

ENHANCEMENT OF USER EXPERIENCE ON E-COMMERCE ASSISTANCE BY USING CHATBOT BASED ON RASA

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Abstract

Whenever a customer using an E-Commerce sites like Amazon,Flipkart etc, the customer may face some challenges in navigating product options, making purchases, or seeking assistance. It takes time for the customer support to resolve the customer issues since billions of people are using those platforms and reporting the issues regularly.

So this makes some congestion on the customer support side, so that they could not react so quickly. One more issue is buying the products by searching from different platforms. This may also takes too much time. In this project adding a chatbot to the platform which can understand the human language and give the response based questions and helps in product filtration.

This chatbots will be useful for filtering the products from whatever the e-commerce sites it has been incorporated it with (here the own site developed, which runs in local server as other e-commerce api procurement is taking much time than expected) and also replying to some of the issues before they got to the customer call center. So these chatbots have emerged as a promising solution to address these issues.

INTRODUCTION

CONVERSATIONAL AI

Conversational AI is a set of technologies that work together to automate human-like communications-via both speech and text-between a person and machines. It combines Artificial Intelligence, Natural Language Processing, Machine Learning to understand, interpret and respond to user inputs in a way that simulates human conversation.

Aiming to connect humans and computers, it comprises a bunch of cutting-edge technologies to construct synthetic brainpower that further makes machines or chatbots capable of understanding, reading, & responding to the human language. And we call it conversational AI in technical terms.

You can find the essence of conversational AI in IVR systems, messaging platforms, voice-based communication channels, Chabot, mobile apps, & many other channels. When employees usually spend 16% of their time in in-house communication & collaboration, conversational AI can reduce the time spent on such activities with automated & immediate referrals to customers' issues, according to Bloomfire.

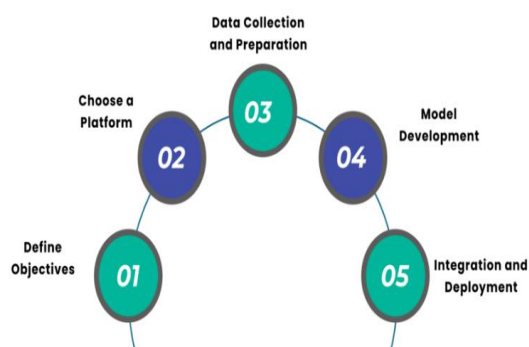


Fig:1 Steps in Conversational AI

These days, online shopping becomes a major part in everyone's life. A RASA-based chatbot tailored for e-commerce assistance offers a dynamic solution to enhance customer engagement and streamline shopping experiences. The bot can handle complex conversational flows, such as handling multiple product attributes or resolving customer queries about shipping and returns policies, ensuring a seamless and efficient shopping experience. By leveraging machine learning, the chatbot can continuously learn from user interactions, improving its ability to understand and respond to user queries over time.

A RASA-based chatbot designed for product filtration in e-commerce offers a dynamic solution to streamline the product discovery process and enhance user experience. Leveraging RASA's advanced natural language processing capabilities, the chatbot can accurately interpret user preferences and refine product searches based on various criteria such as price range, brand, size, color, and other attributes. Through intuitive conversational interactions, users can simply express their preferences, and the chatbot will intelligently filter and present relevant product options, facilitating efficient decision-making and reducing the time and effort required to find desired items.

RASA-BASED CHATBOT

RASA-based Chatbots represent a powerful framework for building conversational AI applications. Leveraging Machine Learning and Natural Language Processing capabilities, RASA enables developers to create highly customizable and context-aware chatbots. By employing advanced dialogue management techniques, RASA-based bots can understand user intents, extract relevant entities, and maintain conversational context to provide accurate and meaningful responses. One of the key strengths of RASA lies in its open-source nature, allowing for flexibility in customization and integration with existing systems.

