A Virtual Shopping Assistant System

[1]Akash Pandey, [2]Deep Patel, [3]Dhruvil Patel

[1 2 3]Bachelor of Engineering,
[1 2 3]Department of Computer Engineering,
[1 2 3]Sal Institute of Technology & Engineering Research, Ahmedabad, India

Abstract: Chatbot is a human-computer interaction bot which is designed to save any individuals time, provide an interactive experience and automate tasks. In this work we have designed a system A.I.SH.A (Artificial Intelligence enabled Shopping Assistant) the idea about this system is that it will allow the user to interact with the E-commerce Engine through an Intelligent Assistant. The chatbot will allow the user to interact with the E-commerce site offering a seamless and hassle free shopping experience. The chatbot will bridge the gap of personalization that customers face in online shopping.

Keywords - **Chatbots, Artificial Intelligence, Ecommerce, Intelligent Agent, Human-Computer Interaction**

I. INTRODUCTION

A chatbot is a computer program or an artificial intelligence bot designed to simulate an intelligent conversation with one or more human users via auditory or textual methods. These chatbots can be integrated into messaging applications, websites, mobile apps and other services. Chatbot is considered as one of the most advanced and promising interaction between humans and machines. By leveraging the use of natural language processing many advanced chatbots can be created. The chatbot understands context and delivers response accordingly. The chatbot takes users input performs analysis and provides response based on the input. [1]

The E-commerce industry is evolving everyday with the industry giants taking measures to improve their services day by day. From pre-sales to after sales services there are some areas which can be improved to provide users a seamless and exhilarating shopping experience. Also digitalization has forced small local vendors and retailers to move towards online E-commerce. E-commerce relates to the ability to buy and sell goods over the Internet. Generally a website is made to offer ecommerce services to the users. These websites host a catalog of thousands of products in thousands of categories. The number of products and services offered by these websites increase every day, this makes the website too heavy and messy. A user who wants to purchase a simple product has to move between various pages and links just to buy a product. Also the customer service they provide although they improve it consistently don't seem to fast in resolving users query.

PURPOSE

Chatbots or automated intelligent assistants will bridge the gap of personalization that customers face in online Ecommerce shopping. Consumers nowadays are knee-deep into chat culture and are already turning to chat platforms for their day to day needs. Chatbots are going to drastically advance and improve the shopping experience of most of the consumers.

PRODUCT SCOPE

This work aims to provide an exhilarating shopping experience through the AI enabled Chatbot named A.I.SH.A (Artificial Intelligence enabled Shopping Assistant). A.I.SH.A can mimic the experience of having a personal assistant. Instead of just responding to specific commands, A.I.SH.A can interpret a user's language to understand and meet their needs.

A.I.SH.A is an Artificial Intelligence based Ecommerce Chatbot that aims to bridge the gap between the Online Marketplace and the Customer. The main feature is to provide the user an exhilarating shopping experience via a virtual assistant. The user can search about products on different marketplaces compare their prices and analyze reviews and photos about the product. A.I.SH.A can suggest various products across various categories through machine learning. Users can interact with the Chatbot using simple English conversations. A.I.SH.A understands it's users by remembering their likes, purchase history, and personalized quizzes.

Customer can search and browse for different products using the Chatbot. Customer can view photos, specifications and reviews about a product. Users can engage with simple conversations with the Chatbot. Users can compare the prices of a certain product among different sites. Users can keep track about previous orders and history. Users are suggested products using product recommendation.

II. LITERATURE SURVEY

Prior state of art reveals that few works have been done in the area of Ecommerce Chatbot.

Gupta, Siddharth, *et al*. have proposed about a website based ecommerce chatbot that can understand and converse with the user in simple language. [2] This ecommerce chatbot is linked to an ecommerce website that holds a variety of numerous products of various features. This chatbot helps you to make a decision about which product is best suitable for you. This becomes very helpful instead of searching and browsing for a product over the website. The chatbot basically functions like an online automated assistant.

In the work proposed by Cui, Lei, *et. al.*, customer service chatbot was discussed that uses large scale publicly available ecommerce data [3]. In conventional human based customer service chatbots there are significant issues in terms of data scale and privacy. The SuperAgent takes the data from in-page product descriptions as well as user content from ecommerce websites, which is cost-effective and make answering repetitive questions easier, also freeing up human staff for much higher value questions and queries. They demonstrate SuperAgent as an add-on utility to web browsers to show its usefulness to the users.

