

An Improved Conversational Chatbot Marketing System Case on FedEx

Kevin Destiny Linus¹, Samson Isaac², Amina Bala Ja'afaru², Ashiru Simon³ and Benjamin Yabanat Joshua⁴

^{1,2,3}Department of Computer Science, Kaduna State University

⁴Department of Economics, Nnamdi Azikiwe University, Awka Nigeria

destinykevin005@gmail.com¹, samson.isaac@kasu.edu.ng², aminabala@kasu.edu.ng², a.simon@kasu.edu.ng³ and
by.joshua@unizik.edu.ng⁴

Abstract

This paper presents an innovative approach to enhancing conversational chatbot marketing systems. In a digital world, customer engagement and service personalization are paramount, and chatbots play a crucial role in this transformation. Fast forwarding to today's digital fast-paced landscape, enhancing customer interaction and service efficiency using chatbots is paramount for global logistics and courier delivery servicing companies like Federal Express FedEx. This study presents the development and integration of an improved conversational chatbot marketing system using the Rasa architecture framework. The aim of this research is to improve an existing chat bot conversational marketing system (case-on FedEx). The system will be able to give in response more accurately with respect to the user input on the messaging platform. With the vital objectives of integrating the system using RASA a machine learning framework for building conversational AI based Chatbot system. The system should be able to provide links to website home page, FAQs page and logs that the admin can see questions not answer and admin will provide the answer respectively, covering many marketing related areas. Rasa framework was chosen for its robust capabilities in building context-aware and intelligent chatbots.. The results indicate a significant reduction in response times, increased customer satisfaction, and higher engagement rates. The chatbot's ability to handle repetitive tasks and common queries allowed human agents to focus on more complex issues, thereby improving overall efficiency. This case study demonstrates the potential of advanced conversational AI systems in revolutionizing customer service and marketing strategies in the logistics industry, setting a new benchmark for digital transformation initiatives. The future work of this research will focus on further refining the chatbot's capabilities, expanding its scope to include predictive analytics, and exploring its application in other operational areas within FedEx.

Keywords: Conversational Chatbot, Marketing System, Federal Express (FedEx), Artificial Intelligence

1. Introduction

In real world today, information is power. The art of moving information is through a well-known means called communication. With proper communication between humans, there's forwardness. In modern technology, communication is more efficient to utilize and this make information to move fast through social media. In the aspect of marketing, information plays a core part, both customers and producers utilizes information by communicating with each other. Zadrozny et al.(2000) as cited by shawar et al.(2007) said In social media age, chat bot will allows humans to communicate with machines where they will express their interest, wishes or queries directly and naturally by speaking, typing and pointing. A chat bot is a computer program that simulate conversation between humans and machine. This programs are also known as bot, chatter box or artificial conversation entity that keeps conversations running via texting methods or audition. Humans interact with the machine in natural spoken language, including an AI technique called NLP (Natural Language Processing) for reliability. This programs are normally design as conversational partners that are deployed in dialog format in different practical purpose such as customer service or information gathering. A chat bot impersonate conversations with human using artificial intelligence techniques which include natural language processing, image and video processing and video analysis. This chat bot learns from their past and improve their response with time to accurately complete tasks given to them Pasqua (2016). Bots enables brands to engage with customer directly in conversation, this happens mostly on messaging platform. With the Combination of data driven efficiency and conversational ease of a person, the result is so authentic that it is hard to tell if one is conversing with human being or machine. Conversational Marketing. Oxford dictionary (2023) defines conversational as a formal way of exchanging ideas, news ETC, Marketing consist of activities that promotes, sell product or services. In conjunction, conversational marketing defined according to Kelly (2006), is a relationship marketing tool for social media age. They perform functions through drivers that leads to integration of various interface that can facilitate a dialogue between customers and companies. They perform human to machine engagements by utilizing chats, messages and natural language processing interface. The term **System** is gotten from a Greek word Systema which means organized relationship between independent component put together to achieve common goals (System analysis/design, tutorial point, 2020). A system may varies in different format such as graphical, command line, web based ETC. most common system put in place in the world are web based and graphical user systems. Unlike various system formats, a Chat Bot Conversational Marketing System is a text user based system. It is concerned with human conversing with a machine for information gathering, it allows users to type text of natural language spoken and the machine gives back response relating to text input. Deploying such system for function use is either on a mobile applications or a web based applications.

Conversations with chatbot on applications system like a mobile system means that users can only explore the system on their various mobile devices, they have to be install a compatible version to their device before use. The system has to be built differently with different methodology. On other side chat bot systems on web applications, a user will explore the system on the internet. This doesn't require type of device. Users will just visit the internet by website link and get access to the application. The system will be a web application user will be able to access it on the website link provided.

2. Related Works

Roller S (2020), did a research and titled it "Challenges in Building Intelligent Open-domain Dialog Systems," the author gave lists several key challenges that developers encounter when designing chatbots that can engage in broad, unrestricted conversations. The authors explored the complexities of these challenges, focusing on issues like understanding and responding to queries that were not clear, maintaining context over extended conversations, and ensuring factual correctness in responses. Such challenges stem from the inherent complexities of natural language understanding and the limitations of current AI technologies. For instance, understanding not clear queries requires nuanced context awareness and world knowledge that current AI systems find difficult to consistently demonstrate. Similarly, maintaining conversation context over a lengthy dialogue is challenging due to limitations in how current models handle long-term dependencies. Factual correctness is another hurdle because a model should not only understand the user's query but also have access to accurate and up-to-date information. This is especially difficult for pretrained models like GPT-3, which have a knowledge cutoff and are not updated with new information after training. The authors emphasize on addressing these issues is key to improving the conversational abilities of AI systems and making them more useful in practical, real-world applications.

Zhou L. (2020) Designed and Implemented a social chatbot called XiaoIce, also called an Empathetic Social Chatbot. It presents a detailed look at the design, development, and implementation of Microsoft's social chatbot. XiaoIce was designed to engage in social conversations and the system was predominantly unique in its capacity for generating concerned responses. XiaoIce employs an innovative multi-turn conversation generation model, and it was one of the first chatbots to demonstrate the capability to understand and respond with empathy to user interactions. Some key aspects of XiaoIce's design include:

1. **Persona:** XiaoIce has a predefined persona. It is a 17-year-old girl who is empathetic and has a sense of humor. This persona guides its behavior and responses.
2. **Social Response Generation:** XiaoIce uses various techniques to generate responses that fit the current social context and maintain the flow of the conversation. This involves sequence-to-

sequence models, attention mechanisms, and the ability to handle context spanning multiple turns of conversation.

