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Smart Complaint and Feedback System Using NLP

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Abstract
Complaint and feedback systems are essential for improving service quality and organizational performance. However, traditional complaint handling methods often face challenges such as manual processing, delayed responses, improper categorization, and difficulty in analyzing large volumes of user feedback. With the advancement of Natural Language Processing (NLP) and artificial intelligence, automated solutions can effectively overcome these limitations. This paper proposes a Smart Complaint and Feedback System using NLP that enables users to submit complaints and feedback through an intelligent, automated platform. The system analyzes user input, performs sentiment analysis, categorizes issues, and assists authorities in faster decision-making and resolution. The proposed system improves efficiency, transparency, and user satisfaction while supporting data-driven service improvement.

Keywords: *Smart Complaint System; Feedback Analysis; Natural Language Processing (NLP); Sentiment Analysis; Text Classification; Automated Response System; User Experience Improvement.*

1. Introduction
Complaint and feedback systems play a crucial role in enhancing service quality and organizational effectiveness. Although digital platforms are widely used today, many traditional complaint handling systems still rely on manual review and basic forms, which limits their efficiency and responsiveness. These systems often face challenges such as delayed processing, lack of proper categorization, inconsistent responses, and difficulty in analyzing large volumes of unstructured user feedback [1], [2]. The rapid development of Natural Language Processing (NLP) and artificial intelligence has significantly improved the ability of systems to understand and process human language. This paper introduces a Smart Complaint and Feedback System using NLP that digitalizes the complaint management process, making it intelligent, scalable, and efficient through automated text analysis and decision support.

2. Related Works
2.1. NLP-Based Feedback Analysis Systems
Previous studies have explored the use of Natural Language Processing in analyzing customer feedback and online reviews for service improvement. These systems mainly focus on sentiment detection and basic classification, but often lack real-time complaint handling and automated resolution mechanisms [3], [4].

2.2. Traditional Complaint Management Systems
Research on complaint management highlights the importance of structured feedback systems for organizational growth. However, most existing solutions rely on manual review or simple web forms, which limits scalability, response speed, and intelligent decision-making. The proposed system integrates NLP techniques with automated complaint handling to provide an intelligent, user-centric feedback and complaint management platform [5], [6].

3. Problem Statement
Figure 1 shows the Smart System Authentication Interface. Traditional complaint and feedback systems suffer from several limitations:

- Difficulty in analyzing large volumes of unstructured text data
- Lack of automatic categorization and prioritization of complaints
- Delayed responses due to manual processing

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- No effective tracking or analytical insight for decision-makers. These issues reduce trust, scalability, and usability.

These issues reduce efficiency, transparency, and user satisfaction. There is a need for an intelligent digital solution that automates complaint analysis and improves overall service quality [7].

