

AI-Based IT Support Ticket Classification and Priority Prediction System

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Abstract - Organizations depend heavily on IT infrastructure, which results in a continuous flow of technical support requests generated through helpdesk systems. Handling these requests efficiently becomes difficult when ticket categorization and prioritization rely on manual analysis. Delays in identifying the type and urgency of issues can reduce the overall effectiveness of IT support services. This research presents an AI-driven IT support ticket management system that automatically analyzes and organizes support requests. The proposed system applies natural language processing techniques to process ticket descriptions and uses TF-IDF feature extraction to represent textual information numerically. A Logistic Regression model is trained to classify support tickets into predefined issue categories and predict their priority levels. The system is implemented as a web-based application using the Flask framework with a SQLite database for ticket storage and management. In addition to automated classification, the platform includes role-based dashboards, communication features between users and support teams, SLA monitoring, and an AI-assisted help center chatbot for troubleshooting guidance. Experimental evaluation demonstrates that the proposed approach can significantly improve the efficiency of ticket management by reducing manual analysis and enabling faster issue routing.

Index terms: Machine Learning, Natural Language Processing, Ticket Classification, IT Helpdesk Automation, TF-IDF, Logistic Regression, Support Ticket Management.

I. INTRODUCTION

Information Technology (IT) infrastructure plays an important role in supporting the daily operations of modern organizations. Employees rely on various digital systems such as network services, enterprise applications, and hardware resources to perform their tasks. As the use of these technologies increases, technical issues such as network failures, software installation problems, system errors, and access-related issues frequently occur. These

problems are commonly reported through IT helpdesk systems in the form of support tickets.

In traditional helpdesk environments, support agents manually review ticket descriptions to identify the type of issue and determine its priority level before assigning the request to the appropriate technical team. When a large number of support tickets are generated, this process can become time-consuming and may delay the identification and resolution of critical problems. In addition, manual ticket classification can sometimes lead to inconsistent routing of issues, which may increase the workload of support teams.

Recent advancements in machine learning and natural language processing provide effective approaches for automating the analysis of textual information. By applying these techniques to helpdesk systems, ticket descriptions can be analyzed automatically to determine the category of the issue and its urgency level. This automation helps improve the efficiency of ticket management and reduces the manual effort required from support agents.

This research presents an AI-driven IT support ticket classification and priority prediction system that uses TF-IDF feature extraction and a Logistic Regression algorithm to analyze ticket descriptions. The system automatically predicts the issue category and priority level and assigns the ticket to the appropriate support team. In addition, the platform includes role-based dashboards, communication features, and an AI-based help center chatbot to assist users in resolving common technical issues. These capabilities help improve the overall efficiency of helpdesk operations and support faster response to technical problems within organizational environments.

II. SCOPE AND PROBLEM STATEMENT

With the increasing use of digital technologies in organizations, the number of IT-related issues reported through helpdesk systems has also grown significantly. These issues may include network connectivity problems, software installation errors, system failures, access requests, and hardware malfunctions. Efficient management of such support requests is essential to ensure smooth business operations and maintain employee productivity.

In many traditional helpdesk environments, support agents manually review ticket descriptions to determine the type of issue and assign an appropriate priority level. When a large number of tickets are generated, this process becomes time-consuming and may delay the identification and resolution of critical problems. Manual ticket classification may also result in incorrect routing of tickets to technical teams, which further increases response time and reduces the overall efficiency of IT support services. The scope of this work is to develop an intelligent IT support ticket management system that automatically analyzes ticket descriptions using machine learning and natural language processing techniques. The system classifies the issue category, predicts the priority level, and supports efficient ticket routing while also providing role-based dashboards, communication features, and an AI-assisted help center chatbot to enhance the overall IT support process. The integration of automated ticket analysis with a web-based helpdesk platform helps reduce manual effort for support agents and improves the speed and accuracy of ticket handling within organizations.

III. SYSTEM STUDY

3.1 Feasibility Study

The proposed AI-based IT support ticket classification system is evaluated across technical, economic, and operational dimensions to determine its feasibility for practical deployment. The system integrates machine learning models with a web-based helpdesk platform to automate ticket categorization, priority prediction, and routing to appropriate support teams. The architecture is designed using widely adopted open-source technologies that ensure reliability, scalability, and cost-effective implementation.