3. **Empathetic Computing:** XiaoIce is designed to recognize users' emotional states and respond appropriately. This is an important feature that sets XiaoIce apart from many other chatbots and helps build a stronger connection with users.
4. **Dialogue Manager:** XiaoIce's dialogue manager decides when and how to initiate a topic change, how to handle user queries, and when to employ its other capabilities, such as empathy and humor.
5. **Content Creation and Curating:** XiaoIce can generate and share content like poems, stories, and songs. This is another way in which XiaoIce engages users beyond typical chatbot functionalities.

The system also shows evaluation methods in performance, its deployment and operation at scale, and lessons learned from millions of user interactions. The system had limitations of lack of understanding and dependence of data.

Adiwardana D. (2020) presents the development and evaluation of Google's Meena, an open-domain chatbot designed to exhibit human-like conversational abilities. Meena is built upon a transformer-based seq2seq model, similar to other large language models like GPT-3, but with some specific design choices and training techniques. The main objectives of Meena's development were to improve its conversational abilities, provide insightful responses, and reduce instances of non-sensical or unsafe replies. The Meena's system had features which includes:

1. **Diverse Dataset:** Meena's training data comes from a wide range of sources on the internet to provide it with a diverse set of language patterns and conversational scenarios.
2. **Training Objective:** Meena's training objective includes not only language modeling but also a new ranking loss that helps it to rank different responses based on their quality, relevance, and safety.
3. **Sensitivity Analysis:** Google conducted sensitivity analysis to understand how Meena's responses could be influenced by altering the ranking loss's parameters, aiming to balance safety and informativeness.
4. **Human Evaluation:** Meena's performance was evaluated using human evaluators who engaged in conversations with Meena, ranking its responses based on quality and appropriateness.
5. **Persona Consistency:** Efforts were made to ensure that Meena maintains consistency in its persona and doesn't exhibit inconsistencies or flip-flopping in responses.

The results of the study show that Meena performs well in terms of engaging in open-domain conversations and generating meaningful responses. However, the paper also highlights challenges that remain in building truly human-like chatbots, such as avoiding generic responses and addressing the issue of plausible-

sounding but incorrect answers. It is important to note that this research represents a step forward in developing more natural and human-like chatbot interactions, but there is still much ongoing research and progress in the field.

Zhang Y. (2020) implemented a Conversational AI. The system was a Science Behind the Alexa Prize that provided valuable insights into the development of conversational AI systems. The authors were part of the team behind Amazon's Alexa Prize, a competition that encourages the development of advanced conversational AI systems. The authors detail the challenges, strategies, and lessons learned from three years of the Alexa Prize competition. They covered various aspects of designing and implementing conversational AI systems, such as system architectures, conversational management strategies, knowledge ingestion techniques, and methods for evaluating conversational AI. The challenges of how the system are:

1. System Architecture: The systems in the competition used a collection of models, with separate components or modules designed to handle different aspects of the discussion. These might contain modules for greetings, answering inquiries, or addressing certain topics.
2. Conversational Management: The system examined the difficulty of regulating the flow of a conversation as well as the usefulness of tactics such as context management, proactive clarification, and entity resolution.

Other challenges checked were knowledge ingestion and evaluation. The system later on had limitations on handling ambiguity, transistion between topics.

Ali Jboor (2021) & Maher Salamin (2021) design and implemented a university admission and registration chatbot for the students of Tawjihi university Palestine. The aim of the system gave student of the college information about both registration guidelines. It saved effort and time for both staff and students in the process of accessing information. The authors implemented the system with use of python and machine learning. The chatbot was built on pure RASA open source conversational AI. It has an architectural model of natural language understanding and dialogue management. The system was later deployed to web application of the college website. The limitation of the system was that it was on based on textual conversations and the information the system was disseminating only covers science faculty.

Sam Altman. (2022), Greg Brockman (2022), Ilya Sutskever (2022), and Elon Musk (2022) implemented an AI-powered chatbot conversation GPT. It was developed by their OpenAI company and excels in providing relevant and meaningful dialogues across a wide range of sectors and topics. It is simple to use for a wide range of personal and professional tasks such as event organizing, email writing, and code generation. The commercial version is based on GPT-4, a Large Language Model (LLM) that has been

trained on 45 terabytes of data, making it one of the most renowned and useful LLMs. The system has beneficial features of the following

1. State-of-the-art AI models that serve as the foundation for many of the tools mentioned in this article
2. Context-aware conversationalist that remembers previous statements to inform current responses
3. The gold standard of basic chat functions with very sophisticated responses
4. It can aid in the creation and maintenance of numerous coding languages.

The system is best for serving as an excellent companion aid. This AI chatbot is useful for fleshing out ideas and doing text-based tasks. It may be used in virtually any area given proper context and prompt engineering. The system was later reported to have limitations of providing information only from the year 2022 and the premium version of the system is very expensive to developers coming from third world countries.

Topic on Artificial Neural Network Based University Chatbot System: A Promising Frontier. Authored by N. Bhartiya, N. Jangid, S. Jannu, P. Shukla, and R. Chapaneri, in 2019. The paper presented in IEEE Bombay Section Signature Conference (IBSSC) delves into the innovative domain of university chatbot systems. The article reveals the development and implementation of an artificial neural network (ANN) based chatbot tailored specifically for university environments. By leveraging the capabilities of ANN, the chatbot serves as a versatile virtual assistant, catering to the diverse needs and queries of students, faculty, and staff within the university ecosystem.

The paper states clearly the architectural framework and design principles guiding the development of the university chatbot system. Drawing on advancements in natural language processing (NLP) and machine learning (ML), the chatbot is equipped with the ability to understand and respond to user queries in a contextually relevant manner. Moreover, the authors navigate through the integration of domain-specific knowledge bases, curriculum databases, and administrative systems to enhance the chatbot's functionality and effectiveness. Through a comprehensive evaluation process and user feedback mechanisms, the efficacy of the ANN-based university chatbot system is assessed, highlighting its potential to streamline communication, facilitate access to information, and enhance the overall university experience for stakeholders. As universities increasingly embrace digital transformation initiatives to enhance operational efficiency and student engagement, the insights gleaned from this paper offer valuable guidance for leveraging chatbot technology in educational settings.