OBJECTIVE

The Objective of this project is to develop a RASA-based chatbot customized for e-commerce assistance to enhance customer experience and increase sales. Creating a RASA-based chatbot involves addressing the challenges of providing personalized and efficient support to users navigating through various stages of the online shopping process. This includes understanding user intent, accurately retrieving product information and handling complex queries.

LITERATURE SURVEY

In this chapter we review some papers to get knowledge and understanding on the techniques had been proposed. All those techniques have the same aim which is track the vehicle and estimate the velocity of the moving vehicle. As Archimedes once said, "Man has always learned from the past. After all, you can't learn history in reverse!" it is essential for man to learn from history. Thus, considering all past researches, the most relevant research glimpses have been picked to be explained in detail. The overview shall discuss relevant aspects contributing to our research.

Superagent: A customer service chatbot for e-commerce websites

ALei Cui, Shachan Huang,Furu Wei,Chuanqi Tan,Ming Zhou

Conventional customer service chatbots are usually based on human dialogue, yet significant issues in terms of data scale and privacy. In this paper, a customer service chatbot that leverages large-scale and publicly available ecommerce data. It takes advantage of data from in-page product descriptions as well as user-generated content from e-commerce websites, which is more practical and cost-effective when answering repetitive questions, freeing up human support staff to answer much higher value questions. We demonstrate SuperAgent as an add-on extension to mainstream web browsers and show its usefulness to user's online shopping experience.

Alime Assist An Intelligent Assistant for Creating an Innovative E-commerce Experience

Feng-Lin, Xing Gao, Minghui Qui, Weipeng,Haiqing Chen

AliMe Assist, an intelligent assistant designed for creating innovative online shopping experience in E-

commerce. Based on question answering (QA), AliMe Assist offers assistance service, customer service, and chatting service. Currently, it serves millions of customer questions per day and is able to address 85% of them. It uses convolutional Neural Networks (CNN) to incorporate the customer questions for intent identification and proposes a Semantic Normalization and Knowledge Graph for customer service question answering and also proposes a hybrid approach that uses Sequence-to-Sequence model to join results.

Development of an e-commerce chatbot for a university shopping mall

Victoria Oguntosin, Ayobami Olomo

This approach aims at developing a web-based chatbot called Hebron for the Covenant University Community Mall. The chatbot is developed using Python and React.js as the programming languages and MySQL (Structured Query Language) server as the database to give a structure to the e-commerce datasets and Admin Portal Process. The e-commerce chatbot application for Covenant University Shopping Mall (CUSM) seeks to provide an easy, smart, and comfortable shopping experience for the Covenant University Community.

Smart chatbot system for E-commerce assistance based on AIML

Arif Nursetyo, Egia Rosi Subhiyakto

Currently, the conventional market is starting to be replaced with many online markets. The tight online market competition demands excellent service from sellers to buyers, so many online stores provide full 24-hour service. This service certainly requires a lot of money if done manually. Chatbot can be used as a solution to automatically shop online. Then the bot must be able to provide an accurate and fast response. This study proposed an intelligent Chatbot system based on Artificial Intelligence Markup Language (AIML) which can be used as an e-commerce assistant. This chatbot is applied to the telegram application. Input questions from users will be proceed through three stages, namely, parsing, pattern matching and crawling data using AIML. In the AIML process, user requests are classified into three categories, namely, general questions, calculations, and stock checks. Where the calculation request traps the order and payment process. Based on the results of 300 trails, the proposed method can answer all user requests well, within average response time time of 3.4 seconds.

E-commerce distributed chatbot system

Stefan Anangelov, Milena Lazarova

The chatbot system attract huge interest in recent years in many different fields in an attempt to increase the efficiency and shortens the business process execution time replacing the human-human communication with a human machine conversations and queries in natural languages. Chatbots have varying levels of capabilities as general purpose conversational agents or task-oriented chatbots as well as open-domain and domain-specific agent systems. This paper aims a distributed chatbot system for supply chain. The system comprises several services: chat service, bot service, natural language processing service as well as supply chain service. It uses WebSocket communication between user interface and the bot, analyzes the user's query and provides information of the queried orders and supplies.