Thomas, N. T. states that Ecommerce has completely changed the way of buying and selling products. [4] But the customer service ecommerce provides is a drawback. In every ecommerce portal user has to wait for a long to get their query resolved from the customer service representative. Especially in the case of a live chat system the representative has to handle multiple customers at a time. The response also might not be as relevant as they only copy paste pre-written responses. As a solution to these problems the authors propose a chatbot which automatically gives instant responses to users based on the dataset of Frequently Asked Questions (FAQs). They propose the use of Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA). Greetings and general questions will be answered using AIML and other service related questions will be answered using LSA.

In a patent Ker, David Mentions about an Ecommerce conversation interface to support not only decision making but also delivery, procurement and after sales support as well as allow the user to perform all ecommerce activities. [5] The patent states some methods and practices relating to E-commerce which not only limit to buying and selling but also go beyond sales, such as delivery and after sales support. All other novice ecommerce activities could also be performed. While our product focuses mainly on selling products, although we will implement some after sales activities such as tracking order, view previous order information, etc..

Stoehr, Mark, *et al*. discusses about methods and apparatus for placing a request of an Internet chat session between a user and chat persona. [6] They state that a client device displays a plurality of chat personas and chat actions to be determined by visitor. In response to the visitor's selection a chat system server selects one chat persona and at least one chat action. The client device then sends a request to initiate a chat session. After identifying the visitor the chat system server retrieves additional information of that visitor. The chat system server then generates a personalized chat session between the visitor on the client device and selected persona on the chat system server.

III. CONCEPT DESCRIPTION

PROPOSED TECHNIQUE

In order to demonstrate the project we will create an ecommerce chatbot named A.I.SHA. The user first signs in to the ecommerce engine. The chatbot then gathers the user's information and initializes the conversation. There are intents created for some of the viable activities and queries user is supposed to perform or ask an ecommerce chatbot.

The chatbot first welcomes the user using a predefined greeting message. After that the chatbot provides some predefined options too choose from such as Search Product, Recommend a product, View cart info, Talk to bot, etc. Users can also have casual small talk with the chatbot in natural language. If a user finds a product interesting he/she can ask for more details about the pr oduct such as reviews, ratings etc. The chatbot would recommend products to the user by using Item-Item based collaborative filtering.

The user after finding the product he/she was looking for can add the product to the cart. The cart is synced with the ecommerce engine. After products have been added to cart and the user wants to check out. The chatbot displays the final cart information and is redirected to the ecommerce engine to finalize the payment.