T.T. Nguyen, A.D. Le, H.T. Hoang, and T. Nguyen , 2021. Published a paper in Computers and Education telling how Artificial Intelligence introduces NEU-chatbot, a pioneering solution designed to streamline the admission process at the National Economics University (NEU). This innovative chatbot leverages cutting-edge artificial intelligence (AI) technologies to assist prospective students throughout the admission journey, offering personalized guidance, answering inquiries, and facilitating seamless interactions with the university's admission system.

The article provides a comprehensive overview of the NEU-chatbot's design, development, and implementation. Leveraging natural language processing (NLP) algorithms and machine learning (ML) techniques, the chatbot is capable of understanding and responding to a wide range of admission-related queries in real-time. Furthermore, the NEU-chatbot is seamlessly integrated with the university's existing admission infrastructure, allowing for efficient data exchange and automation of administrative tasks. Through rigorous evaluation and user feedback mechanisms, the authors demonstrate the effectiveness and usability of the NEU-chatbot in enhancing the admission experience for both prospective students and university staff. As educational institutions worldwide strive to embrace digital transformation initiatives, NEU-chatbot emerges as a model solution for leveraging AI-powered chatbots to streamline administrative processes, improve user satisfaction, and foster innovation in higher education.

A. Heryandi. 2020 presented a paper that discusses the development of a chatbot tailored for academic record monitoring within higher education institutions. Published in the IOP Conference Series: Materials Science and Engineering, the article sheds light on the innovative integration of chatbot technology to enhance academic administration and student support services. The author research explores the design and implementation of the chatbot, which serves as a virtual assistant for students, faculty, and administrative staff. Leveraging natural language processing (NLP) algorithms and machine learning techniques, the chatbot enables users to access academic records, track progress, and receive personalized guidance on course selection and graduation requirements. Through seamless integration with existing academic databases and systems, the chatbot streamlines administrative processes, reduces manual workload, and enhances the overall efficiency of academic record management.

The paper also gave highlights on the transformation on the impact of the chatbot on higher education institutions, empowering stakeholders with real-time access to critical information and insights. By automating routine tasks and providing on-demand support, the chatbot contributes to improved student outcomes, increased faculty productivity, and enhanced institutional effectiveness. As higher education institutions continue to embrace digital transformation initiatives. Heryandi's work underscores the

potential of chatbot technology to revolutionize academic administration and student services, paving the way for a more streamlined and responsive educational experience.

Kasthuri E and Balaji, S. (2023), titled their research a "Natural Language Processing and Deep Learning Chatbot Using Long Short Term Memory Algorithm". S. Isaac (2023), the study focuses on the application of the Long Short-Term Memory (LSTM) algorithm to enhance the performance of chatbots, offering insights into how deep learning can improve natural language understanding and response generation. The primary objectives of this research was to create an advanced chatbot system that can effectively understand and respond to user queries. The integration of NLP with deep learning, specifically utilizing LSTM networks, addresses the inherent challenges of maintaining conversational context and generating coherent responses over multiple exchanges.

Key Technologies adopted in the chatbot system development are

Natural Language Processing (NLP): Essential for parsing and understanding human language, NLP enables the chatbot to interpret the nuances and context of user inputs.

Deep Learning: Utilizing neural networks to model complex patterns within data, deep learning enhances the chatbot's ability to produce accurate and contextually relevant responses.

Long Short-Term Memory (LSTM) Algorithm: A specialized form of recurrent neural network (RNN), LSTM is particularly effective in managing sequential data and maintaining long-term dependencies. This makes it an ideal choice for processing conversational data where context retention is crucial.

The architecture of the chatbot system was designed to leverage the strengths of the LSTM algorithm in the phase of

Data Collection: where the system begins with the collection of a comprehensive dataset of conversational exchanges, which forms the training foundation for the LSTM model.

Data Preprocessing: This step involves tokenization, stop-word removal, and text normalization, ensuring that the data is clean and suitable for training the model.

Model Training: The preprocessed data is used to train the LSTM model, allowing it to learn the patterns and structures of human conversation.

Response Generation: Once trained, the LSTM model is employed to generate responses that are contextually appropriate and coherent with the ongoing conversation.

Practically the application on various fields of customer service, personal assistant, educational tools etc. Just as many chatbots system had challenges, this system had the challenge of handling ambiguity and the future directions of this system is to focus on integrating a context relevance, language diversity, and implementing other AI techniques.

Athota, L., Shukla, V.K., Pandey, N., and Rana, A., 2020 titled their paper "Chatbot for Healthcare System Using Artificial Intelligence,". This research gave insights in the case of an ever-evolving landscape of healthcare technology. The integration of artificial intelligence (AI) has already emerged as a transformative force, reshaping patient care and clinical workflows. The research also gave a groundbreaking study that delved into the development of a chatbot to be tailored for the healthcare domain, leveraging AI to enhance accessibility, efficiency, and effectiveness in patient-provider interactions. At the core, the research lies on a noble objective that is to harness the power of AI-driven chatbots and to revolutionize healthcare delivery. Unlike traditional communication channels, this innovative chatbot system was designed to empower patients with instant access to medical information, support healthcare providers in streamlining workflows, and ultimately, improve patient outcomes. This should be done by bridging the gap between patients and healthcare professionals, the chatbot endeavors to enhance the overall quality and accessibility of healthcare services.

The architecture of the healthcare chatbot system is meticulously crafted to optimize performance and user experience in the following processes.

Data Acquisition and Preprocessing: The system begins by aggregating and preprocessing vast repositories of medical data, encompassing information on diseases, symptoms, treatments, and more.

Model Training: ML algorithms are employed to train the chatbot's NLP models on the preprocessed data, equipping it with the knowledge and understanding necessary to address a wide range of medical queries.

Response Generation: Armed with its trained models, the chatbot stands ready to engage users in dialogue, providing personalized medical advice, symptom assessment, appointment scheduling, and other healthcare-related services.

Integration with Healthcare System: The chatbot seamlessly integrates with existing healthcare IT infrastructure, enabling interoperability with electronic health records (EHRs), telemedicine platforms, and other clinical systems. The healthcare chatbot holds immense potential to transform the patient-provider dynamic and enhance healthcare delivery in myriad ways which are: Patient Education and Engagement, Symptom Triage and Assessment, Appointment Scheduling and Reminders and a 24/7 Accessibility. In this

research an array of challenges were pinpointed which could be worked on for a further refinement. These challenges are: Data Security and Privacy, Accuracy and Reliability, User Experience and Optimization

The research by Athota et al. exemplifies the transformative potential of AI-driven chatbots in revolutionizing healthcare delivery. By leveraging the power of AI, NLP, and ML, the healthcare chatbot presented in their work heralds a new era of patient-centric care, characterized by accessibility, efficiency, and empowerment. As we embark on this transformative journey, the healthcare chatbot stands poised to reshape the healthcare landscape, driving positive outcomes for patients, providers, and healthcare systems worldwide.