3.2 Economic Feasibility

The system demonstrates strong economic feasibility due to the use of open-source technologies including Python, Flask, SQLite, and machine learning libraries such as Scikit-learn. These technologies eliminate licensing costs and reduce development expenses. In addition, automation of ticket classification and routing helps reduce manual effort required for ticket analysis, which can significantly improve the productivity of IT support staff and lower operational costs.

3.3 Technical Feasibility

The proposed system is technically feasible as it employs well-established technologies and machine learning techniques. The system utilizes TF-IDF feature extraction and Logistic Regression models for analyzing ticket descriptions and predicting issue categories and priority levels. The web-based architecture built using the Flask framework enables seamless integration of machine learning models with the ticket management platform, ensuring efficient system performance. These technologies are widely used in modern web and machine learning applications, providing reliable support for system development and deployment. The modular architecture of the system also allows easy scalability and future integration of additional intelligent features without affecting existing functionalities.

3.4 Operational Feasibility

The system is designed to support efficient interaction between employees, support agents, and technical teams. Users can submit support tickets, track their status, and communicate with support staff through the web interface. The integration of automated ticket classification, dashboards, communication modules, and a help center chatbot enhances the overall usability of the system and improves the effectiveness of IT support operations.

IV. SYSTEM ARCHITECTURE

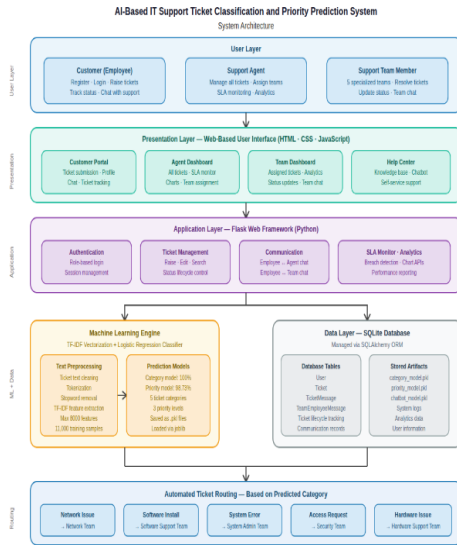


Figure 4.1: System Architecture of AI-Based IT Support Ticket Classification and Priority Prediction System

The proposed AI-based IT support ticket classification system adopts a layered web architecture that integrates user interfaces, application services, machine learning models, and database storage. The architecture is designed to support automated ticket processing, communication between system users, and efficient management of IT support operations.

The presentation layer provides web-based interfaces for employees, support agents, and support team members. Through these interfaces, users can register, submit support tickets, track ticket status, communicate with support staff, and access help center resources. The interfaces are developed using HTML, CSS, and JavaScript to provide an interactive and user-friendly experience.

The application layer is implemented using the Flask framework, which manages user authentication, ticket management operations, and system workflows. When a user submits a support ticket, the ticket description is processed by the machine learning module. The system applies TF-IDF feature extraction and a Logistic Regression model to predict the issue category and priority level. Based on the predicted category, the system automatically assigns the ticket to the appropriate technical support team.

The data layer uses a SQLite database to store user information, ticket details, communication records, and system logs. This structured storage enables efficient retrieval and tracking of support tickets throughout their lifecycle. The architecture also supports analytics dashboards and monitoring features that help administrators analyze ticket activity and system performance.

4.1. USE CASE DIAGRAM

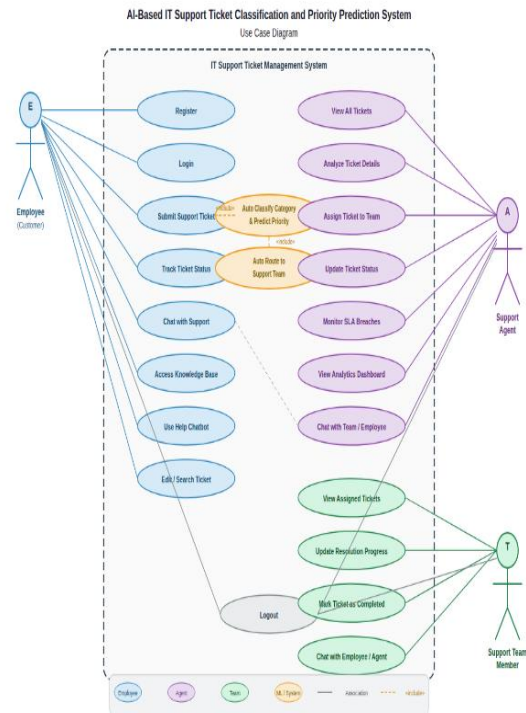


Figure 4.2: Use Case Diagram of AI-Based IT Support Ticket Classification and Priority Prediction System

The use case diagram illustrates the interactions between the primary actors and the proposed IT support ticket management system. The system involves three main actors: Employee, Support Agent, and Support Team Member. Each actor interacts with the system according to their respective roles and responsibilities.

