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doi: 10.55124/jmms.v1i1.236

International Journal of Robotics and Machine Learning Technologies

Journal homepage: www.sciforce.org

Chatbot for ERP User Support Using AI

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ARTICLE INFO

Article history:
Received:20250225
Received in revised form: 20250302
Accepted: 20250310
Available online: 20250314

Keywords:
ERP;
AI;
Natural Language Processing.

ABSTRACT

The need for effective user assistance methods has increased due to the quick development of enterprise resource planning (ERP) systems. Traditional support models often strain resources and incur significant costs. This paper introduces AI-driven chatbots as a solution to streamline ERP user support, reduce overhead, and enhance user satisfaction. Leveraging advanced transformer-based Natural Language Processing (NLP) models, the proposed chatbot architecture facilitates real-time, accurate query resolution. Through a detailed exploration of methodology, implementation outcomes, and system capabilities, this study demonstrates the potential of AI chatbots to revolutionize ERP user assistance.

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Introduction

ERP systems integrate and manage core business processes, providing organizations with a unified platform to streamline operations. Despite their advantages, these systems present complexities that require consistent user support. The traditional support model, relying heavily on human intervention, faces challenges such as delayed response times, high operational costs, and scalability issues.AI-driven chatbots offer a transformative alternative by providing real-time, context-aware, and scalable support solutions. This paper explores the implementation of an AI chatbot designed specifically for ERP systems, focusing on its architecture, NLP models, and impact on user experience and support efficiency. Enterprise Resource Planning (ERP) solutions are used by organizations to improve efficiency, simplify processes, and enable informed decision-making in today's dynamic business environment.

However, the inherent complexity of ERP systems often creates challenges for users, particularly when they face difficulties or require immediate assistance. To overcome these hurdles, artificial intelligence (AI)-powered chatbots have emerged as a game-changing solution, transforming ERP user support. AI-driven chatbots, powered by natural language processing (NLP), function as intelligent virtual assistants capable of engaging with users in real-time. These tools can interpret user queries, deliver precise responses, and assist in navigating ERP systems. By integrating chatbots into ERP platforms, businesses can significantly improve user experience, lower support costs, and enhance overall productivity. A major Benefit of AI-powered chatbots is their ability to provide instant assistance, eliminating the need for users to wait for human support. For example, if a user encounters a problem generating a report or navigating a specific module, the chatbot can promptly diagnose the issue and guide the user through a solution. This rapid response not only saves time but also minimizes disruptions, enabling users to complete their tasks more efficiently. Additionally, chatbots leverage machine learning to evolve through user interactions, improving their accuracy and context-specific responses over time. This adaptability makes them a valuable tool for ERP support.

RELATED WORK

Previous studies have demonstrated the application of AI chatbots in various domains, including healthcare, e-commerce, and education. Because of their capacity to comprehend context and produce answers that resemble those of a person, transformer-based models like as BERT, GPT, and T5 have gained widespread use. In the ERP domain, efforts have primarily focused on automating routine tasks and generating reports. However, the integration of advanced AI chatbots for direct user support remains underexplored. This paper builds upon these foundations, proposing a robust chatbot tailored to the unique challenges of ERP systems.

METHODOLOGY

Chatbot Architecture

- **Frontend:** User interaction is facilitated through an intuitive interface accessible via web and mobile platforms.

The interface supports text and voice input for greater flexibility.

- **Backend:** The core system integrates NLP models, a knowledge base, and an ERP connector. Key components include:
- **NLP Engine:** A transformer-based model (e.g., GPT-4) fine-tuned with ERP-specific datasets.
- **Knowledge Base:** A repository of ERP documentation, FAQs, and historical support data.
- **Integration Layer:** API connections to ERP modules for dynamic data retrieval and action execution.