T.T. Nghi, T.H. Phuc, N.T. Thang (2019). Titled “Empirical Study: Applying AI Chatbot for Teaching a Foreign Language”. The integration of artificial intelligence (AI) chatbots in education has garnered significant attention in recent years, particularly in the realm of language learning. This article presents an empirical research study focused on the application of AI chatbots for teaching a foreign language. Leveraging the capabilities of AI, the chatbot serves as a virtual language tutor, providing personalized learning experiences and interactive lessons to students. The study investigates the effectiveness of the AI chatbot in enhancing language acquisition and proficiency among learners. Through empirical analysis and student feedback, the research evaluates the chatbot's impact on language learning outcomes, user satisfaction, and engagement. The findings contribute to the growing body of literature on AI in education and shed light on the potential of chatbot technology to revolutionize language instruction. Future research directions include further refinement of the chatbot's capabilities, integration with educational curricula, and exploration of innovative teaching methodologies facilitated by AI technologies.

“Design Principles and Architecture of a Second Language Learning Chatbot” a paper work Authored by H. Kim, H. Yang, D. Shin, J.H. Lee (2022). The utilization of chatbots in second language learning has gained prominence as a promising avenue for enhancing language acquisition and proficiency. This article delves into the design principles and architecture of a second language learning chatbot, aiming to provide insights into the development process and key considerations for effective implementation. Leveraging advancements in natural language processing (NLP) and machine learning (ML), the chatbot serves as a virtual language tutor, offering personalized lessons, interactive exercises, and real-time feedback to learners. The paper elucidates the underlying principles guiding the chatbot's design, encompassing pedagogical theories, user-centered design approaches, and technological considerations. Furthermore, the architectural framework of the chatbot is delineated, highlighting the integration of NLP algorithms, educational content databases, and user interface components. Through a comprehensive analysis of design

choices and architectural components, the article offers valuable guidance for researchers and developers embarking on similar endeavors in the field of language education. Future directions include the

“Know Your Enemy: Conversational Agents for Security Education, Training, and Awareness at Scale” a research work authored by J.S. Giboney, R.M. Schuetzler, G.M. Grimes (2023). This research talks about an era of evolving cybersecurity threats, how the role of conversational agents (CAs) will emerge as a vital component in bolstering security education, training, and awareness efforts at scale. This article delves into the application of CAs in addressing cybersecurity challenges, providing insights into their design, implementation, and effectiveness. Leveraging advancements in artificial intelligence (AI) and natural language processing (NLP), CAs serve as interactive platforms for delivering security-related content, conducting simulated exercises, and fostering a culture of security awareness among users. The paper elucidates the multifaceted role of CAs in enhancing security education, encompassing threat intelligence dissemination, incident response training, and policy enforcement. Furthermore, the scalability and accessibility of CAs enable organizations to reach a broad audience, irrespective of geographical location or organizational hierarchy. Through a comprehensive analysis of use cases and best practices, the article offers valuable guidance for security practitioners and educators seeking to harness the potential of CAs in addressing cybersecurity challenges. Future directions include the integration of advanced AI techniques, such as reinforcement learning, to enhance the adaptability and responsiveness of CAs in dynamic threat environments.

"SecBot: a “Business-Driven Conversational Agent for Cybersecurity Planning and Management,” presented in the 2020 16th International Conference on Network and Service Management (CNSM) by Franco, M.F., Rodrigues, B., Scheid, E.J., Jacobs, A., Killer, C., Granville, L.Z., and Stiller, B., introduces an innovative approach to cybersecurity planning and management. The paper elucidates the development and implementation of SecBot, a conversational agent designed to cater to the unique needs of businesses in navigating the complex landscape of cybersecurity. Leveraging advanced natural language processing (NLP) and machine learning (ML) techniques, SecBot serves as a virtual cybersecurity advisor, assisting organizations in risk assessment, policy formulation, incident response, and compliance management. By integrating business-driven insights and cybersecurity expertise, SecBot empowers organizations to make informed decisions, prioritize resources effectively, and mitigate security risks proactively.

The SecBot framework represents a significant advancement in cybersecurity planning and management, offering a tailored solution that aligns with the strategic objectives and operational requirements of modern businesses. Through its intuitive conversational interface and AI-driven capabilities, SecBot bridges the gap between technical cybersecurity expertise and business decision-making, facilitating a holistic

approach to cybersecurity governance. As organizations grapple with the evolving threat landscape and regulatory compliance mandates, SecBot emerges as a valuable ally in safeguarding digital assets, preserving business continuity, and fostering a culture of cybersecurity awareness and resilience.

In "Conversational AI: Dialogue Systems, Conversational Agents, and Chatbots" authored by McTear and published by Springer Nature in 2022, a comprehensive exploration of conversational AI unfolds. The book serves as a definitive guide to understanding the intricacies of dialogue systems, conversational agents, and chatbots, elucidating their evolution, underlying technologies, and practical applications. McTear delves into the theoretical foundations of conversational AI, spanning linguistic principles, cognitive models, and computational methodologies, providing readers with a holistic understanding of the field's interdisciplinary nature. Moreover, the book navigates through real-world use cases and case studies, offering insights into the diverse applications of conversational AI across industries such as healthcare, finance, customer service, and education. By elucidating the principles and practices underpinning conversational AI, McTear equips readers with the knowledge and tools necessary to design, develop, and deploy effective dialogue systems and chatbots. As conversational AI continues to reshape human-computer interaction and redefine the boundaries of automation, McTear's work emerges as an indispensable resource for researchers, practitioners, and enthusiasts seeking to navigate the rapidly evolving landscape of conversational technology.

T.P. Nagarhalli, V. Vaze, and N.K. Rana 2020 Titled their research "Exploring Current Trends in Chatbot System Development: A Comprehensive Review" In their paper presented at the 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS), Nagarhalli, Vaze, and Rana delve into a comprehensive review of current trends in the development of chatbot systems. The research work navigates through the evolving landscape of chatbot technology, shedding light on recent advancements, emerging methodologies, and innovative applications. By synthesizing insights from academic research, industry practices, and technological advancements. The author research covers a wide range of topics, including natural language processing (NLP) techniques, machine learning algorithms, dialogue management strategies, and user interface design principles. Moreover, the paper explores diverse use cases spanning various domains such as customer service, healthcare, education, and e-commerce. Through a critical analysis of existing literature and case studies, Nagarhalli et al. identify key challenges, opportunities, and future directions in chatbot system development. As organizations increasingly leverage chatbots to enhance customer engagement, streamline business operations, and deliver personalized experiences, the insights gleaned from this review serve as a valuable resource for researchers, developers, and practitioners seeking to navigate the dynamic landscape of chatbot technology.

