A Chat-Based Ordering and Analytics Application using NLP: A Survey

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Abstract:

Chatbot-based ordering on an e-commerce application opens a new way to shop online, where customers can engage with chatbot using natural language for initiating orders, tracking deliveries and accessing analytical insights. This paper study the existing systems used for conversational commerce and e-commerce chatbots. We identify various findings within current systems that have scope of improvement. The goal is to study the existing chatbots described in various research paper highlight limitations that can be overcome in upcoming development. This can improve the process of order placement, delivery tracking, secure payments, and analytics using chatbot. This paper also provides an account for some of the research opportunities in the domain of conversational AI.

Keywords: Conversational ecommerce, E-commerce chatbots, Natural Language Processing (NLP), Messaging applications, chatbot.

1. Introduction:

In the constantly changing world of online shopping, when discussing the fascinating world of cutting-edge technology, there's no avoiding the exciting topics of Natural Language Processing (NLP) and Artificial Intelligence (AI) has grown significantly. E-

commerce companies are always looking for new ways to improve how customers interact with their websites, make their operations more efficient, and offer personalized services. A notable development in this field is the use of NLP and Large Language Models (LLMs) to create chatbots that allow natural language conversations for a range of e-commerce functions [5]. These chatbots function as smart virtual assistants, capable of having natural conversations with customers and handling important e-commerce tasks effectively. This integration has significant potential to transform how online businesses engage with their customers, offering easy order placement, effective delivery tracking, secure payment processing, and data analytics for better decision-making. In this research, we examine different system architectures and methods for creating chatbots. Our analysis uncovers some findings, offering opportunities for future research and enhancement. The current conversational agents in e-commerce excel at addressing human inquiries but fall short in offering essential features such as a product catalogue, personalized recommendations, efficient product searches, user reviews, product sorting and filtering, wish list, shopping carts, transaction history, order tracking, and secure credit card payment options[4]. Hence, the importance of this study lies in its potential to bring about significant changes. By implementing these functions [3], online retailers can enhance customer interactions, streamline their operations, and acquire valuable insights into customer behaviour. This paper aims to establish a strong foundation for such exploration.

2. Literature Survey:

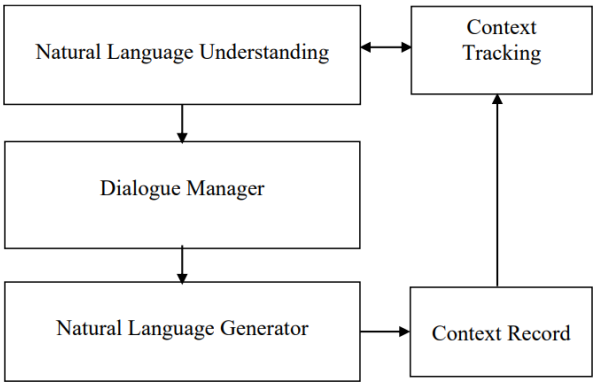

Fig. 1. Architecture of Chatbot

Chatbot System Architecture [1] , this paper explores the architecture of a chatbot(also known as a conversational agent) system [1]. The system's design emphasizes three key components: Natural Language Understanding (NLU) is responsible for interpreting user utterances and converting them into a format that can be understood by the DM. The Dialog Manager (DM), acting as the intermediary, takes the formatted input from NLU and processes it, generating responses for the NLG. The and Natural Language Generator (NLG), as the final core component of the conversational agent, considers the responses from the DM and selects the most relevant one based on priority. Overall, this architecture results in a highly functional chatbot system.