Chatbot for E-Learning: A Case of Study

Francesco Colace, Massimo De Santo, Macro Lombardi, Francesco Pascale

Chatbot Technology can be considered an important innovation for e-learning: In fact they are turned out to be the most innovative solution in filling the gap between Technology and education. This paper presents the realization of a chatbot prototype for supporting students during their learning activities. Chatbot aims to be an e-tutor for students. E-learning makes good use of database and CMS (Content Management System) technologies. These two work hand in hand to store your course content, test results and student records. The data is stored in the database and the CMS provides a user interface for you to add, update and delete data. The aim of this paper is the introduction of a framework for:

The automatic identification of the students need thanks to the adoption of Natural Language Processing Techniques.

The selection of the best answer thanks to the use of the ontological representation of knowledge domain.

Chatbot: An automated conversation system for the educational domain Anupam Mondal, Monalisa

Dey, Dipankar Das, Sachit Nagpal

This system focused on designing textual communication application namely chatbot in the educational domain. The proposed chatbot assists in answering questions provided by users. To develop the system they employed an ensemble learning method as random forest in the presence of extracted features from our prepared dataset. Besides, the validation system offers an average F-measure 0.870score on various K-values under random forest for the proposed chatbot. Finally, they deployed the proposed system in a form of telegram bot.

A Conversational Agent to Encourage Willingness to Communicate in the Context of English as a Foreign Language

This system focused on proposed embodied conversational agent based on the willingness to communicate (WTC) model in L2 to help increase WTC in the context of English as a Foreign Language (EFL) by providing user with various daily conversation contexts. To simulate realistic and efficient conversations, we adopted a semantic approach in the response generation and created a system with flexible and adaptable domain knowledge, user's intent detection, and mixed-initiative conversation strategy. Our evaluation of the proposed system demonstrated it's potential to increase WTC in the EFL context.

EXISTINGSYSTEM

The existing technique for e-commerce chatbot is the Contextual Dialog Management. Creating a chatbot for e-commerce with contextual dialogue management involves designing a system that can understand and respond to user queries in a conversational manner while keeping track of the context of the conversation. It requires natural language processing (NLP) techniques such as intent recognition, entity extraction, and dialogue state tracking. Additionally, you'll need a robust backend system to handle product catalog queries, order processing, and other e-commerce functionalities.

PROPOSED SYSTEM

In this project we proposed RASA framework to communicate with the user while using the e-commerce assistance. The System consists of the following steps. The core of the system is RASA Open Source, which provides natural language understanding (NLU) and dialog management capabilities. RASA processes user messages, extracts intents and entities, and generates appropriate responses based on predefined rules and machine learning models. Training data is collected and annotated to train the NLU and dialogue management models. The NLU model is responsible for understanding user messages and extracting intents. RASA provides various NLU pipelines, including pre-trained embedding's like Spacy and TensorFlow. Dialogue management controls the flow of the conversation and determines the Chabot's responses to user inputs. Monitoring tools are used to track the performance of the Chabot in production, including metrics such as user satisfaction, conversation completion rates, and response times. RASA is used to visualize conversations, annotate training data, and iteratively train and evaluate the Chabot's models based on new insights gathered from user interactions.

SYSTEMSTUDY

A system study for an e-commerce chatbot based on RASA involves a detailed analysis of various aspects of the system, including its objectives, requirements, stakeholders, functionality, architecture, and deployment considerations.