IMPLEMENTATION DETAILS

For the demonstration of the system, we will be creating a fully functional ecommerce website that is to be integrated with the chatbot. For the development of the chatbot system, we will be using Google's DialogFlow (Formerly Api.ai) which is a human computer interaction technology based on Natural Language Processing.
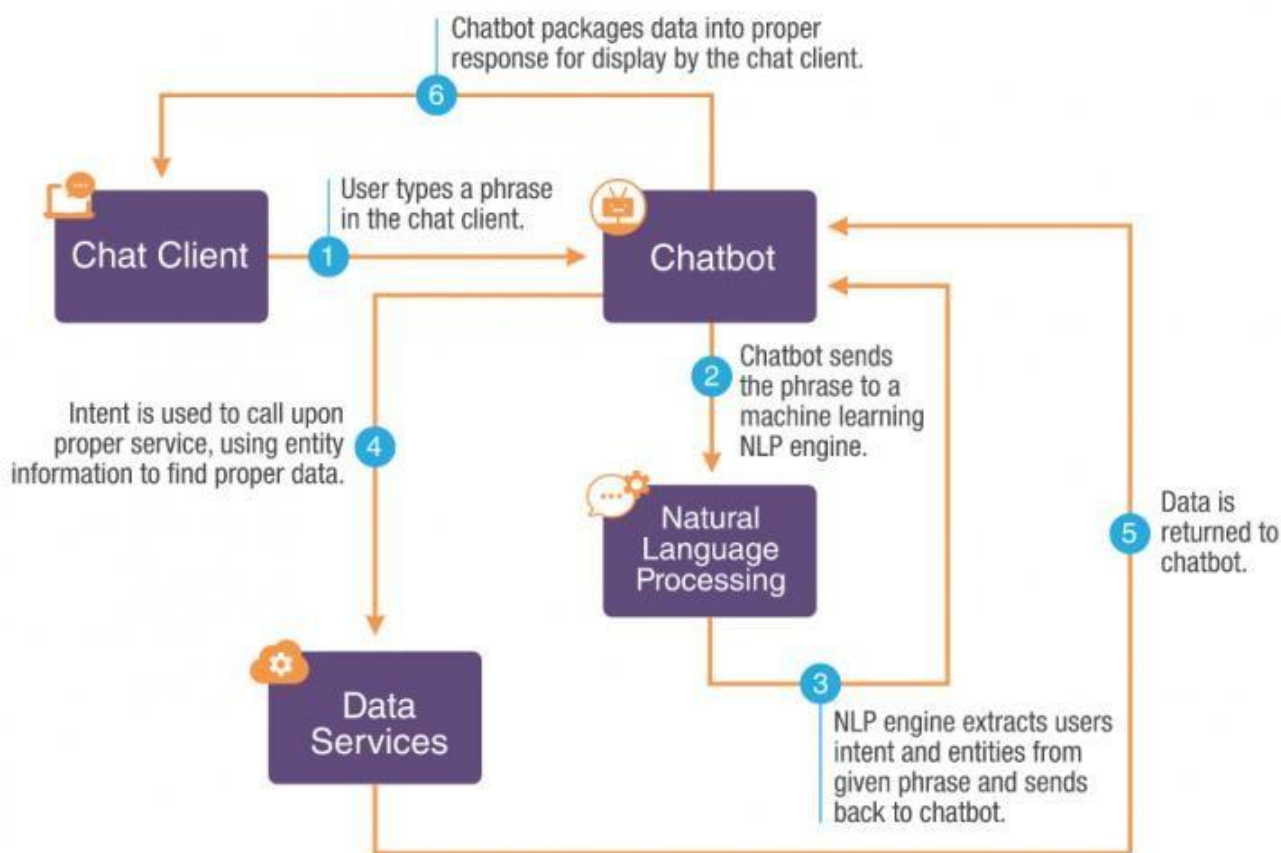

Figure 1. A typical Chatbot Flow of Work [7]

The website would be made using HTML5, CSS3 and J2EE (Spring Boot, Hibernate, etc.). The chatbot will be integrated into this ecommerce engine using DialogFlow Java SDK. Using DialogFlow's intents and webhooks will be created for various actions. By the use of External APIs certain external actions could also be performed. The DialogFlow general architecture is depicted in figure 2.
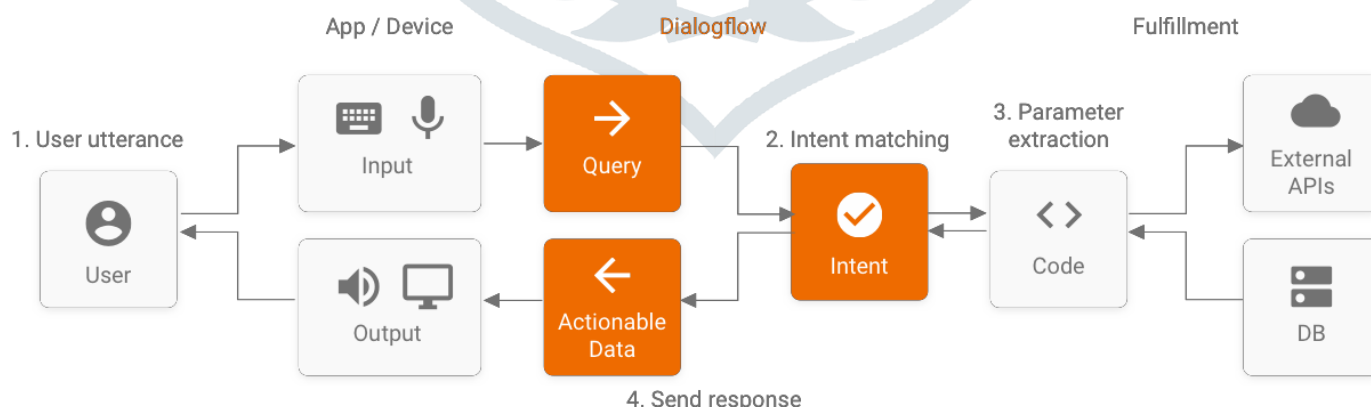

Figure 2. DialogFlow Internal Flow Diagram [8]

