International Journal of Scientific Research and Engineering Development-– Volume 9 Issue 3, May-June 2026
Available at www.ijsred.com

RESEARCH ARTICLE OPEN ACCESS

AI-Assistance Paperless Ticketing and Support System

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Abstract
Many organizations still rely on manual or semi-digital ticketing systems that lack automation and intelligent management, leading to inefficiencies, delayed resolutions, and poor customer experiences. This study introduces the AI-Assistance Paperless Ticketing and Support System, an innovative platform that automates the entire ticketing process from submission to closure using artificial intelligence technologies. The system utilizes Natural Language Processing (NLP) for intent recognition, Machine Learning (ML) algorithms for intelligent routing, and automated workflows for seamless communication and tracking. Using an Agile software development methodology, the system is designed to automatically classify, prioritize, and route support tickets, eliminating paper-based documentation through fully digital records. By integrating web-based technologies with AI components such as Naive Bayes or Logistic Regression classifiers, the system achieves accurate ticket categorization and provides real-time analytical dashboards for performance monitoring. The proposed system demonstrates how automation and AI can improve operational efficiency, reduce manual effort, accelerate response times, and promote environmental sustainability in modern organizations.

Keywords — Artificial Intelligence, Natural Language Processing, Machine Learning, Paperless System, Ticketing System, Automated Routing, Support Management.

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I. INTRODUCTION

In today's digital-driven world, organizations handle a large volume of support requests and service issues that require fast and efficient responses. Traditional paper-based ticketing systems or manual email handling processes are slow, error-prone, and difficult to track. These outdated methods often result in delayed resolutions, misplaced records, and inefficient coordination between support teams.

With advancements in artificial intelligence (AI) and natural language processing (NLP), it is now possible to create systems capable of understanding, categorizing, and prioritizing support requests automatically. AI-powered ticketing systems can extract essential details from customer messages, determine the urgency and intent, and even provide suggested solutions based on previous cases [1]. Moreover, automation ensures that tickets are routed to the right personnel while maintaining accurate tracking and digital documentation.

This study introduces the AI-Assistance Paperless Ticketing and Support System, an innovative platform that automates the entire ticketing process from submission to closure. The system utilizes NLP for intent recognition, ML algorithms for intelligent routing, and automated workflows for seamless communication and tracking [2]. By digitizing records and enabling paperless documentation, it promotes operational efficiency, environmental sustainability, and effective customer service management.

II. STATEMENT OF THE PROBLEM

Many organizations still rely on manual or semi-digital ticketing systems that lack automation and intelligent management features. This results in inefficiencies, delayed resolutions, and poor customer experiences. The absence of AI-driven tools means that large volumes of tickets are often mishandled, miscategorized, or left unresolved due to human limitations and slow workflows [6].

Specifically, the following problems are observed: (1) lack of intelligent automation in categorizing, prioritizing, and routing support tickets, leading to slower response and resolution times; (2) inefficient tracking and documentation processes due to dependence on manual or paper-based systems; and (3) limited analytical insight into ticket data, preventing organizations from identifying recurring issues or optimizing support performance.

III. OBJECTIVES OF THE STUDY

The main objective of this study is to develop an AI-Assistance Paperless Ticketing and Support System that automates and digitizes the support ticket process using artificial intelligence. Specifically, this study aims to:

- Design and develop an AI-based system that automatically classifies, prioritizes, and routes support tickets using NLP and ML algorithms;
- Create a paperless and automated workflow that enables seamless tracking, updating, and documentation of tickets throughout their lifecycle;
- Implement analytical tools that generate insights on ticket trends, response performance, and common issues for continuous service improvement.

IV. REVIEW OF RELATED LITERATURE

Fuchs [1] emphasized how traditional support ticket systems depend on manual handling, resulting in inefficiencies. A systematic review assessed how machine learning algorithms can assess patterns from historical customer concerns, reducing dependency on human handling and improving response time with minimal inconsistencies.

Koka [2] addressed the importance of AI in improving modern ticketing systems, noting that NLP enables systems to filter and categorize tickets accurately without human intervention. AI also allows systems to predict possible issues through past experiences, improving efficiency and preventing delays.

Singh [3] designed a hybrid approach integrating NLP and Reinforcement Learning for ticket classification, enabling the system to understand context, intent, and sentiments. The system continuously improved through feedback loops, demonstrating significant improvement over existing systems.