FEASIBILITYSTUDY

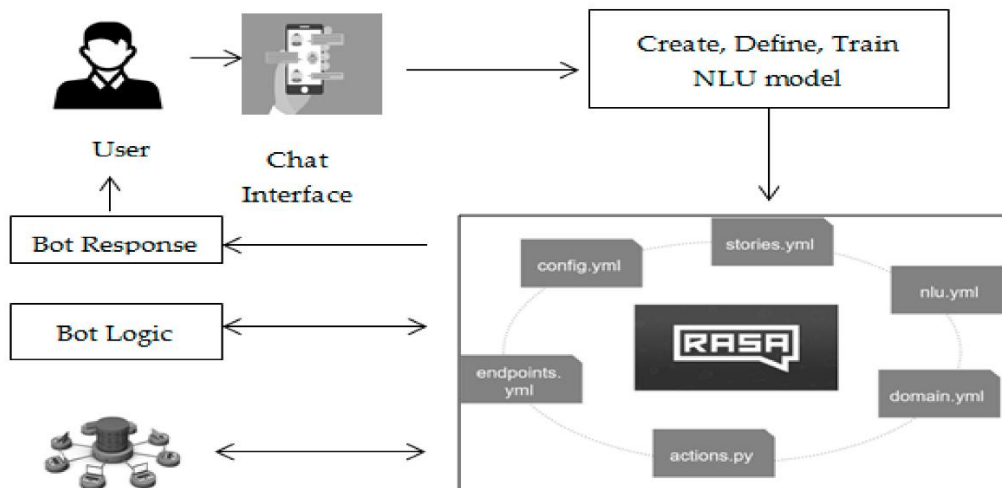
A feasibility study of a chatbot for e-commerce based on RASA involves assessing the practicality and viability of developing and deploying such a system. Evaluate the current market demand for e-commerce chatbots and assess the level of competition. Identify potential target audiences and user segments that could benefit from an e-commerce chatbot. Improving customer service, increasing sales, reducing operational costs, or enhancing user engagement. Determine how the chatbot aligns with the overall strategic goals of the business. Assess the technical feasibility of implementing a chatbot using RASA, considering factors such as:

Availability of skilled developers familiar with RASA or the ability to train existing staff.
Compatibility with existing IT infrastructure, including backend systems, databases, and APIs.
Scalability and performance requirements to handle potential increases in user traffic.
Assess whether sufficient data is available for training the natural language understanding (NLU) model and whether it accurately represents the language and context used by users in e-commerce interactions. Identify potential risks and challenges associated with developing and deploying the e-commerce chatbot.

SYSTEM ARCHITECTURE

The System consists of the following steps :-

1. Chat Interface
2. RASA NLU
3. RASA CORE
4. Bot Response



CHAT INTERFACE

A Chat Interface is the user-facing component of a chatbot or conversational AI system where user interact with the bot through text-based messages. It serves as the medium through which users can ask questions, make requests, provide information, or engage in conversation with the bot. The chat interface typically includes a text input field where users can type their messages or queries. Users can enter natural language text to communicate with the bot and initiate conversations.

RASA NLU

RASA NLU(Natural Language Understanding) is a component of the framework that focuses on understanding and interpreting user messages in conversational AI applications. It is responsible for extracting structured data, such as intents and entities, from unstructured user inputs, enabling the chatbot to understand user requests and respond appropriately. It consists of Intent Classification and Entity Recognition.

INTENT CLASSIFICATION

Intent Classification in a chatbot for an e-commerce application based on RASA involves identifying the user's intention behind their messages related to shopping, product inquiries, purchases, and other e-commerce related activities. Intent classification collects training data, configure the RASA NLU pipeline, train the model, and integrate it with RASA CORE.

ENTITY RECOGNITION

Entity recognition in chatbots is the process of identifying and extracting specific pieces of information, such as quantities, names and other relevant data, from the user's messages. Similar to intent classification, entity classification requires labeled training data containing examples of text annotated with the entities to be extracted. These labeled examples serve as training data for machine learning models used

for entity recognition. Features are extracted from the text to train the entity classification model. These features could include word embedding, linguistic features, content information, or syntactic patterns that help identify entities.

RASA CORE

RASA CORE is a component of the RASA framework that is responsible for managing the dialogue and conversation flow in conversational AI applications. It enables developers to create sophisticated chatbots and virtual assistants. It enables developers to create sophisticated chatbots and virtual assistants capable of engaging in natural, contextually-aware conversations with users. It consists of Dialogue Management.