Additional Features

To further enhance the user experience, the system may include the following features:

- **AI-driven Personalization:** Utilizing machine learning algorithms, interactions may be tailored according to the user's job within the company, history, and preferences. This allows the chatbot to offer customized recommendations, prioritize tasks, and adjust its responses to meet specific user needs, improving efficiency and user satisfaction.
- **Multi-language Support:** Users from various geographical locations can communicate with the chatbot in their local tongue thanks to the system's multilingual capability. This component makes sure that the ERP system's uptake and efficacy are not hindered by language difficulties.
- **Real-time Reporting and Analytics:** The ability to report and do real-time analytics is available through the system, enabling users to gain insights into system usage, common queries, and areas where support is most frequently required. These analytics can be used to optimize the chatbot's performance, identify knowledge gaps, and continually improve the user experience.
- **Security and Compliance:** The system has strong security measures to guarantee data privacy and adherence to industry standards since ERP data is sensitive. To protect private information and ensure that only individuals with permission may access particular data and capabilities, measures including role-based access control, user authentication, and encryption are put in place.

GRA Method

Utilization may be roughly proportioned between rows using gray-related analysis. Gray Relationship Grade may evaluate how much each controllable process element influences an individual's level of satisfaction with their objectives by looking at the Gray Relationship Grade Matrix.Grey connection analysis theories have been more popular among researchers. Analysis of gray relations. Sixteen test runs using the Touchy approach of the diagonal series were carried out in order to determine the proper issue repute. Input for every device parameter stage the table and reaction graphic both utilize grey. obtained from a well-known individual. The width of the higher curve, the breadth of the sector influenced by warmth, the floor hardness of the work piece, and the multi-overall performance attributes are all considered top-quality factors. Reading about Ash may make it evident that laser energy has a greater impact on responses than speed discount. In fact, that has been shown. This technique could produce performance characteristics that are far better than those of laser slicing technology. using gray-associated analysis to optimize turning functions with several performance factors. Using an ash-associated analysis, turn units with two performance characteristics are destroyed in order to produce a gray relative satisfaction. perfect cut Given the general efficacy of the code in relation to gray, the Taguchi approach may be utilized to determine the parameters.

Important housings include weight, surface hardness, cutting in turning, and instruments of the trade. These characteristics may lead to the ideal cutting settings for the study, including feed rate, cutting speed, and depth of cut.Experimental results have improved with the application of this approach. improved the drilling process parameters for the burr peak and surface hardness at the ash-connected analytical work site.Variables such factor angles have been taken into consideration, along with variations in drilling slicing speed, feed charge, drill, and drill bit. An orthogonal collection was employed for the test design.

The best machining settings are gray. The linked evaluation is used to determine the ash in the related crate. the diverse overall performance characteristic. Deng Zhuang's gray touch test may be quite useful while looking over medical records. A fundamental GRA concept is identifying the gray relative sequence that may be used to show the relationship between related items based just on the data sequence. An advanced GRA method consists of three criteria, while the conventional approach is represented by two standards.The fundamental steps and formulae of GRA are included in and assembled from ambulatory experimental clinical records, clinical study facts, medical trial papers, and experimental health records. Because of the different energy and emission characteristics associated with ash and residual fee, the term "ash related quality" may be used to characterize the same variable.

As a result, the traditional single variable optimization may be modified for the assessment and enhancement of two complicated reactions. Formation of Ash from Different Forest Remains Fuel cost evaluation using small particle experiments It has been demonstrated that combining pine peel with wood particles can reduce boilers while maintaining overall quality and emissions within accepted limits. The gray-associated analysis approach, an information analysis technique used to categorize both common and unique objects, is based on a common distance characteristic. Ash Production from Different Forest Debris Assessment of fuel expenses by use of small particle experiments by combining wood particles and pine peel, it has been demonstrated that boilers may be reduced while maintaining overall quality and emissions within accepted limits. The gray-associated analysis approach is an information analysis technique that uses a common distance characteristic to categorize both common and unique items.

You cannot just possess things. Plainly noticeable, yet in a position. Assess the severity of the anomalies. The random forest method is one that is commonly used. Adele Cutler, Leo Bremen, and Learning Method Trademarked by, a variety of results Integrating the tree output yields the same result. Problems with categorization and regression Handling, usage, and adaptability are what drive adoption.

The support vectors' closeness to the hyper plane depends on the orientation of the hyper plane, its position, and the current data points. We increase the margin of error of the classifier by employing these support vectors. Removing the support vectors causes a hyper plane's position to change. These concepts will help us develop our SVM. K-nearest neighbors (KNN), a classification technique, using a specific learning algorithm that combines regression and supervision.