Singh, Kense, and Jayaswal [4] discussed the effectiveness of deep learning models like BERT for understanding complex textual data for ticket classification based on context rather than keywords, significantly reducing workload and routing tickets more efficiently.

Cristian [5] identified the potential of NLP in extracting relevant information from user-submitted content, including issue type, urgency, and user intent. The study concluded that NLP is integral to modern service ticket systems for efficient data processing.

Iyer and Prasad [6] highlighted that manual incident management causes severe workflow bottlenecks. They proposed Automated Incident Management (AIM) frameworks using AI for first-level support, enabling automatic parsing of text and appropriate routing, critical for establishing a genuinely paperless ecosystem.

Baqar [7] introduced the RAG4Tickets framework leveraging Retrieval-Augmented Generation to automate complex software ticket resolution, achieving a 45% reduction in average resolution time by retrieving semantically similar historical resolutions to guide Large Language Models.

Attal [8] developed an NLP Jira plugin for detecting semantically similar tickets using TF-IDF and Sentence-BERT embeddings, effectively bypassing limitations of traditional keyword matching and mitigating redundant engineering effort in agile development environments.

Dlodlo and Sibanda [9] explored automation of IT helpdesk ticket classification using KNN, SVM, and Random Forest classifiers. The optimized SVM achieved 94.6% accuracy, proving traditional ML algorithms can effectively automate ticket classification when properly tuned.

AbdulKareem et al. [10] examined the transition toward paperless environments in public universities in Nigeria, outlining operational, financial, and environmental sustainability benefits of digitization while critically addressing infrastructural deficits and cultural resistance challenges.

A study at St. Paul University Philippines [11] developed an ICT helpdesk ticketing management system addressing inefficiencies in handling IT-related concerns. The web-based system allowed structured ticket submission, monitoring, and management with proper documentation, supporting automation and digital tracking.

Alcober, Rubio, Lazaro, and Mangaba [12] created a helpdesk support system for tertiary institutions using the TISSA (Ticket System with Forecasting Algorithm) technique. This system efficiently communicated with students, faculty, and IT staff and demonstrated the importance of data-driven ticketing for improving planning and service quality.

Aglibar et al. [13] examined ticketing systems for project management and issue tracking in IT companies, finding they play a crucial role in organizing tasks, monitoring progress, and ensuring timely resolution. Structured ticketing improves accountability and transparency within teams.

Dagsa et al. [14] developed an automated ticketing and tracking system for mining hauling operations, demonstrating how automation and real-time tracking improve efficiency and accuracy in managing tasks through digital monitoring and data integration.

Calora et al. [15] explored a ticketing-based student support system in open and distance e-learning institutions, emphasizing that structured ticketing systems significantly improve service quality, transparency, and accountability in educational institutions.

Adducul and Adducul [16] developed a mobile-based ticketing system demonstrating that mobile platforms allow

users to conveniently submit and manage tickets, reducing the need for physical processes and supporting digital transformation.

Mission [17] developed an online support management system at the University of Antique to centralize IT-related services, showing that a centralized digital system allows better coordination, faster response time, and improved tracking, significantly improving service efficiency and user satisfaction.

C. Related Studies

Koukal et al. [18] focused on improving automated categorization of customer requests using NLP advances. Their study concluded that meticulous text preprocessing, balancing ticket categories, and deploying fine-tuned Transformer models are crucial for building successful text classifiers.

A systematic evaluation of the AI Web-Based Smart Ticketing System using PRISMA guidelines highlighted the transformative potential of combining NLP models like BERT with intelligent hierarchical workflow routing. The most effective architectures maintain a hybrid model combining automated intent processing with manual oversight for ambiguous cases [2].

Mandal et al. [19] documented a successful automated dispatch system at IBM Research that processed over 90,000 helpdesk emails monthly. Using an ensemble classifier augmented by a configurable rule engine and serving over 700,000 tickets, it achieved approximately 90% accuracy, saving more than 50,000 man-hours annually.

Selvi et al. [20] presented an NLP-driven system automating categorization and prioritization of support tickets simultaneously using a dataset of 78,313 customer complaints. The system achieved 90.45% classification accuracy and 98.84% prioritization accuracy using Topic Modeling and urgency keyword extraction.

Harun, Huspi, and Iahad [21] focused on automating question classification in Helpdesk Ticketing Support systems, comparing Naive Bayes and SVM algorithms. Their findings indicate that applying these algorithms to properly preprocessed textual queries drastically reduces tickets being routed to incorrect departments.