In the dynamic landscape of digital interactions, chatbots have emerged as indispensable tools for businesses seeking to engage with customers in a personalized and efficient manner. A groundbreaking study titled "In Bot We Trust: A New Methodology of Chatbot Performance Measures," authored by Przegalinska, A., Ciechanowski, L., Stroz, A., Gloor, P., and Mazurek, G., and published in *Business Horizons* in 2019, introduces a pioneering methodology for evaluating the performance of chatbots. This research not only sheds light on the key metrics for assessing chatbot effectiveness but also underscores the pivotal role of trust in shaping user interactions with these intelligent agents.

At its core, the research endeavors to redefine the approach to measuring chatbot performance by introducing a comprehensive methodology that goes beyond conventional metrics. Recognizing the significance of trust in fostering user acceptance and satisfaction, the study seeks to elucidate the interplay between technical proficiency and user confidence in shaping the overall effectiveness of chatbots. By pioneering a holistic framework for assessing chatbot performance, the research aims to provide businesses with actionable insights to enhance customer engagement and drive business growth.

With a methodological Innovations, the research unfolds a wealth of insights aimed at redefining the paradigm of chatbot performance assessment of the concepts of

Trust-Centric Approach: Departing from traditional performance measures focused solely on technical capabilities, the study introduces a trust-centric framework that considers user perceptions and attitudes towards chatbots.

Multidimensional Metrics: Beyond technical proficiency, the methodology encompasses multidimensional metrics such as transparency, reliability, empathy, and ethicality, which collectively contribute to building user trust in chatbot interactions.

Qualitative and Quantitative Analysis: Employing a mixed-methods approach, the research combines qualitative analysis of user perceptions with quantitative assessment of chatbot performance metrics, providing a comprehensive understanding of user experiences.

The framework for evaluating chatbot performance is meticulously designed to capture the nuances of user trust and satisfaction of a Technical Proficiency Assessment, Trust Perception Analysis and an Integration of Quantitative and Qualitative Data. In relating how a system advantage is used to rate a system, so as the challenges are listed. Enhanceing User Experience, Improving the Customer Retention and Loyalty, Strategizing Decision-Making. This research stands asa pivotal contribution to the field of chatbot performance assessment, transcending traditional metrics to prioritize user trust and satisfaction. By pioneering a novel methodology that integrates technical proficiency with user perceptions, the study

illuminates the complex dynamics of chatbot interactions and underscores the centrality of trust in shaping user experiences. As businesses navigate the digital frontier, the insights gleaned from this research serve as a guiding beacon, empowering organizations to build chatbots that inspire confidence, foster engagement, and drive value for users and businesses alike.

Kai Denecke, Anas Abd-Alrazaq, Muhamad Househ, Jonathan Warren (2021). A research titled “Evaluation Metrics for Health Chatbots: A Delphi Study”. This research enlightens on the creation of chatbots in healthcare settings that has highlighted the need for standardized evaluation metrics to assess their performance effectively. In this study, the present findings from a Delphi study aimed at identifying and establishing evaluation metrics specifically tailored for health chatbots. Engaging experts in multiple iterative rounds, soliciting inputs and feedbacks to distill a comprehensive set of metrics essential for evaluating health chatbot performance. This research addresses a critical gap in the healthcare domain, where factors such as accuracy, reliability, and user trust are paramount. By leveraging the expertise of participants and employing a systematic consensus-building approach, the aim was to provide healthcare practitioners and developers with a standardized framework for evaluating health chatbot effectiveness. The identified metrics encompass various dimensions, including clinical accuracy, user satisfaction, usability, privacy, and security. This study contributes to advancing the field of health informatics by offering guidance on assessing and enhancing the performance of chatbots in healthcare settings, ultimately facilitating improved patient care and engagement.

Sneha Pingale, Priyanka Kulkarni, Rohan Ambekar, Varsha Babanne (2020) titled their research “Enhancing E-commerce Experience: Implementation of an E-Negotiator Chatbot”. The research talks on the ever-evolving landscape of e-commerce, and how the integration of chatbots has emerged as a pivotal strategy for enhancing customer engagement and streamlining online transactions. This paper presents the implementation of an E-Negotiator chatbot tailored specifically for e-commerce websites. Leveraging natural language processing (NLP) and machine learning (ML) algorithms, the E-Negotiator chatbot facilitates real-time negotiations between buyers and sellers, offering personalized assistance and optimizing the purchasing process. The study outlines the development process of the E-Negotiator chatbot, encompassing data acquisition, preprocessing, model training, and integration with e-commerce platforms. Through a user-centric design approach and iterative refinement, the chatbot is tailored to meet the diverse needs and preferences of online shoppers. The implementation of the E-Negotiator chatbot holds promise for enhancing customer satisfaction, increasing sales conversions, and fostering a dynamic and interactive e-commerce experience. Future research directions include expanding the chatbot's capabilities, integrating with additional e-commerce platforms, and further enhancing its conversational abilities to better serve the evolving needs of online consumers.

A research titled “Revolutionizing E-commerce: Implementing a Chatbot for Price Negotiation Using Natural Language Processing” authored by M.S.S.N. Shankar, G.D.K. Kishore, N.L.N.C. Anudeep, R. Bhavya, R.S. Sankar. The dynamic landscape of e-commerce has led to the integration of chatbots that emerges as a transformative strategy for enhancing customer engagement and optimizing purchasing processes. This article presents the development and implementation of an e-commerce chatbot specifically designed for price negotiation, leveraging the capabilities of Natural Language Processing (NLP). The chatbot facilitates real-time negotiations between buyers and sellers, providing personalized assistance and streamlining the negotiation process. The paper outlines the comprehensive development process, including data acquisition, preprocessing, model training, and integration with e-commerce platforms. Through a user-centric design approach and iterative refinement, the chatbot is tailored to meet the diverse needs and preferences of online shoppers. The implementation of the e-commerce chatbot for price negotiation holds promise for enhancing customer satisfaction, increasing sales conversions, and fostering dynamic interactions between buyers and sellers. Future research directions include expanding the chatbot's functionalities, integrating with additional e-commerce platforms, and further enhancing its NLP capabilities to better serve the evolving needs of online consumers.