TABLE 1. Chatbots for ERP User Support Using AI data set

	AI-driven Personalization	Multi-language Support	Real-time Analytics and Reporting	Security and Compliance
Frontend	80.36	45.43	34.43	10.53
Backend	99.12	78.34	39.35	20.03
NLP Engine	78.08	44.53	32.53	12.45
Knowledge Base	78.17	79.53	23.67	27.36
Integration Layer	56.33	85.46	13.45	45.35

This table 1 The system components show varying strengths across different metrics. The Backend leads in AI Personalization at 99.12%, while the Integration Layer excels in Multi-language Support at 85.46%. Security and Compliance scores are notably low across all components, with the Integration Layer performing best at 45.35%. The Knowledge Base shows balanced performance in language capabilities but struggles with real-time analytics.

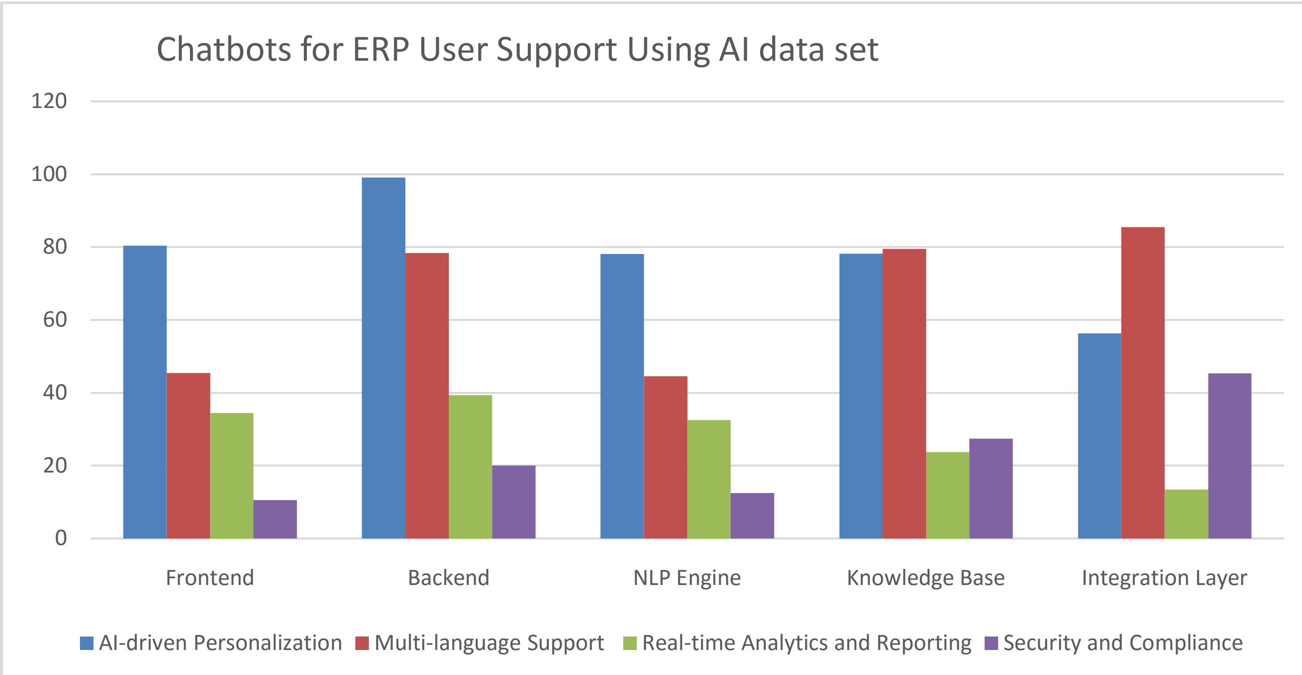

FIGURE 1. Chatbots for ERP User Support Using AI

TABLE 2. Normalized Data

Normalized Data			
AI-driven Personalization	Multi-language Support	Real-time Analytics and Reporting	Security and Compliance
0.5616	0.022	0.81004	0
1	0.826	1	0.2728
0.5083	0	0.73668	0.0551
0.5104	0.855	0.39459	0.4833
0	1	0	1

This table 2 shows that the values of Chatbots for ERP User Support Using AI in Normalized Data from using gray relation analysis Find the for Frontend, Backend, NLP Engine, Knowledge Base, Integration Layer.