DIALOGUE MANAGEMENT

Dialogue management in chatbots refers to the process of managing the flow of conversation between the user and the bot. It involves determining the bot’s responses or actions based on the current state of the conversation, the user’s input, and the chatbot’s internal logic.

DIET CLASSIFIER ALGORITHM

The DIET (Dual Intent and Entity Transformer) algorithm is a state-of-the-art neural network architecture developed by RASA for joint intent classification and entity recognition in conversational AI systems. It leverages transformer-based models to capture contextual information from user messages and make accurate predictions about the intents and entities present in the text.

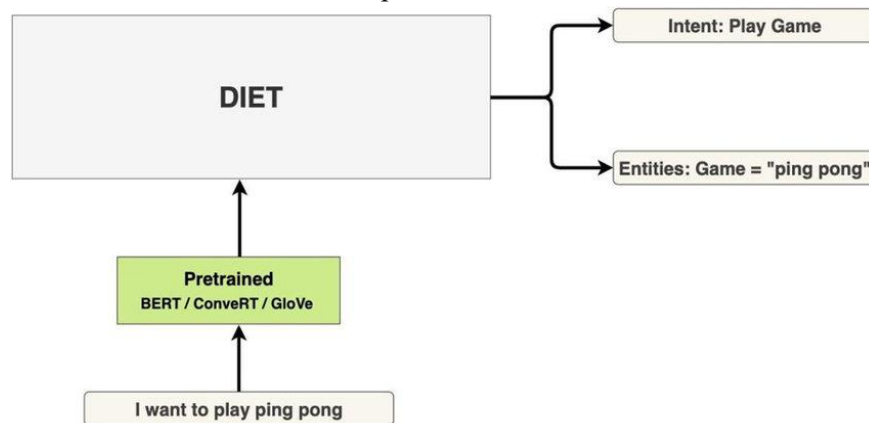


Fig:3 DIET CLASSIFIER working

The DIET algorithm is based on transformer architecture, which has demonstrated remarkable success in Natural language Processing tasks. Transformers are designed to process sequential data, such as text, by capturing long-range dependencies and contextual information effectively.

The DIET classifier starts by encoding the input text into a sequence of token embedding. These embeddings represent the semantic meaning of individual words or subword units in the text and capture their contextual relationships within the sequence. For intent classification, the token embeddings are processed through multiple transformer layers to capture the contextual information from the entire input sequence. The final output of the transformer is fed into a softmax classifier, which predicts the probability distribution over a set of predefined intent classes. In addition to intent classification, the token embedding are also used for entity recognition. The encoded input sequence is passed through a linear layer followed by a conditional random field (CRF) layer.

Results & Analysis

Evaluation Criteria

In this study, we construct a chatbot for real-time product filtration and we use it to display the details of required product of user that are available in various e-commerce platforms such as flipkart, amazon, etc., In this process, we: a) Use chatbot for user interface. b) RASA framework to effectively provide product details. c) Use DIET classifier algorithm to process the conversation.

The execution of the process will be explained clearly with the help of the continuous screenshots. The whole process in the execution is giving input to the chatbot and it will automatically process the input and provide the respective output of product based on user requirements. This whole process is done in four simple steps. Each figure mentioned below are the simultaneous process of outputs.



Fig: 4 The Webpage of the project

Description :Fig 1, describes how the website of project looks like.

In this webpage at right most corner an icon is present which is called as chatbot where the user interacts with.