The 2022 study by Agarwal, Linh, and Aponte, presented in the book "Recent Advances in Internet of Things and Machine Learning: Real-World Applications," explores the perceptions of students regarding the use of chatbots for counseling in higher education. The research delves into the potential of chatbot technology to provide immediate, accessible, and effective support to students facing academic and personal challenges. By leveraging advancements in machine learning and natural language processing, these chatbots are designed to offer personalized counseling sessions, thereby enhancing the overall student experience. The study highlights the growing trend of integrating artificial intelligence into educational settings, aiming to supplement traditional counseling methods and address the increasing demand for mental health services in universities. The findings of the study indicate a generally positive reception from students towards the use of chatbots for counseling purposes. Students appreciated the convenience, anonymity, and round-the-clock availability of chatbot-based counseling, which often alleviates the stigma associated with seeking help. However, the research also notes certain limitations, such as the lack of human empathy and the potential for miscommunication. Despite these challenges, the authors conclude that with continuous improvement and proper integration, chatbots hold significant promise as a supportive tool in the mental health and counseling landscape of higher education. The study underscores the importance of ongoing research and development to optimize chatbot functionalities and ensure they effectively complement the human elements of counseling services.

The 2021 study by Barnett, A., Savic, M., Pienaar, K., Carter, A., Warren, N., Sandral, E., Manning, V., & Lubman, D. I. (2021)., published in the **International Journal of Drug Policy**, investigates the perspectives of clients and counselors on the integration of chatbots in alcohol and other drug (AOD) counseling. The literature on this topic highlights the growing interest in leveraging artificial intelligence to augment traditional therapeutic practices. Barnett and colleagues' research is positioned within this context, emphasizing the "more-than-human" care paradigm, which explores the multifaceted roles that chatbots can play in therapeutic settings. The study illuminates the potential of chatbots to provide consistent, accessible, and non-judgmental support, which is crucial in AOD counseling where stigma and accessibility are significant barriers to treatment. The findings from Barnett et al.'s study contribute to a broader understanding of the affordances and limitations of chatbot integration in counseling services. Both clients and counselors acknowledged the value of chatbots in offering immediate responses and reducing the burden on human counselors, thus allowing for more efficient allocation of resources. However, the literature also points out concerns regarding the lack of emotional nuance and empathy in chatbot interactions, which are critical components of effective counseling. Despite these concerns, the study suggests that with appropriate design and continuous improvement, chatbots can enhance the therapeutic landscape by complementing human counselors and providing an additional layer of support. This aligns with the broader discourse in the literature, advocating for a hybrid approach that combines the strengths of both human and artificial intelligence in therapeutic contexts.

Nosrati, S., Sabzali, M., Heidari, A., Sarfi, T., & Sabbar, S. (2020) study, published in the *Journal of Cyberspace Studies*, which provides a critical examination of the use of chatbots in counseling and the broader implications for digital life. The study situates itself within the expanding body of literature exploring the integration of artificial intelligence in mental health services, focusing specifically on the discontents and challenges posed by this digital transition. The authors investigate the effectiveness of chatbots in providing psychological support and the potential downsides, such as the depersonalization of care and the ethical considerations around data privacy and security. Their findings reveal a nuanced picture where, while chatbots offer accessibility and convenience, they also risk reducing the depth and empathy inherent in human-to-human interactions.

Further, Nosrati. discuss the sociocultural impacts of chatbot counseling, emphasizing how digital life shapes user experiences and expectations. The literature reviewed in this study highlights mixed reactions from both counselors and clients, with some appreciating the immediacy and non-judgmental nature of chatbots, and others expressing concerns over the lack of genuine emotional support and the potential for miscommunication. The authors argue for a balanced approach that acknowledges the benefits of chatbot technology while critically addressing its limitations. They call for more rigorous research to develop best

practices and guidelines for the ethical and effective use of chatbots in counseling, ensuring that these digital tools enhance rather than detract from the quality of mental health care.

3. Methodology

Customers who want to use FedEx services will have the option to ask whatever queries they want via the system. Upon accessing the official website through a web browser, consumers will notice buttons in the navigation bar leading to accounts, shipping, tracking, support, and a chatbot. Users view information about the chatbot system when they click on the chatbot link, which opens a new page. On this page, there is a chatbot button that, when pressed, launches an online chat window. The user is then granted unrestricted access to ask any queries he chooses in this window.

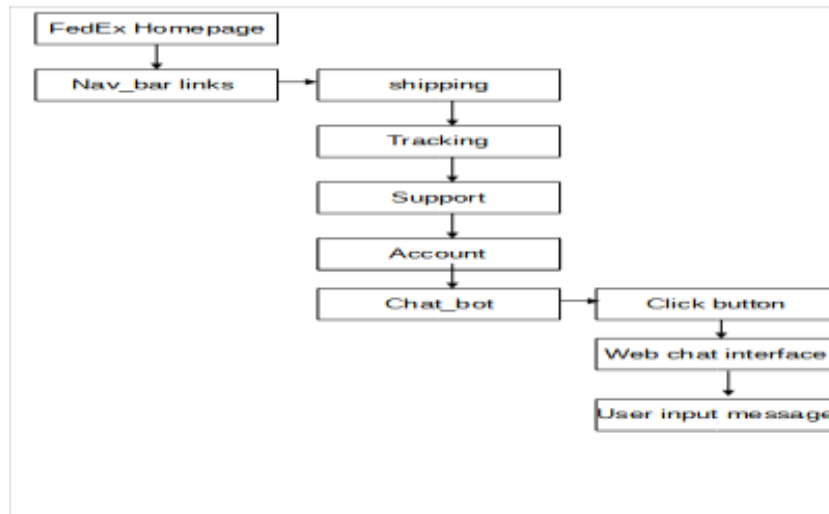


Figure 1 detailed description of the purposed system of the proposed system

3.1 RASA Architecture

Rasa is an open-source framework for building conversational AI chatbots and virtual assistants. Its architecture is designed to facilitate the development of natural language understanding (NLU) and dialogue management systems. Rasa has a flexible and modular architecture that consists of several key components. Here's an in-depth explanation of Rasa's architecture:

1. NLU Pipeline: Rasa's NLU pipeline is responsible for processing user input and extracting structured information from it. It typically includes the following component:

- Tokenizer: Breaks down the user input text into individual tokens (words).