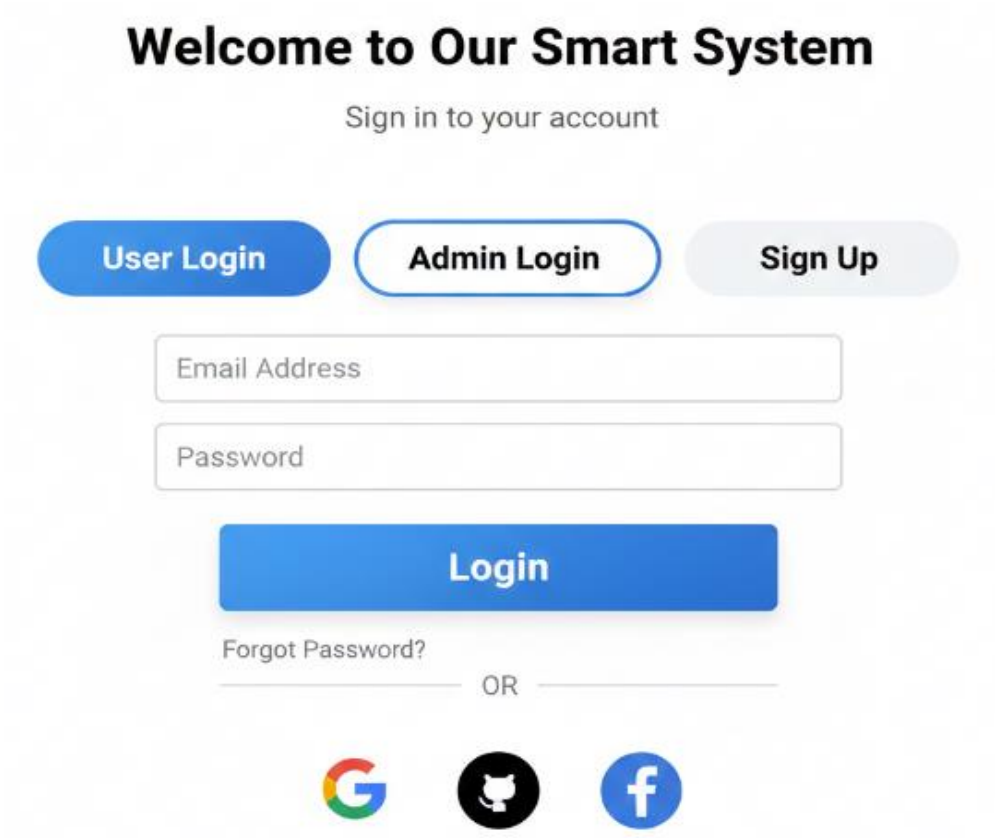

Figure 1 Smart System Authentication Interface

4. Proposed System

The proposed system is an NLP-based Smart Complaint and Feedback platform that enables users to submit complaints and feedback using natural language. The system acts as an intelligent intermediary, analyzing user input, identifying sentiment, categorizing issues, and assisting authorities in efficient complaint resolution [8].

4.1. Key Objectives

- Enable users to submit complaints and feedback digitally without manual intervention
- Provide intelligent analysis and categorization of user complaints
- Ensure transparency, ease of use, and faster response handling
- Maintain secure and well-organized records of complaints and feedback

5. System Modules

5.1. User Registration and Login Module

Figure 2 allows users to securely register and log in using authenticated credentials to access the complaint and feedback system.

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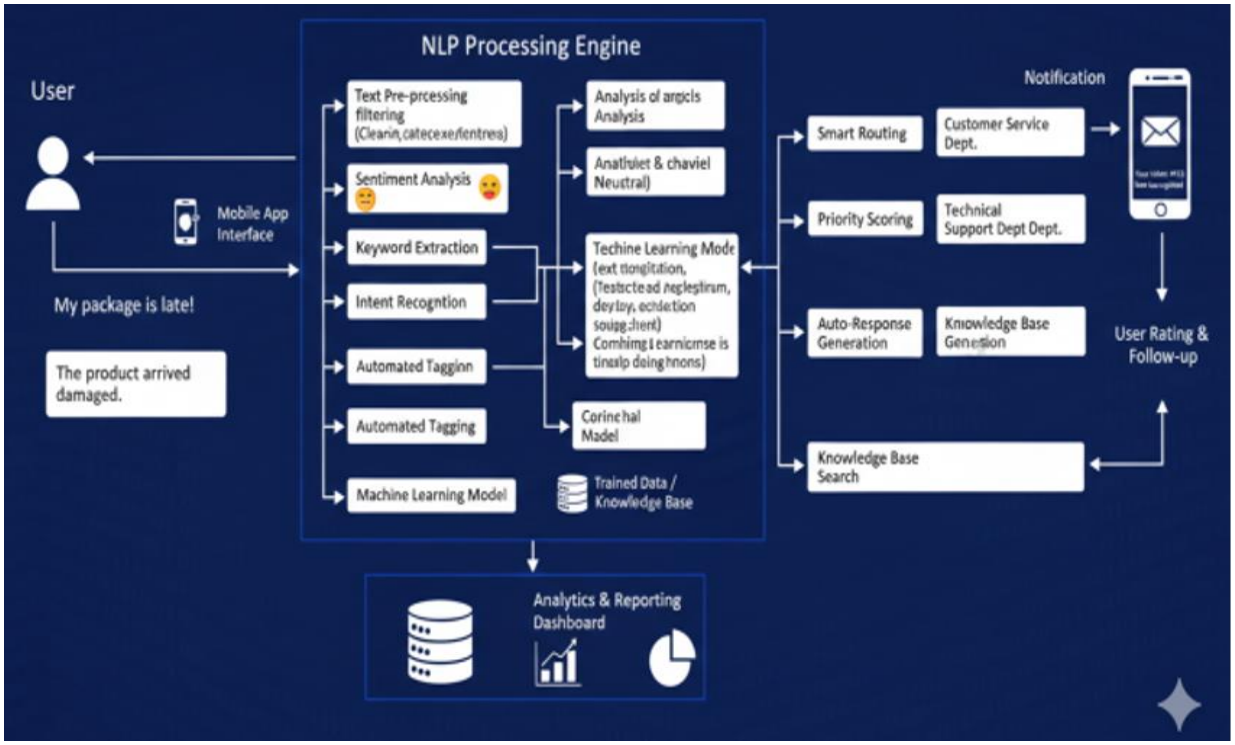