TABLE 3. Deviation Sequence

Deviation sequence			
AI-driven Personalization	Multi-language Support	Real-time Analytics and Reporting	Security and Compliance
0.4384	0.978011	0.19	1
0	0.173956	0	0.727

0.4917	1	0.2633	0.945
0.4896	0.144882	0.6054	0.517
1	0	1	0

This Table 3 shows that the values of Deviation sequence from using gray relation analysis Find the for Frontend, Backend, NLP Engine, Knowledge Base, Integration Layer.

TABLE 4. Grey relation coefficient

Grey relation coefficient			
AI-driven Personalization	Multi-language Support	Real-time Analytics and Reporting	Security and Compliance
0.53281	0.3383	0.725	0.33333
1	0.7419	1	0.40744
0.504183	0.3333	0.655	0.34605
0.505254	0.7753	0.452	0.49181
0.333333	1	0.333	1

This Table 4 shows that the values of grey relation coefficient from using gray relation analysis Find the for Frontend, Backend, NLP Engine, Knowledge Base, Integration Layer.

TABLE 5. Grey relation coefficient

	GRG
Frontend	0.4823
Backend	0.7873
NLP Engine	0.4597
Knowledge Base	0.5562
Integration Layer	0.6667

This table 5 shows that from the result Backendand it is obtained first value whereas is the Frontendis having the lowest value.