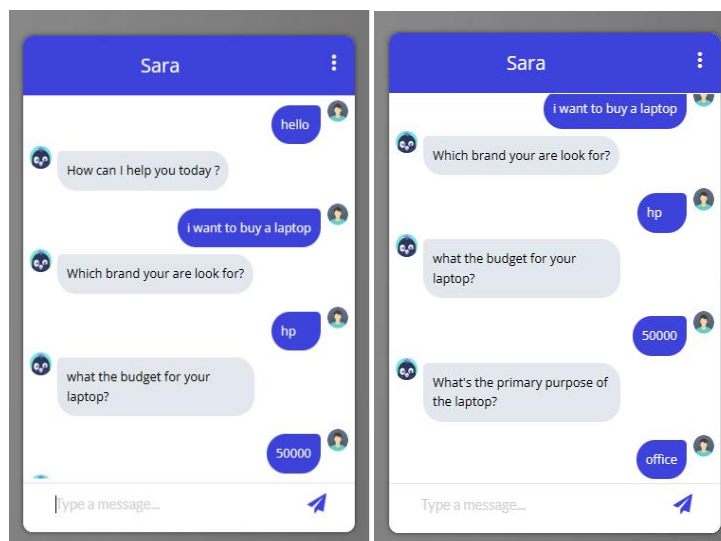


Figure:5 Conversation Between User and Chatbot

Description:Theabovefig2represents the conversation between user and chatbot.

The user enters the input in user interface. Next the input is trained by Natural Language Understanding (NLU) and the NLU understand the user intents and create the output response based on input. The output is generated by Dialogue Management.

In the above figures we can observe that when the user greets/texts the chatbot, it asks the user about user requirements for a product. The chatbot mainly focuses mainly on three features: They are – brand, budget and purpose. Based on these factors chatbot gather the product information that are present in various platforms and produce the details to the customer.

Next we will see how the chatbot gives the required product information to the customer in figure 3.

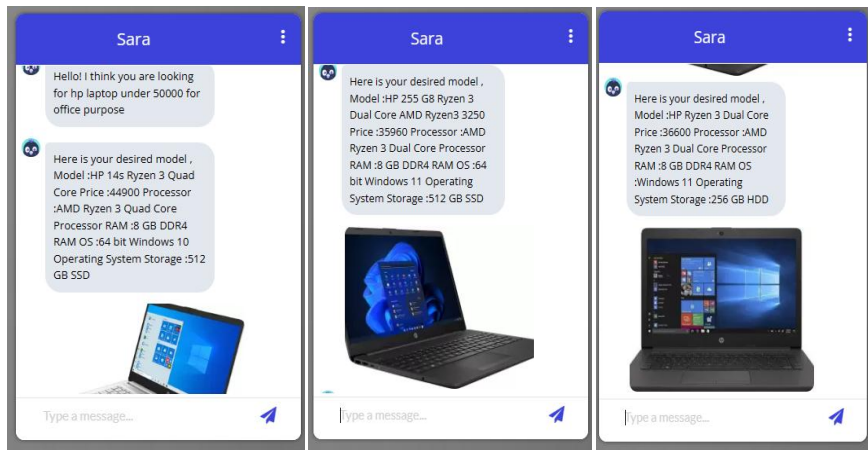


Figure: 6 Images and Description of required product of the customer

Description : Above fig represents the images and description of the product based on user requirements. Here we are doing this project on laptops only. When a user enter all the requirements, the RASA framework collects the information from all the platforms. Due to this the customer will have very good experience while using e-commerce platforms and it will be very easy to the customer to filter the products easily.

CONCLUSION

In this project we design a chatbot that will help to the customers who are using e-commerce platforms. First, we have created a chatbot that will take user queries as input. The chatbot process the input through NLU and understand user intents. Based on these intents the dialogue management produce the output. The chatbot will asks the requirements of user about the product and display the product details that are present in various e-commerce platforms. This will help the customers to easily search the products in a short period of time. The adoption of a Rasa-based chatbot for e-commerce assistance presents a significant opportunity for businesses to elevate their online shopping experience.

FUTURE ENHANCEMENTS

After many efforts we had successfully implemented the product filtering. Here are some future enhancements :

Multimodal Interaction: Enable voice input/output for users who prefer to interact with the chatbot through speech.

Natural Language Understanding (NLU) Improvement: Train the chatbot with more data to better understand user intents including the synonyms of given text.

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