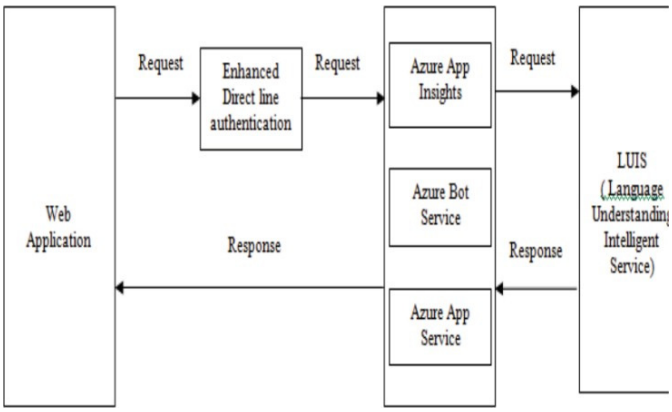

Fig. 2. Azure Webapp Chatbot Architecture

An Intelligent Web App Chatbot [2], this paper explore the execution of a chatbot on LUIS, also known as Language Understanding Intelligent Service. With a focus on delivering the best user experience, LUIS efficiently detects the intents and entities within a user's response, thanks to its high precision score. Our web app chatbot, which boasts impressive accuracy and performance, is discussed in detail. LUIS, a cognitive service powered by Azure, is our go-to for handling user queries. As a semantic machine learning API, it assists in training chatbots and conversational agents by providing key elements such as intents, entities, and utterances. This equips our chatbot with the ability to accurately predict user intentions, allowing for seamless interactions.

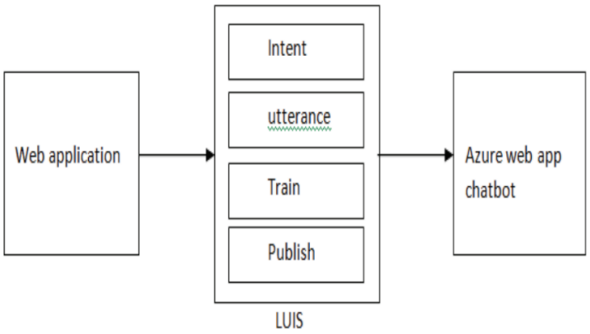

Fig. 3. Automation For Luis Training

When crafting LUIS applications, it's crucial to incorporate a variety of elements such as intents, entities, and utterances. These components play a crucial role in classifying and organizing user conversations. Intents define the desired action, while entities serve as the corresponding response for each intent. Utterances encompass all user queries that fall under each classified intent. LUIS comes equipped with essential pre-built intents, entities, and utterances. The efficiency of this chatbot is outstanding, boasting a 99% accuracy rate with response times in mere seconds. Its prediction scores also range between a remarkable 85% to 99%.

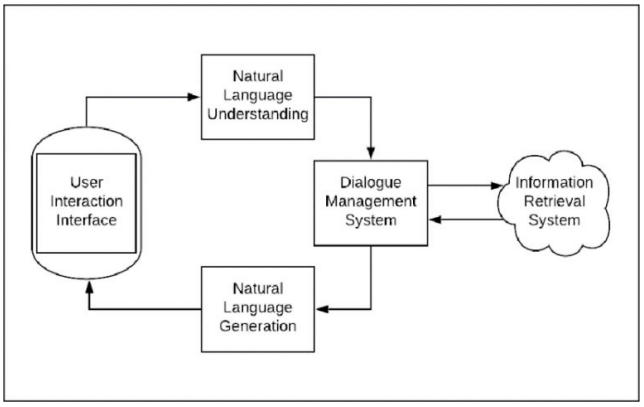

Fig. 4. Chatbot Architecture

Conversational AI [3], this study paper study was conducted to This paper aims to showcase the cutting-edge advancements in Conversational AI architecture research, along with highlighting the significant improvements and progress made in this field over time. In addition, this paper establishes opportunities for further research in the ever-evolving field of Conversational AI, paving the way for future innovation and

advancements. It discuss the crucial part of architecture like Word2Vec, Conditional Random Fields (CRFs). LSTM models and Sequence-To- Sequence (Seq2Seq) models are frequently used for classifying dialogue intents, showcasing their effectiveness for the task at hand. In addition to examining current advancements in Conversational AI Agents, this paper delves into the fundamental building blocks of these technologies. Through assessing the precision of various models and their corresponding methodologies, we have identified key strategies for each component that yield significant outcomes.

Designing Interaction for Chatbot-Based Conversational Commerce with User-Centered Design [4], this paper examines different e-commerce platforms that use chatbots for shopping. Author conducted a preliminary survey with several users, and they told us that the way chatbot-based conversational commerce apps work is not user friendly. Users found the menu options confusing and the product display design poor. To address these user issues and the advantages and disadvantages of the current conversational commerce chatbots, goal of the paper was to create an interaction and interface design that focuses on what users want. The paper focuses on using a user-centric design approach to make the program, more user-friendly, aligning with their goals and preferences.

