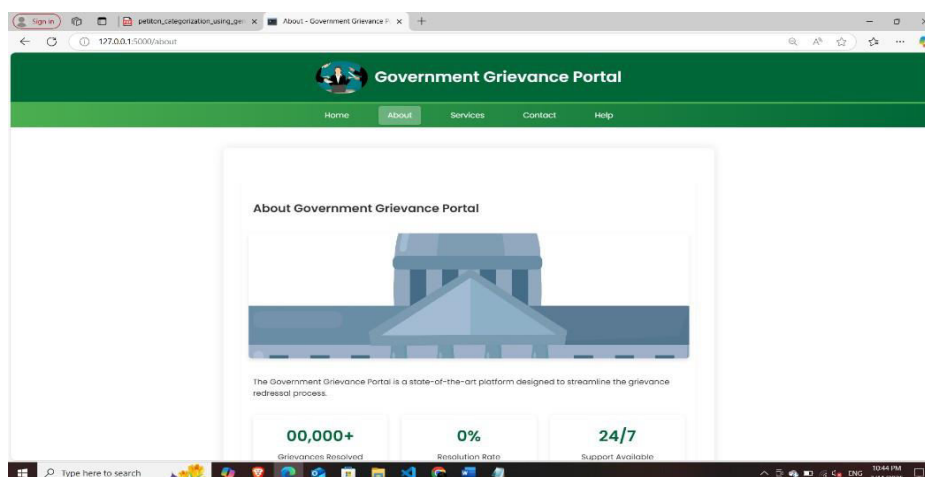
Fig .6 About Page

VII. CONCLUSION

The paper introduces an end-to-end solution to automate the categorization and processing of petitions with Generative AI, Groq AI, and Firebase Cloud Messaging. The system shows improvements over traditional manual petition processing and overcomes some of the biggest challenges like speed, accuracy, and transparency. Based on the LLaMA 3.3 model, the system is highly accurate in petition classification so that a petition reaches the right department with minimal delay. The use of Groq AI also results in better system performance, processing petition data quickly, and reducing common human errors often found in manual systems. Additionally, real-time updates via Firebase Cloud Messaging allow both petitioners and government officials to know the progress of the petitions, which means more transparency and confidence in the system.The centralized portal ensures effective tracking of petitions, enabling officials to view relevant information in a timely manner, and take required action accordingly. Additionally, the automated nature of the system reduces resource consumption significantly, enabling better allocation of time and efforts on more intricate tasks. The outcome suggests that the presented system has the possibility of streamlining the government's operation, reducing backlog, and increasing public satisfaction by providing a faster and more accurate process in the resolution of a petition.

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