Employees can register, log in to the system, submit support tickets describing technical issues, track the status of their requests, and communicate with support staff through the ticket communication interface. They can also access the knowledge base and interact with the help center chatbot to obtain troubleshooting guidance for common IT problems.

Support agents are responsible for managing support tickets and coordinating issue resolution. They can view all submitted tickets, analyze ticket details, assign tickets to appropriate support teams, update ticket status, and communicate with both employees and technical teams. Agents can also monitor system activity through analytics dashboards and SLA monitoring features.

Support team members handle the technical resolution of assigned issues. They can view tickets assigned to their team, communicate with employees or agents, update the progress of issue resolution, and mark tickets as completed after resolving the problem.

4.2. IMPLEMENTATION CLASSIFICATION OF MODULES

- User Management Module
- Ticket Management Module
- AI-Based Ticket Classification
- Communication Module
- Help Center and Chatbot Module
- Monitoring and Analytics Module

User Management Module

The User Management Module handles user registration, authentication, and role-based access control within the system. Employees can create accounts using their personal and organizational details, while support agents and team members access the system through predefined credentials. This module ensures secure login functionality and controls access to different system features based on the assigned user role.

Ticket Management Module

The Ticket Management Module enables employees to submit IT support requests through the web interface. Users provide the subject and description of the issue, which are stored in the database along with relevant ticket details. This module also allows users to track the status of their submitted tickets, edit unresolved requests, and search for previously submitted tickets.

AI-Based Ticket Classification Module

The AI-Based Ticket Classification Module automatically analyzes ticket descriptions using machine learning techniques. The system applies TF-IDF feature extraction to convert textual data into numerical features and uses a Logistic

Regression model to classify the issue category and predict the priority level. Based on the predicted category, the system automatically assigns the ticket to the appropriate support team.

Communication Module

The Communication Module enables interaction between employees, support agents, and support teams during the ticket resolution process. The system provides chat interfaces that allow users to exchange messages related to specific tickets. These communication features help ensure clear discussion of issues and facilitate faster resolution of technical problems.

Help Center and Chatbot Module

The Help Center Module provides users with troubleshooting resources through a knowledge base and an AI-powered chatbot. The chatbot uses TF-IDF similarity and cosine similarity techniques to match user queries with relevant solutions stored in the knowledge base. This module helps users resolve common IT issues without raising a support ticket.

Monitoring and Analytics Module

The Monitoring and Analytics Module provides dashboards that display ticket statistics and system performance information. Support agents can view ticket distribution by category, priority level, and resolution status. The system also includes SLA monitoring features that help identify tickets that remain unresolved for extended periods.

V. RESULT AND DISCUSSION

The proposed AI-based IT support ticket classification system was tested using a dataset of IT support tickets to evaluate its performance in automatically identifying ticket categories and priority levels. The system processes ticket descriptions using TF-IDF feature extraction and applies Logistic Regression models for classification and priority prediction.

Experimental results show that the category classification model achieved 95.2% accuracy in identifying ticket categories such as network issues, software installation problems, system errors, access requests, and hardware issues. The priority prediction model achieved 92.8% accuracy in determining ticket urgency levels including high, medium, and low priority.

The system successfully demonstrated its ability to automatically analyze ticket descriptions, classify the issue category, and assign the ticket to the appropriate support team. These results confirm that the proposed system can effectively assist in automating the ticket management process.