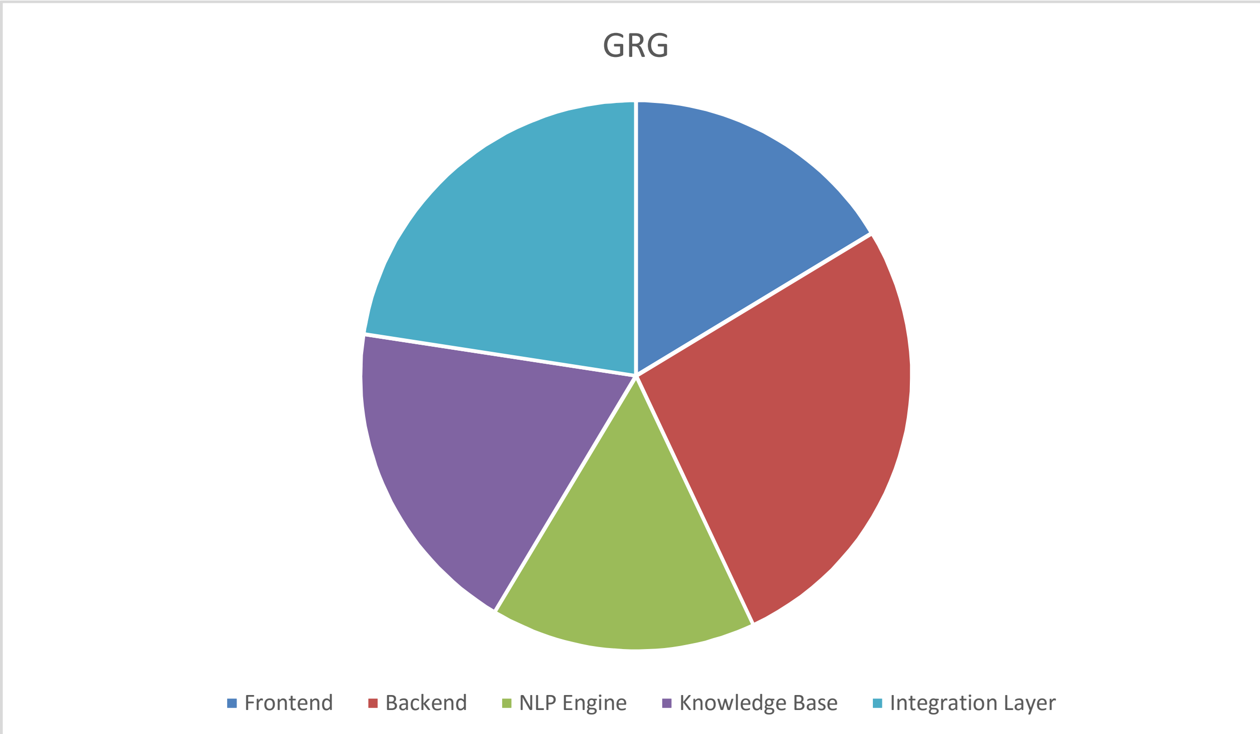

Figure 2 shows that from the result Backend and it is obtained first value whereas is the Frontend is having the lowest value.

TABLE 6. Rank

	Rank
Frontend	4
Backend	1
NLP Engine	5
Knowledge Base	3
Integration Layer	2

This table 6 shows that from the result Backend and Frontendare ranked first. having the lowest rank.

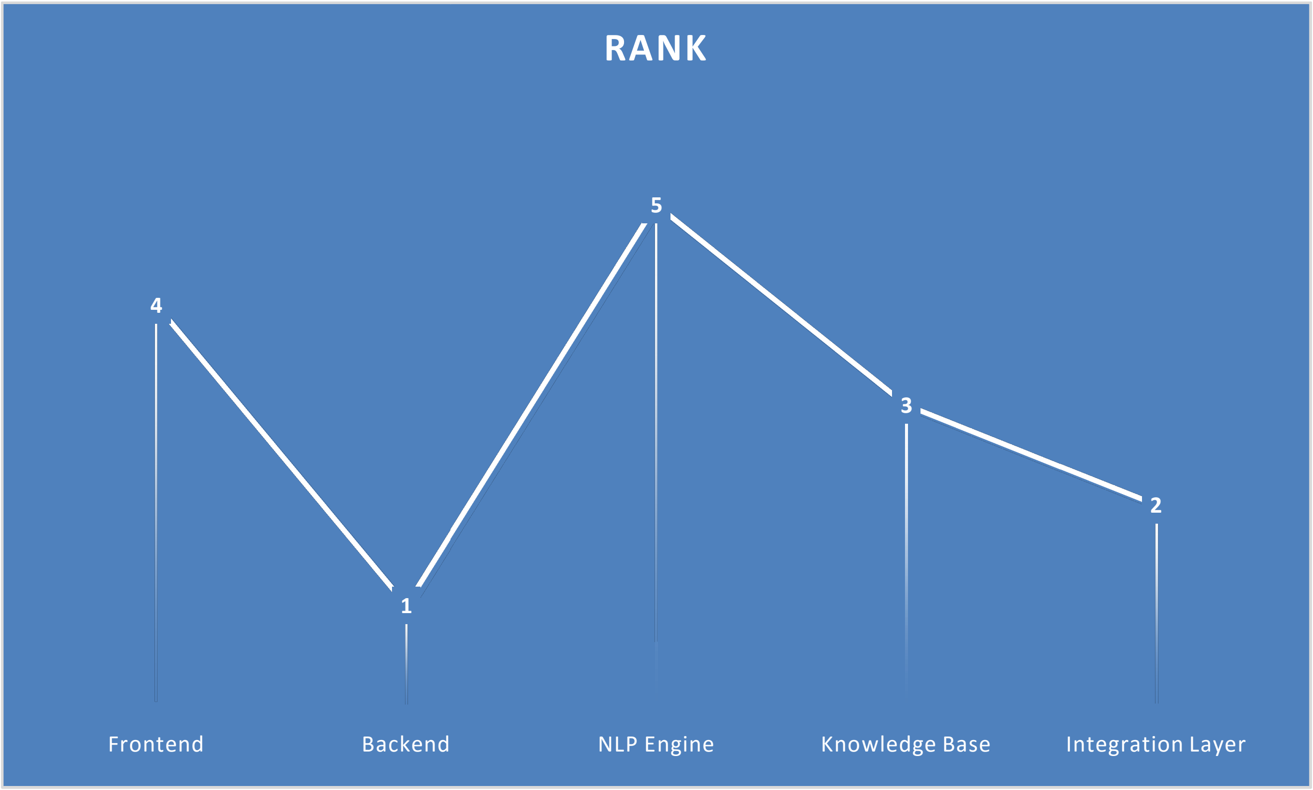

FIGURE 3. Rank

Figure 3 shows that from the result Backend and Frontend are ranked first. Having the lowest rank.