Figure 2 Allows Users to Securely Register and Log in Using Authenticated Credentials to Access the Complaint and Feedback System

5.2. Complaint and Feedback Submission Module

Users interact with the system to:

- Submit complaints or feedback in natural language
- Describe issues related to services or facilities
- Track the status of submitted complaints (Figure 3).

Figure 3 Users Interact With the Complaint and Feedback System

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5.3. NLP Analysis and Classification Module

The system analyzes user input using Natural Language Processing (NLP) techniques and automatically performs sentiment analysis and categorizes complaints based on type and priority to support efficient resolution.

5.4. Complaint Management and Response Module

Manages the complaint handling process by:
Assigning complaints to the appropriate authority or department
• Updating complaint status (pending, in progress, resolved)
• Notifying users about responses and resolution updates (Figure 4)

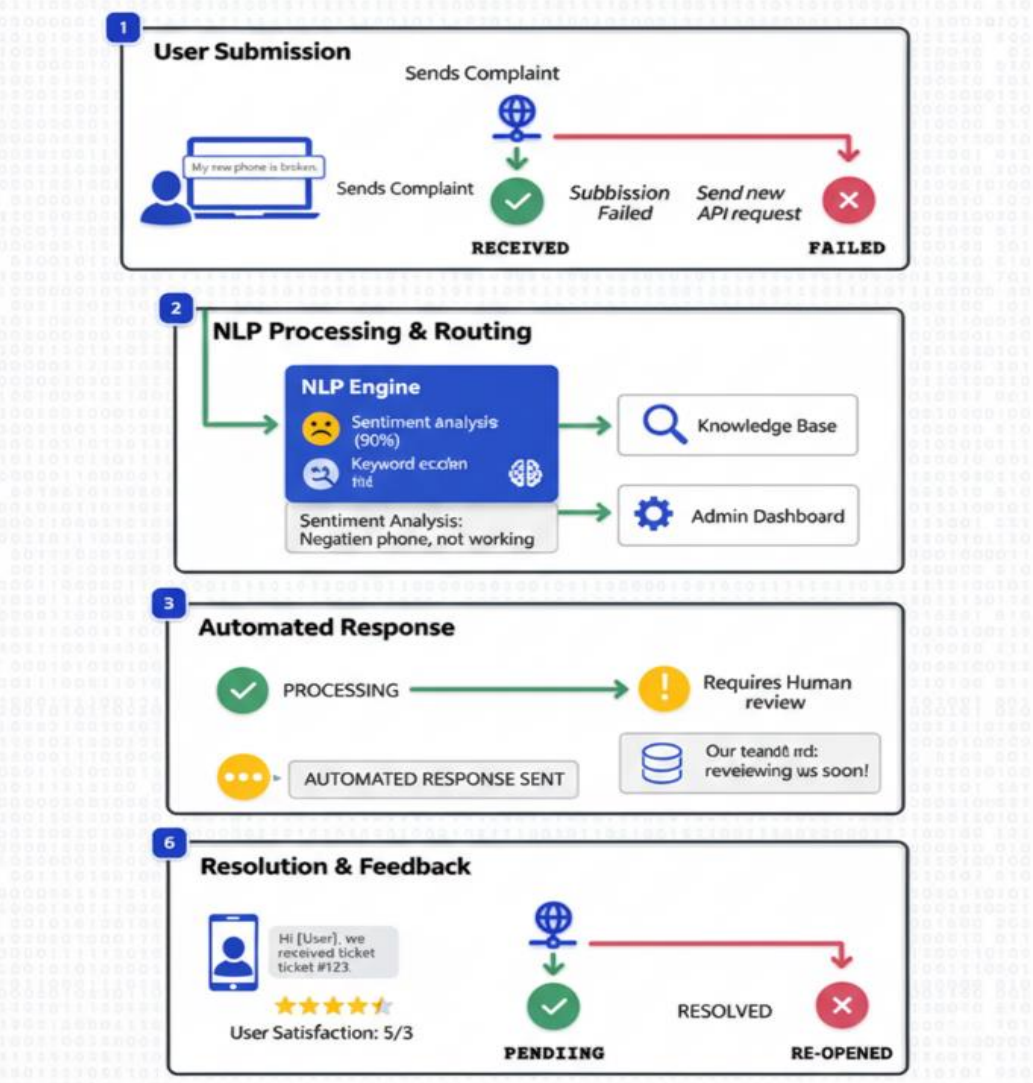

Figure 4 Workflow of Feedback Process

5.5. Database Module

Stores user profiles, complaint and feedback details, NLP analysis results, status updates, and interaction history securely to ensure data integrity, reliability, and consistency of the system (Figure 5).

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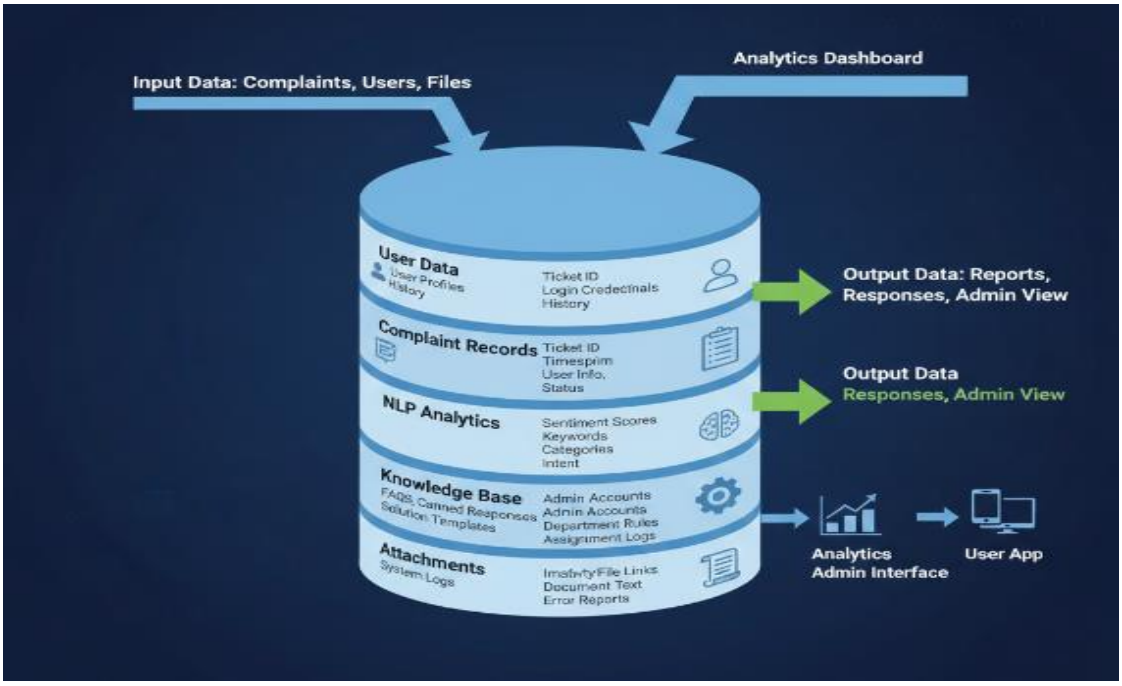