- Featurizer: Converts tokens into numerical feature vectors that machine learning models can work with.
 - Intent Classifier: Determines the user's intent, which represents the user's goal or request.
 - Entity Extractor: Identifies entities (e.g., dates, locations, product names) within the user input.
2. NLU Model: This component uses machine learning techniques to train models for intent classification and entity recognition. These models learn from labeled training data and are used to make predictions during runtime.
 3. Dialogue Policies: The dialogue management component manages the conversation flow and decides how the chatbot should respond to user inputs. It consists of two main parts:
 - Policy: Policies determine the chatbot's actions based on the dialogue context. Rasa uses reinforcement learning techniques to learn policies that maximize user satisfaction over time. Policies can be rule-based or machine learning-based.
 - Tracker Store: The tracker store maintains conversation history and current state information for a given user. It tracks user messages, bot responses, slots (user-specific variables), and events in the conversation.
 4. Action Server: The action server is responsible for executing actions based on the decisions made by the dialogue management component. Actions can include sending messages, making API calls, or performing custom business logic. The action server allows Rasa to interface with external systems and services.
 5. Domain: The domain defines the structure of the conversation. It includes information about intents, entities, slots, actions, and responses. The domain is used to configure the chatbot's behavior and specify how it should respond to different user inputs.
 6. Custom Actions: Developers can define custom actions that allow the chatbot to perform actions specific to their application, such as making database queries, sending emails, or interacting with external APIs.
 7. Connectors: Rasa can be integrated with various messaging platforms like Slack, Facebook Messenger, or custom web chat interfaces using connectors. Connectors handle the communication between the chatbot and the messaging platform.

8. Training Data: Rasa requires labeled training data for both NLU and dialogue management. Developers provide example conversations, intents, entities, and responses to train the NLU model and dialogue policies.
9. Data Storage: Rasa stores user messages and conversation history in a tracker store. Depending on the configuration, it can use various storage options such as an in-memory store, a database, or a combination of both.
10. Core and NLU Servers: Rasa can be run as two separate servers, the Core server for dialogue management and the NLU server for natural language understanding. This separation allows for scalability and modularity.

In summary, Rasa's architecture is modular and flexible, allowing developers to customize and extend its components to build sophisticated chatbots and virtual assistants. It combines natural language understanding, dialogue management, and external actions to create conversational AI systems capable of handling complex conversations with users.

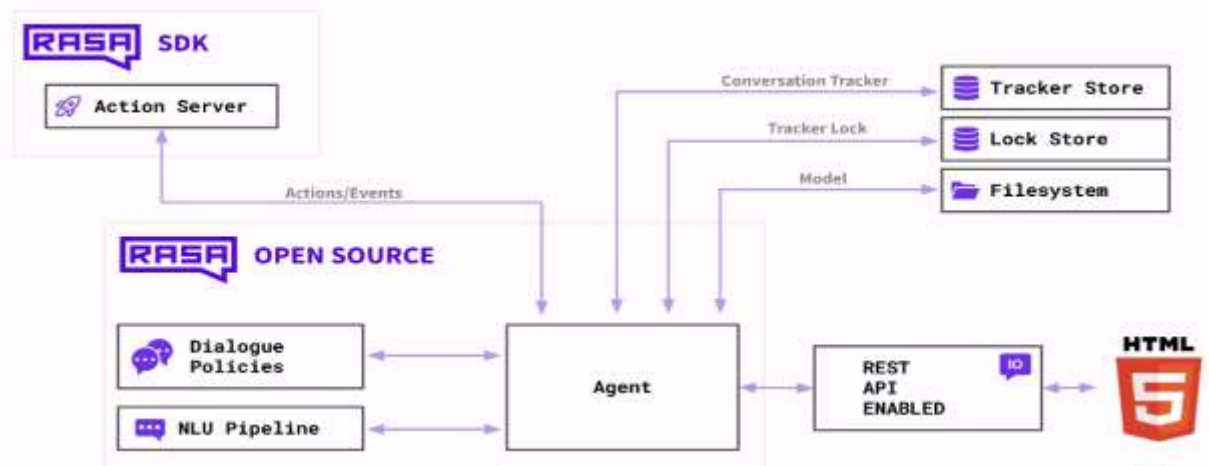


Figure 2 RASA Architecture

3.2 Use Case Diagram

In this system the UML diagram show the functionality of the system. To represent this the use of UML use case. This diagram describes the behavioral view of design. It consists of actors (customer, admin), actions (activities) and flows (arrows) that shows the actual functionalities of the system. This diagram is given below:

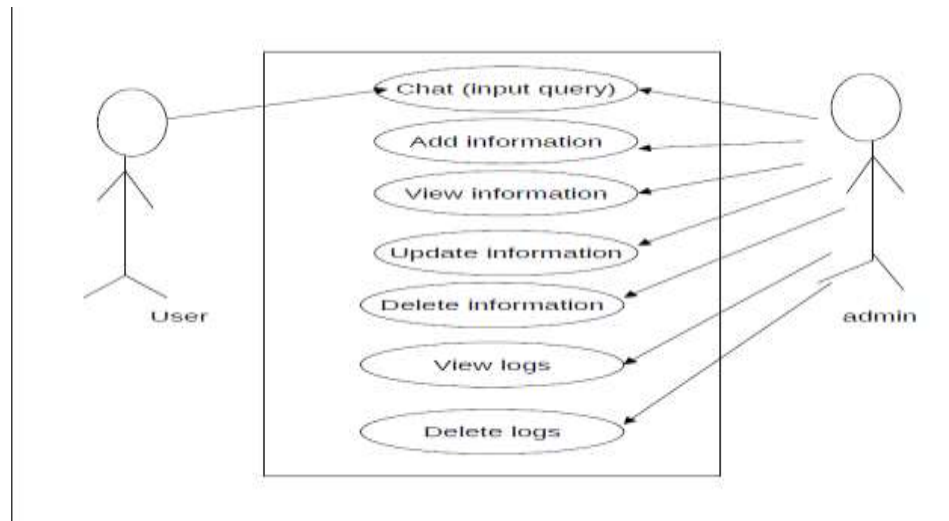


Figure 3 Use Case Diagram of the Purposed System

3.3 Data Flow Diagram (DFD)

This architectural view of design illustrate how data will be processed by the system in the terms of input and output. It focuses on flow of information, where data comes and where it goes and how it will be stored. The flow is represented in Level0 and level1.