The proposed design, based upon user feedback, has received positive ratings. All users found the prototype effective, efficient, easily understandable, joyful, and helping. Additionally, 83.30% of users considered it safe to use.

Privately Fine-Tuning Large Language Models with Differential Privacy [5], this paper presents EW-Tune, a technique designed to enhance large language models (LLMs) while safeguarding user data privacy. It reduces errors in LLMs by up to 5.6% and improves their overall performance by up to 1.1%. LLMs are sophisticated computer programs with countless rules, often used by major companies like OpenAI and Facebook, which train them using extensive data fromthe internet, such as Wikipedia, news, and social media sources. EW-Tune allows third parties to make LLMs more intelligent using their own private data, makingit useful for applications like chatbots that can generate text based on personalized information.

AI-Based Conversational Agents: A Scoping Review From Technologies to Future Directions [6], this paper gives a broad look at conversational agents, which are computer programs that can chat with people. It talks about various methods, like using patterns, deep learning, and machine learning to enable these bots to function. It also goes over the many roles that these agents can play. The study focuses on how these entities can behave human- like by displaying feelings and emotions during dialogue. People have used various techniques in different parts of these agents, from simple rules to more advanced machine learning, and now they're exploring deep learning methods.

Design and Development of Conversational Chatbot for Covid-19 using NLP: an AI application [7], this study presents an artificial intelligence (AI) chatbot that serves multiple purposes. First, it's designed to evaluate, identify, and counsel patients who have been infected by COVID-19 a virus related to COVID-19 on safety and preventive actions. Furthermore, it serves as a virtual assistant to analyse symptoms and determine the infection's severity. If more serious care is required, it can link with approved medical facilities. Looking ahead, It is intended for upcoming AI virtual assistants in the health field to go beyond just responding to user queries. They aim to use innovative technologies to help users schedule appointments, ensure they take their medications as prescribed, and provide general health advice. These applications can be accessed through a website or popular messaging platforms like WhatsApp and Facebook. All the components work together in a systematic way to ensure the whole process runs smoothly.

3. Findings and Discussions:

With reference to above literature survey we analyze numerous conversational agents and system architecture used for developing e-commerce chatbot. Based on the challenges and problem encountered by consumers using conversational commerce to shop online, as well as analyzing the benefits and drawbacks of the current chatbot-based conversational commerce, below are the findings we identified after this investigation.

In our study, we found that menu exploration is a critical component of the user experience in e-commerce platforms. Users often spend a significant amount of time browsing through menus to discover products or services. The order placement process is a pivotal point in the user journey. Our research uncovered that a streamlined and user-friendly order placement system results in higher conversion rates.

Personalized product or service recommendations play a significant role in enhancing the user experience. Our findings indicate that users are more likely to make additional purchases when they receive tailored recommendations. Access to a comprehensive transaction history is valued by users for several reasons. It not only helps in tracking past purchases but also build trust in the platform.

In our research, we observed that users appreciated easy access to their transaction history, and it positively influenced their decision to continue using the platform. Order tracking is crucial for the post-order experience. Our study indicated that users consider real-time order tracking to be a valuable feature, as it provides transparency and reduces anxiety about their purchases. Analytics tools enable businesses to gain insights into user behavior, preferences, and patterns. Our research shows that businesses that utilize analytics data effectively can make data-driven decisions and improve their offerings.

4. Conclusion:

This survey has provided a comprehensive overview of existing chatbot systems from various research papers. We have examined various methodologies, systems, and highlighted some of the limitations in the existing literature. The findings has created a scope of improvement in the field of conversational ecommerce. Our survey has identified several limitations, such as lack of personalized recommendations, limited context awareness, difficulty in handling ambiguity, limited vocabulary, complex menu exploration and no support for insights. Additionally, the diverse methodologies employed in the reviewed literature have improved our understanding of chat based ordering from various perspectives. These gaps present opportunities for future

research in the field of conversational ecommerce, contributing to the ongoing advancement in this domain. These findings collectively emphasize the importance of optimizing these aspects to create a more enjoyable and trustworthy e-commerce environment, ultimately resulting in heightened user engagement, higher user satisfaction and success in the competitive e-commerce industry.

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