Figure 5 Database Module

6. Performance Analysis

The system is evaluated based on the following parameters:

Response Time: The NLP-based system processes complaints and feedback quickly, providing faster acknowledgments and improving user experience (Figure 6).

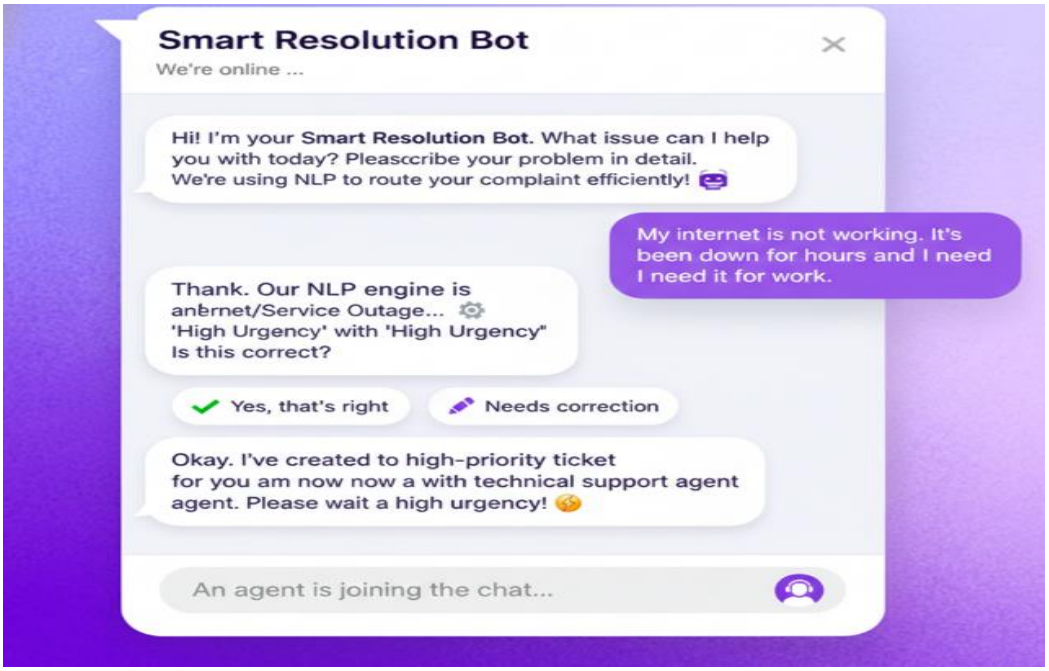

Figure 6 Response Time

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- **Matching Accuracy:** NLP techniques ensure accurate understanding of user intent, sentiment, and complaint category.
- **Efficiency:** Automated analysis and categorization significantly reduce manual effort and processing time.
- **Scalability:** The system can efficiently handle a growing number of users and large volumes of complaints and feedback (Figures 7 and 8).