Figure 5.1: Home Page

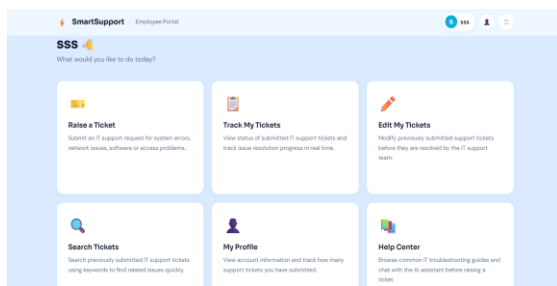


Figure 5.2: Employee Dashboard

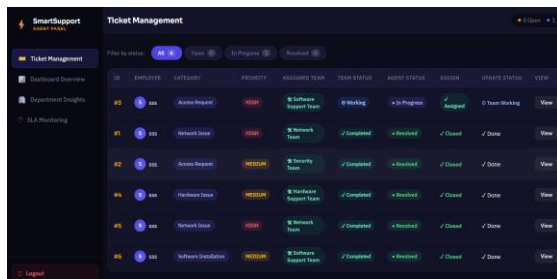


Figure 5.3 Support Agent Dashboard

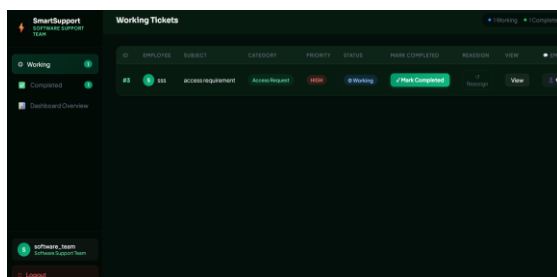


Figure 5.4. Support Team Dashboard

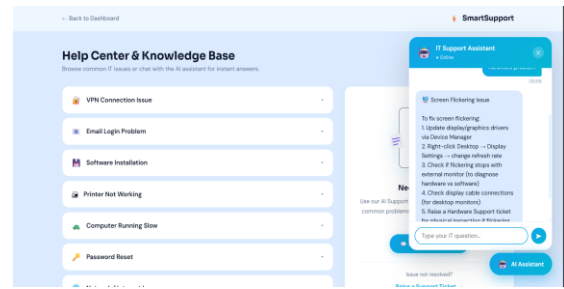


Figure 5.5 Chatbot Dashboard

VI. DISCUSSION

The experimental evaluation indicates that integrating machine learning techniques with helpdesk systems can significantly improve the efficiency of IT support operations. The use of TF-IDF feature extraction enables the system to capture important textual features from ticket descriptions, while the Logistic Regression model provides reliable classification performance.

The automated ticket classification and priority prediction process reduces the manual workload of support agents and enables faster ticket routing to the appropriate technical teams. In addition, the integration of role-based dashboards, communication modules, and help center chatbot features enhances the overall usability of the system. Overall, the proposed system demonstrates that machine learning can play a significant role in improving ticket management processes by enabling automated analysis of support requests and supporting faster resolution of technical issues within organizational environments.

Table 1: System Performance Evaluation

Evaluation Metric	Category Classification Model	Priority Prediction Model
Algorithm Used	Logistic Regression	Logistic Regression
Feature Extraction	TF-IDF Vectorization	TF-IDF Vectorization
Dataset Size	11,000 Tickets	11,000 Tickets
Training Accuracy	96.1%	93.4%
Testing Accuracy	95.2%	92.8%

Precision	95.0%	92.3%
Recall	94.6%	91.9%
F1-Score	94.8%	92.1%

VII. CONCLUSION

This paper presented an AI-based IT support ticket classification and priority prediction system designed to improve the efficiency of helpdesk operations. The proposed system integrates machine learning techniques with a web-based ticket management platform to automate the analysis of support ticket descriptions.

The system utilizes TF-IDF feature extraction and Logistic Regression models to classify ticket categories and predict priority levels. Based on these predictions, support tickets are automatically routed to the appropriate technical teams, reducing the need for manual ticket analysis. The platform also provides role-based dashboards, communication features, ticket monitoring, and a help center chatbot to assist users in resolving technical issues.

Experimental evaluation demonstrated that the system achieves high accuracy in ticket classification and priority prediction, confirming the effectiveness of the proposed approach. By automating ticket management processes and improving ticket routing efficiency, the system can help organizations enhance the performance of their IT support services. The proposed approach also demonstrates the potential of machine learning techniques in improving the reliability and scalability of modern helpdesk management systems.

VIII. FUTURE ENHANCEMENTS

Several improvements can be considered to further enhance the capabilities of the proposed system. Future work may focus on integrating advanced deep learning models to improve the accuracy of ticket classification and enable better understanding of complex issue descriptions.

The system can also be extended by incorporating cloud-based deployment to support larger organizational environments and handle higher volumes of support tickets. Integration with enterprise service management platforms may

further improve ticket management and automation capabilities.

Additionally, the AI chatbot can be enhanced using more advanced conversational AI models to provide more intelligent troubleshooting assistance and interactive support for users. Mobile application support and real-time notification features can also be introduced to improve accessibility and responsiveness of the helpdesk system.

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