De Guzman et al. [22] created a web-based barangay information system for service requests showing that centralized database tracking effectively improves response time, transparency, and eliminates inefficiencies related to manual handling of community requests.

Gabuya [23] assessed the readiness of a Local Government Unit to transition to paperless legislative sessions, finding strong consensus on cost-efficiency and environmental benefits of digital systems while noting that unstable internet connectivity and lack of ICT training pose significant barriers.

Rodelas and Aglibar [24] conducted a mixed-methods study on the impact of automated tickets on IT support workers' productivity and well-being at the University of the East, concluding that intelligent ticketing systems and knowledge management dashboards are necessities to prevent staff burnout.

Virata [25] examined integration of the ITJoSeT e-Ticketing system in a Philippine organization, demonstrating that intuitive design, infrastructure reliability, and user-friendliness are the primary determinants of high end-user satisfaction in newly implemented digital support environments.

Cabral and Salazar [26] evaluated the e-Barangay Information Management System (E-BIMS) showing that deployment of a paperless administrative system expedited public transactions, improved record management security, and boosted operational productivity and accountability.

V. METHODOLOGY

A. Research Design

This study uses a developmental research design centered on creating, testing, and improving a practical product to address a real problem. The Agile software development model was adopted due to its iterative and flexible approach emphasizing collaboration, adaptability, and incremental delivery [3].

Agile is particularly suitable because it allows frequent testing and refinement of the ML model, essential for ensuring accurate real-time categorization and routing of support tickets. It encourages continuous engagement with users and provides flexibility to adapt requirements as the study evolves.

The development of the NLP component requires extensive datasets of historical IT support tickets sourced primarily from open-access repositories such as Kaggle. Datasets include textual data representing common technical issues, software requests, and hardware complaints across different vocabulary, urgency levels, and departmental categories.

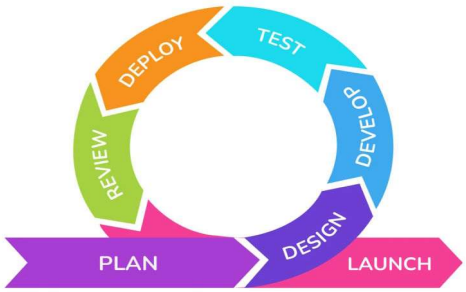

Figure 1 Agile Method

B. System Architecture

The architectural framework follows an Input-Process-Output (IPO) model. In the input phase, users submit support tickets through a web-based interface. In the process phase, the NLP module analyzes textual content by extracting keywords and understanding context, followed by the ML model classifying, prioritizing, and routing tickets. In the output phase, users receive confirmation and tracking information while administrators receive categorized tickets and analytical reports.

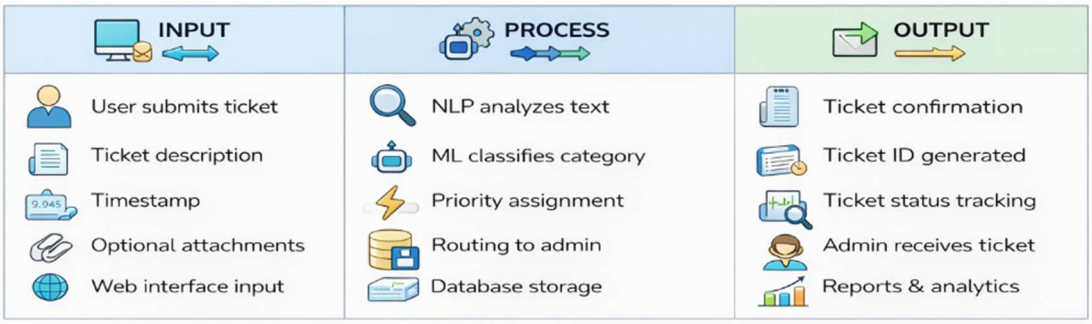

Figure 2 System Architecture

C. Methods and Tools

Text preprocessing involves removing unnecessary characters, tokenizing input, and transforming text into numerical representations using TF-IDF vectorization. Machine Learning classifiers (Naive Bayes or Logistic Regression) categorize tickets and assign priority levels based on urgency keywords.