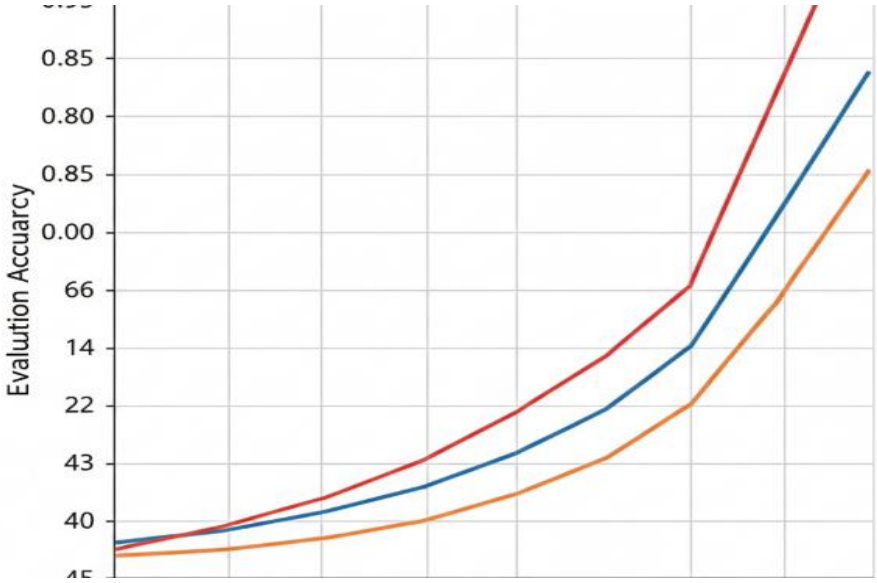

Figure 7 Matching Accuracy

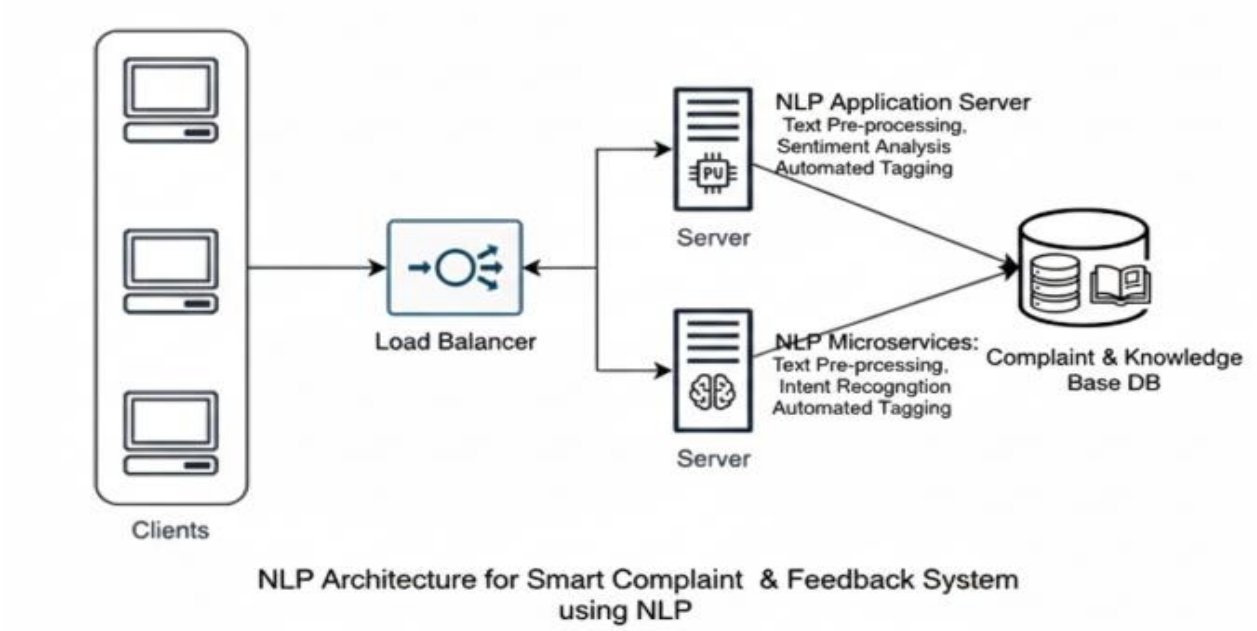

Figure 8 Scalability

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User Satisfaction: Easy-to-use interfaces and timely responses improve overall user satisfaction (Figure 9).