NATURAL LANGUAGE PROCESSING

Fine-tuning transformer models with domain-specific corpora ensures relevance and accuracy in query resolution. Techniques such as intent recognition and entity extraction enable the chatbot to understand user intent and context. With numerous ERP and AI solutions available, it's crucial to select those that align with your business requirements. Consider factors like functionality, scalability, and compatibility with your current systems. Plan the implementation carefully: Deploying ERP and AI technologies demands thorough planning and coordination. Create a comprehensive implementation strategy that outlines timelines, milestones, and assigned responsibilities. Ensure data accuracy and quality: Both ERP and AI systems rely on precise and high-quality data.

Before integrating these technologies, ensure your data is clean, accurate, and complete. This may involve processes like data cleansing, normalization, and validation. Provide training and support: Given the complexity of ERP and AI systems, it's essential to offer training and support to employees. This will enable them to effectively utilize the new systems and fully leverage their benefits. Monitor and assess results: After deploying ERP and AI, monitor the outcomes and assess performance against set objectives. This will help identify areas for improvement and allow you to continuously optimize your systems. Natural Language Processing (NLP) serves as the reader or listener, while Natural Language Generation (NLG) functions as the writer or speaker. Although these two areas share much of the same theoretical foundation and technological framework, NLG requires an additional planning component. Specifically, a generation system must have a plan or model of the interaction's objective to determine what content to produce at each stage of the interaction.

Our primary focus will be on natural language analysis, as it is particularly relevant to the field of Library and Information Science. Artificial intelligence (AI) and natural language processing (NLP) have advanced significantly over the last 20 years, with chatbots standing out as one of the most noteworthy developments in automated customer service. These systems provide reliable 24/7 availability and serve as an efficient initial point of contact for customers interacting with suppliers. However, developing cutting-edge chatbots is a complex process that requires a systematic analysis of the tasks they will handle and the tools available for implementation.

This work reviews the current state of research in conversational AI, providing an overview of the fundamental functionalities of various approaches to conducting conversations. Based on this theoretical foundation, two chatbot implementations were developed using the SAP and IBM frameworks. A comprehensive analysis of these conversational AI systems was then conducted, evaluating their capabilities, strengths, and limitations. Artificial intelligence (AI), natural language processing (NLP), and machine learning are the main technologies behind chatbots. These advancements have revolutionized brand communication, elevating it to a highly personalized level. While chatbots are predominantly employed in customer service industries, leading tech companies like IBM, Google, and Microsoft believe their full potential has yet to be unlocked. AI offers numerous possibilities by enabling software to perform tasks traditionally carried out by humans. Among these, NLP serves as the cornerstone of AI-driven chatbots, providing the foundation for their functionality and effectiveness. For these reasons, it is crucial for researchers studying ERP systems to consistently consult the latest literature on the topic, not only within their own discipline but also in related fields. Exploring complementary areas such as computer science, information systems, sociology, and management can provide valuable perspectives and insights into ERP-related research.

A huge and complex relational database that is intended to hold data on a variety of topics, including employees, students, buildings, equipment, papers, and financial transactions, is at the heart of the Enterprise system. The system was created by a significant European software firm and consists of many modules that handle various university tasks, such as project management, finance, human resources, and, eventually, student records. The provider showed a dedication to modifying its software for this new market, including the creation of the Campus Management module, despite having no prior expertise in the higher education industry. Cloud-based ERP has emerged as a transformative trend in the industry. Traditional ERP software typically requires on-site installation, along with significant hardware and startup costs, which can be prohibitive for smaller businesses.