1. LEVEL 0

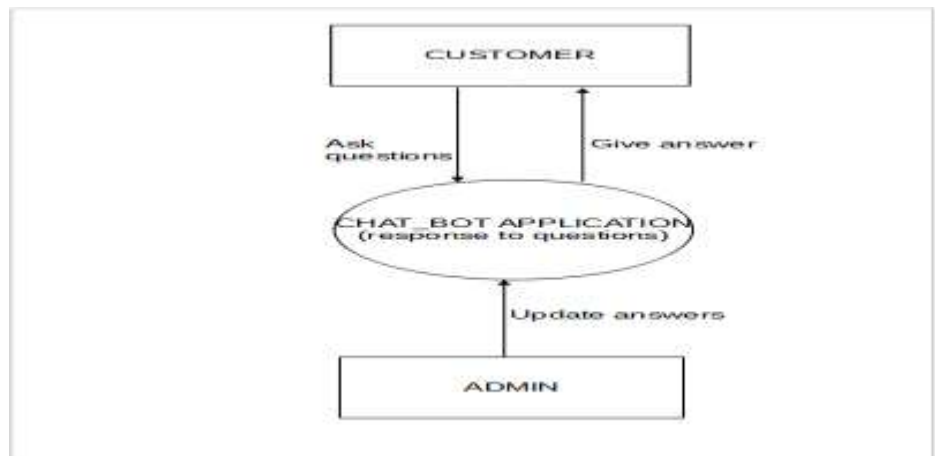


Figure 4 Level0 Data Flow Diagram of the purposed system

2. LEVEL 1

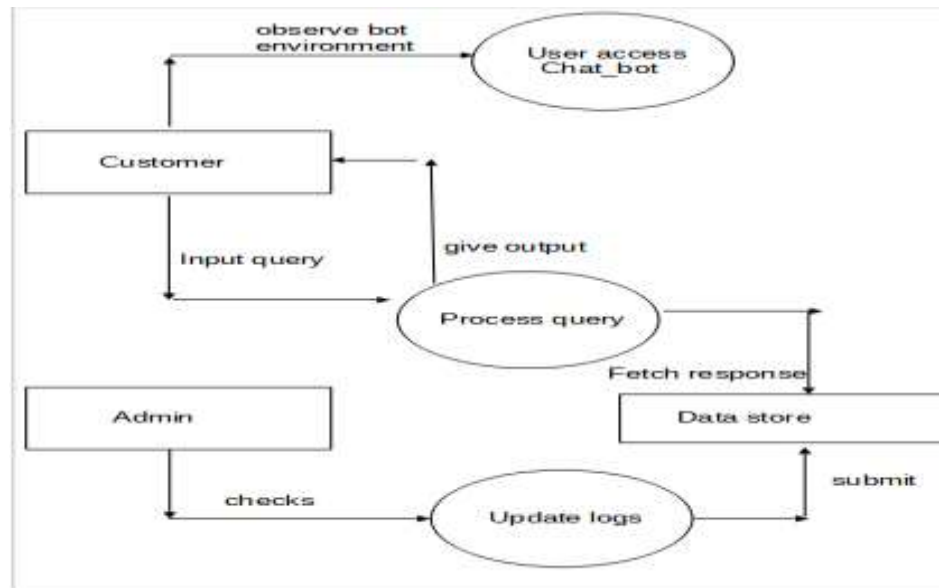


Figure 5 Level1 of Data Flow Diagram of the proposed system

3.4 Entity-Relationship Diagram

An Entity-Relationship Diagram (ERD) is a visual representation used in database design to illustrate the structure and relationships between entities in a database system. This database design for the project consist of two main components:

1. Entities: These represent real-world objects or concepts, in this project only one entity is defined which is **Events**
2. Attributes: Attributes describe the properties or characteristics of entities. They are shown as ovals connected to their respective entities. In this project an events entity may have attributes like ID, Sender_id, type_name, timestamp, intent_name, action_name and data TEXT. This database, keep tracks of user activities of how they relate with the bots. Below is the E-R diagram defined by My SQL.

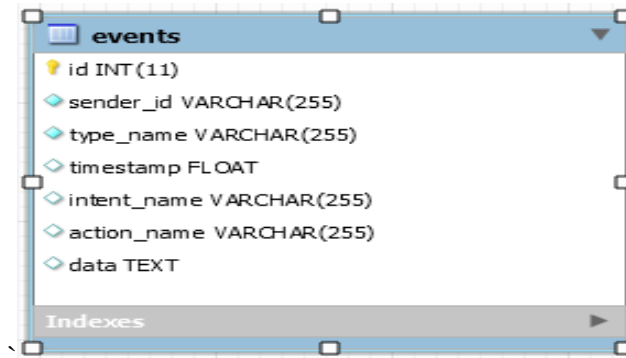


Figure 6 E-R diagram of the tracker store for FedEx bot

4. Results and discussion

Results could be presented in descriptive, tabular or graphical form. Information presented in tables should not be repeated as figures. Discussion should be focused on the interpretation of experimental findings.

All Tables must be lucid and centralized as depicted below. The source of the table must be stated in parenthesis.

Table 1. Classifiers’ performance on the Airline dataset (Source: Bajeh et al., 2018)

Classifier		Precision	Recall	F-Measure	Accuracy
KNN	-1	0.65	1.0	0.79	0.662
	0	0.80	0.12	0.21	
	1	0.92	0.10	0.18	
RASA	-1	0.78	0.92	0.84	0.745
	0	0.63	0.36	0.46	
	1	0.68	0.57	0.62	
SVM	-1	0.83	0.91	0.87	0.623
	0	0.64	0.55	0.59	
	1	0.76	0.63	0.69	

Table 2. Classifiers’ performance on the Deflategate dataset

Classifier		Precision	Recall	F-Measure	Accuracy
KNN	-1	0.54	0.96	0.69	0.567
	0	0.80	0.17	0.27	
	1	0.82	0.19	0.31	
RASA	-1	0.62	0.76	0.68	0.603
	0	0.62	0.40	0.48	
	1	0.56	0.51	0.53	
SVM	-1	0.66	0.76	0.70	0.49
	0	0.63	0.49	0.55	
	1	0.58	0.55	0.56	

5 Conclusion

The objectives of this project was to improve an existing system, the use of machine learning frame work was considered. The system was deployed to a web interface and the use of a web chat library built with java script. This web interface will only be accessible by users. Users who wish to use FedEx services can get access over the internet with an internet connection with various device. A database is created and only to be accessible by the administrator. After developing users gave feedback and a lot of reviews were made. Such reviews were implemented and this led to the successful development of improving the existing system.

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