The system is implemented using JavaScript/PHP for front-end and back-end development, Python with Scikit-learn and NLTK for ML and NLP components, MySQL for data storage, and XAMPP/Node.js as the web server environment.

TABLE I
HARDWARE REQUIREMENTS

Component	Minimum Specification	Rationale
Processor	Intel i5 or equivalent	Provides sufficient processing power for web application and AI tasks.
Memory (RAM)	8 GB minimum	Required to run web server, database, and AI processes without lag.
GPU	Integrated Graphics	Lightweight ML models do not require a dedicated GPU.
Storage	256 GB HDD/SSD	Adequate space for system files, database, and ticket logs.
Network	50 Mbps Fiber	Ensures real-time ticket submission and system communication.

VI. RESULTS AND DISCUSSION

This section presents the developed AI-Assistance Paperless Ticketing and Support System through its key interface screenshots. The system integrates NLP and ML to automate the full ticket lifecycle—from submission and AI classification to tracking and resolution. Figures 3 through 6 illustrate the login interface, ticket submission module, AI classification output, and the administrator dashboard.

A. Login Interface

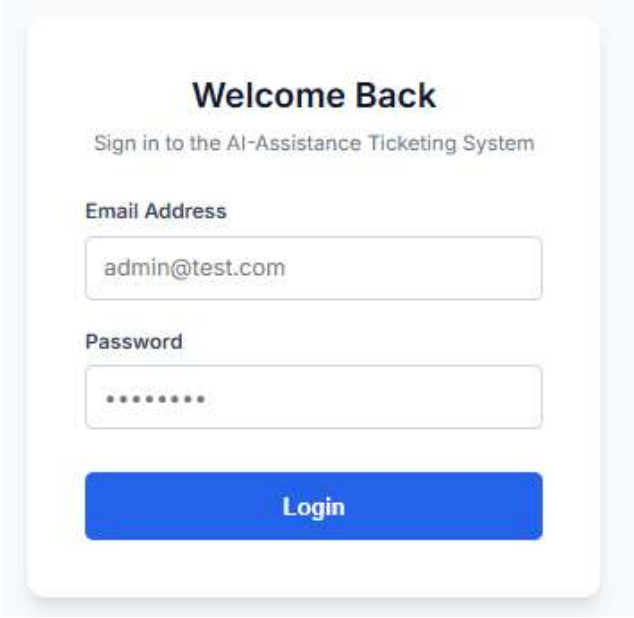

Fig. 3 *Login Interface*

The login interface (Fig. 3) allows users and administrators to securely access the system using their institutional email credentials. Upon successful authentication, the system applies role-based access control to direct end users to the ticket submission dashboard and administrators to the management panel.

B. Ticket Submission Interface

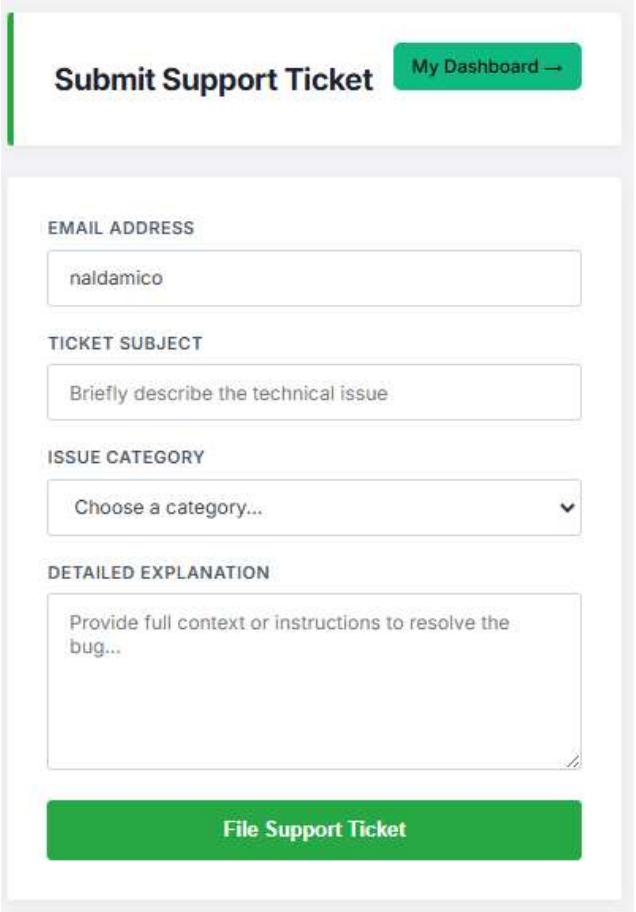

Fig. 4 *Ticket Submission Interface*

The ticket submission module (Fig. 4) enables users to submit concerns and support requests digitally by entering a subject and detailed description. The interface includes a live AI Preview button that invokes the NLP pipeline and displays real-time classification results—category, priority, sentiment, and confidence score—before the ticket is formally submitted.