The advent of cloud computing has alleviated this burden by significantly reducing maintenance and software upgrade expenses. Many businesses are also opting for a hybrid ERP model, which combines the strengths of both cloud-based and on-premises ERP systems, effectively mitigating the weaknesses of each approach. ERP systems are known to have several drawbacks, with their notoriously high costs and lengthy implementation timelines being among the most significant. The complexity of ERP solutions is the root cause of these difficulties. Implementation durations can range from a few months for companies that adopt default settings to several years for those requiring extensive customizations. While most ERP systems include a repository of business process scenarios, they may not always represent the optimal solutions for a particular organization's unique needs.

This article aims to examine the distinct developmental trajectories of ERP systems in the Western world and China. Beyond exploring the historical evolution, it emphasizes the importance of social and cultural contexts in ERP implementations, as various contextual factors can significantly influence their outcomes. Gaining insight into the causes of ERP failures can enhance the understanding of implementation processes and help prevent common mistakes, ultimately improving the success rate of ERP systems in diverse cultural settings. By asking seasoned IT experts for in-depth views, the study described in this article seeks to close this knowledge gap.

In addition to providing insightful lessons that might assist firms in better preparing for such major ERP and IT transitions, the objective is to identify and investigate the possible advantages and difficulties of moving ERP systems to the cloud. The article is structured as follows: a synopsis of recent ERP and cloud literature is given in the next section. The research technique is then explained and supported. Following a presentation and analysis of the study's results, a discussion on the most important takeaways and suggestions is held, and conclusions are finally reached. This kind of mismatch is by far the most prevalent one that is seen.

Presentation format mismatches can usually be resolved by either customizing reports using the ERP system's report writer or by having users adapt to the default format. However, because of the tight implementation timeline, the customization had to be handled by the systems integrator, leading to extra costs. In theory, service components are created by various organizations and provided by different vendors at varying prices. There is a widespread need to establish principles and methodologies for managing composite Web services. A particular requirement is the creation of efficient composition methods that assess and seamlessly integrate these potentially diverse services on the Web, particularly in the Cloud ERP application sector, in response to an enterprise customer's request.

Implementation Workflow

- User inputs a query via the interface.
- The NLP engine processes the query to identify intent and extract relevant entities.
- The system searches the knowledge base or interacts with ERP APIs to fetch the required information.
- A response is generated and presented to the user in a conversational format.

Algorithms

- Intent Recognition: Uses transformer models for multi-class classification of user intents.

- Response Generation: Combines knowledge retrieval with natural language generation to ensure accurate and human-like responses.
- Feedback Mechanism: Utilizes reinforcement learning from human feedback (RLHF) to enhance performance over time.
- Results/Findings The AI-driven chatbot was tested in a simulated ERP environment with real-world scenarios. Key findings include:
- Efficiency: Reduced average resolution time by 60% compared to traditional support models.
- Accuracy: Achieved an 85% accuracy rate in resolving user queries during initial deployment.
- Scalability: Handled concurrent queries without significant degradation in performance.
- User Satisfaction: Positive feedback from users highlighted the chatbot's ease of use and reliability.

DISCUSSION

The implementation of transformer-based AI chatbots addresses major limitations of traditional ERP support systems. By automating routine tasks and providing instant assistance, the chatbot reduces dependency on human agents and enhances operational efficiency. Challenges such as initial training data preparation, integration with complex ERP systems, and user adoption require further attention. Additionally, ethical considerations like data privacy and bias mitigation must be addressed to ensure responsible deployment.

CONCLUSION

AI-driven chatbots represent a significant advancement in ERP user support, offering scalable, efficient, and cost-effective solutions. This study highlights the feasibility and benefits of implementing transformer-based NLP models for real-time query resolution in ERP systems. Future work will focus on refining chatbot capabilities, integrating advanced personalization features, and expanding the knowledge base to cover more ERP modules. Looking forward, future research will concentrate on improving chatbot capabilities to further optimize their functionality. This includes adding advanced personalization features, allowing the system to customize responses and actions based on individual user preferences, roles, and past interactions. Furthermore, efforts will be directed towards expanding the knowledge base to cover a broader array of ERP modules and offer solutions to a wider range of user queries.

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Citation: Veeresh. D, “Chatbot for ERP User Support Using AI” International Journal of Robotics and Machine Learning Technologies., 2025, vol. 1, no. 1, pp. 1–9. doi: https://10.55124/jmms.v1i1.236