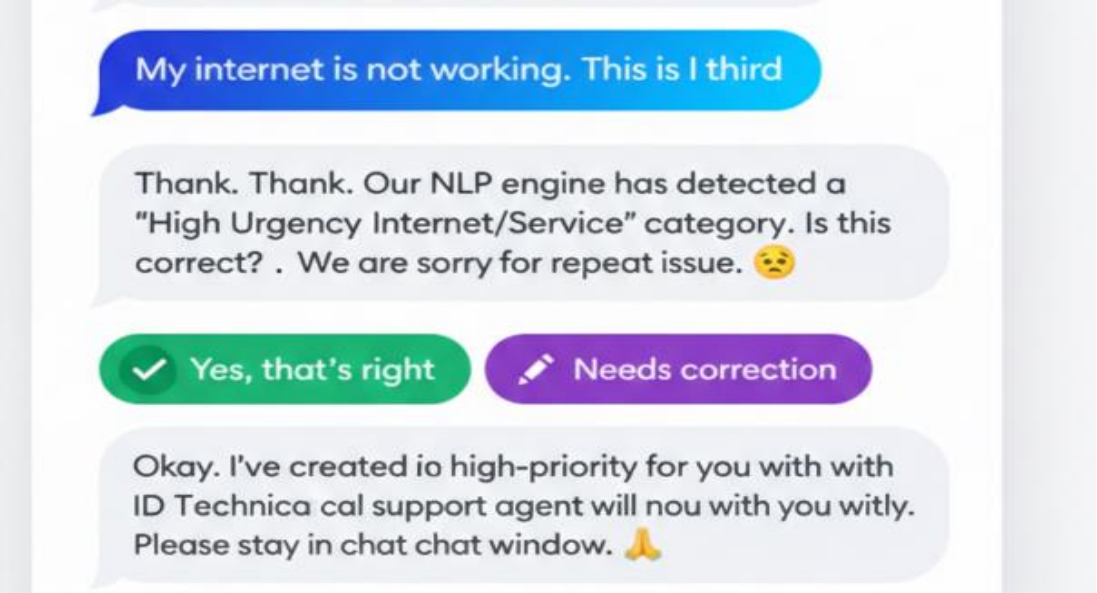

Figure 9 User Satisfaction

Conclusion

The Smart Complaint and Feedback System using NLP represents an intelligent improvement over traditional complaint handling methods by integrating Natural Language Processing with automated analysis. The proposed system successfully addresses the limitations of conventional systems by enabling faster complaint processing, accurate categorization, and sentiment-based analysis of user feedback. Through intelligent text processing and automated workflows, the system reduces manual effort and enhances decision-making for authorities. By providing a centralized and digital platform, it improves transparency, efficiency, and accessibility for users from diverse backgrounds. The use of NLP-driven analysis ensures better understanding of user concerns, timely resolution, and improved service quality. Overall, the proposed solution demonstrates the strong potential of NLP-based systems in building scalable, efficient, and user-friendly complaint and feedback management platforms.

Future Enhancements

Several enhancements can be incorporated into the system to further improve its functionality and reach. A dedicated mobile application can be developed to allow users to submit complaints and feedback anytime and from anywhere. Introducing multilingual support will enable users from different linguistic backgrounds to interact comfortably with the system, increasing accessibility and adoption.

An AI-based prioritization and recommendation mechanism can be implemented to automatically highlight critical complaints for faster resolution. The integration of a voice-enabled interface will allow users to submit complaints using speech, making the system more accessible for elderly and differently abled users. Additionally, advanced analytics and dashboard visualization can be incorporated to provide deeper insights into complaint trends and service performance. These future enhancements will strengthen the system's scalability, intelligence, and usability, leading to a more effective and responsive complaint and

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feedback management solution.

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