C. AI Ticket Classification Output

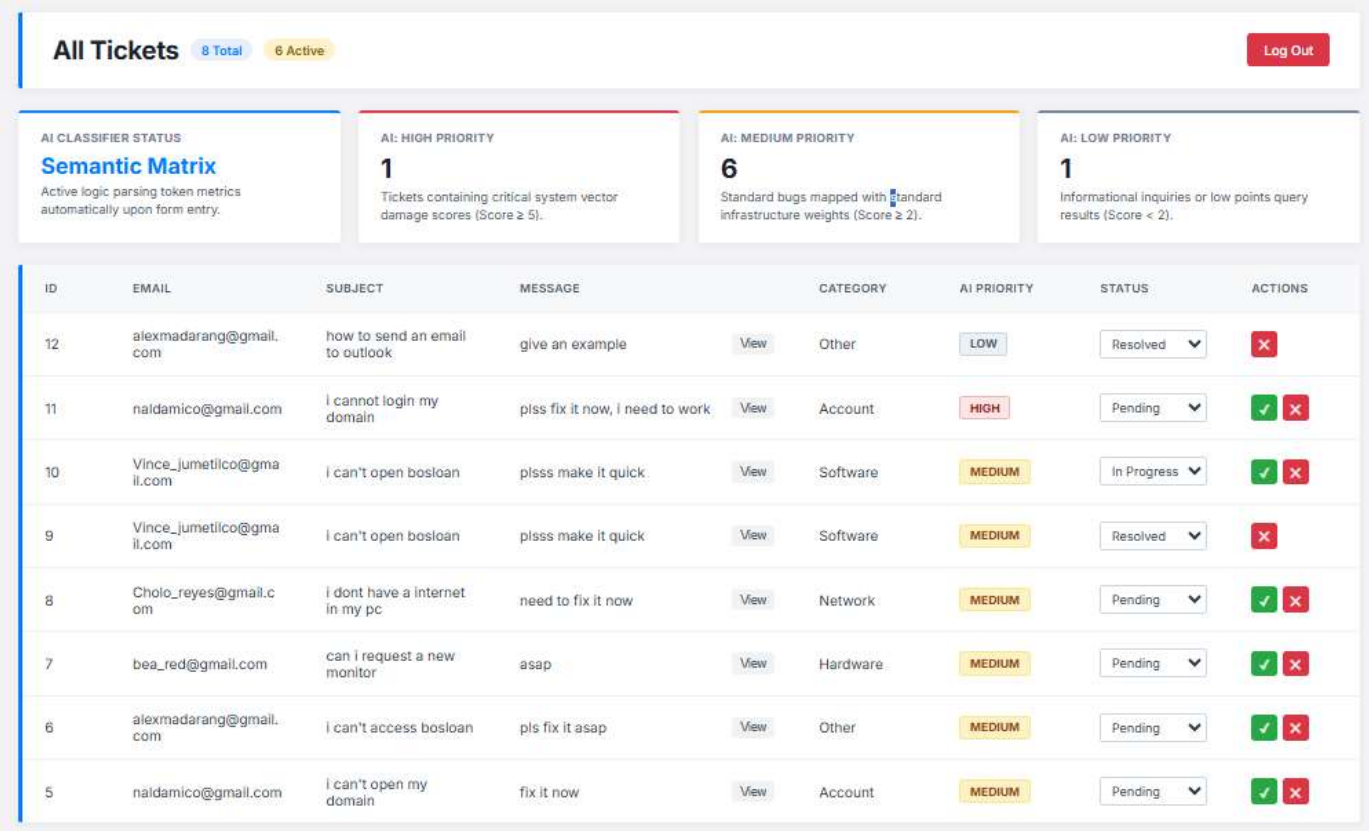

Fig. 5 *AI Ticket Classification Output*

The AI classification output (Fig. 5) is displayed after ticket submission. It shows the automatically determined category (e.g., Technical Support, Account & Access), priority level (low/medium/high/critical), detected user sentiment, confidence percentage, and top TF-IDF keywords extracted from the ticket text—providing full transparency into the automated decision.

D. Admin Dashboard

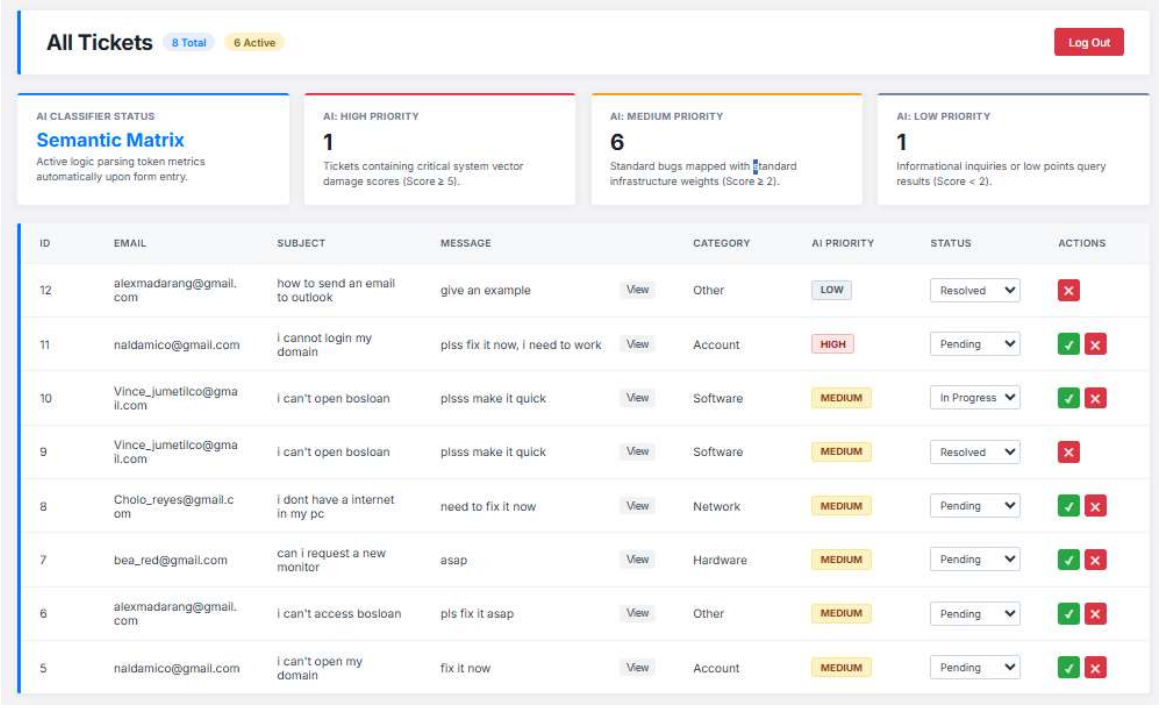

Fig. 6 *Admin Dashboard*

The admin dashboard (Fig. 6) provides centralized management and monitoring of all submitted tickets. Administrators can view real-time statistics, ticket queues with AI classification badges, SLA due indicators, priority filters, and quick-action controls for assigning agents and updating ticket status

VII. CONCLUSION

This study presents the AI-Assistance Paperless Ticketing and Support System as a solution to the inefficiencies of manual and semi-digital support management. By integrating NLP for text analysis and ML for intelligent classification, the system automates the full ticket lifecycle from submission to resolution.

The system directly addresses three core problems: inaccurate ticket categorization is resolved through automated AI classification; paper-based documentation is eliminated through fully digital records; and administrative transparency is improved through the centralized admin dashboard. Lightweight ML models compatible with standard hardware (Intel i5, 8 GB RAM) make the system accessible to small and medium-sized organizations such as schools and local government units.

Future work should focus on integrating more advanced deep learning models such as BERT for improved classification accuracy, expanding multilingual NLP capabilities to serve diverse user populations, and incorporating a dedicated analytics dashboard for longitudinal performance monitoring.

VIII. ACKNOWLEDGMENT

The researchers would like to express their sincere gratitude to the Faculty of the Information Technology Department of Jesus Reigns Christian College for their guidance and support throughout the development of this study. Special thanks to all respondents and evaluators who participated in the system testing and evaluation process.

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