For Recommendation of products, we would be using Item-Item based Collaborative, till recently, people used to buy products recommended to them by their friends or the people they trust. This used to be the primary purchase method when there was any doubt about a product. But today with the advent of digital age, that circle has expanded to include online ecommerce sites that utilize some sort of recommendation engine.
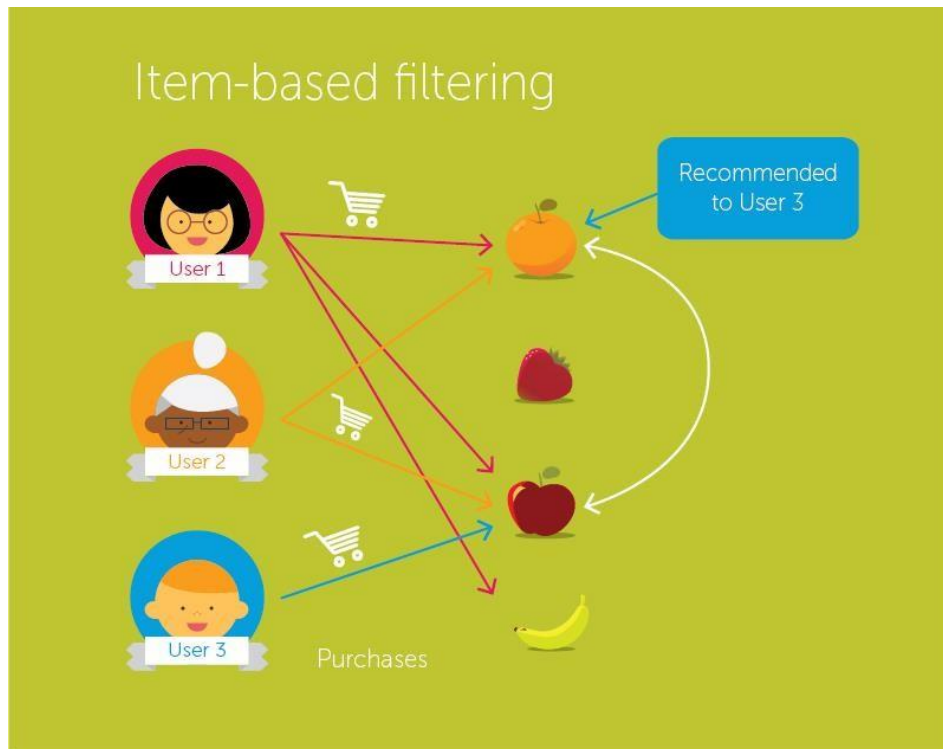
Figure 3. A Figure depicting ITEM-ITEM based Collaborative Filtering [9]

A recommendation engine filters the input data using different algorithms and recommends the items that are most relevant items to users. It first captures the past behaviour of a customer and based on that, it recommends products which the users might be likely to purchase.

If we can recommend a few products to a customer based on their needs and interests, it will create a positive impact on the user experience and lead to frequent visits by the user. Hence, businesses nowadays are building smart and artificial intelligence enabled recommendation engines by studying the past behaviour of their users.

So in our case we will find the similarity between each product pair and based on that, we will recommend similar products which are liked and purchased by the users in the past. This algorithm works same as the user-user collaborative filtering with just a little change – instead of taking the weighted sum of ratings of "user-neighbours", we take the weighted sum of ratings of "item-neighbours". The prediction is given by Eq. (1) [10]

$$P_{u,i} = \frac{\sum_N (S_{i,N} \cdot R_{u,N})}{\sum_N (|S_{i,N}|)} \qquad (1)$$

Here,
- *Pu,i* is the prediction of an item
- Ru,N is the rating to product
- Si,N is the similarity between products

Now we will find the similarity between items using Eq. (2) [11]

$$s(u,v) = \cos(u,v) = \frac{u \cdot v}{\|u\|_2 * \|v\|_2} \qquad (2)$$

As we move further to implement these concepts, there is a question which we must know the answer to – what happens if a new user or a new item is added into the dataset? It is called a Cold Start. There can be two types of cold start:

1. Visitor Cold Start
2. Product Cold Start

Visitor Cold Start means that a new user has been introduced in the dataset. Since there is no history of that new user, the system does not know the preferences of that new user. Hence, It becomes harder to recommend products to that new user. So, how can we solve this problem? One simple approach could be to apply a popularity based strategy, i.e. recommend the most popular products in respective categories. These can be determined by what has been popular recently overall or regionally or categorically. Once we know the preferences of the user, recommendation of products will be easier.

On the other hand, Product Cold Start means that a new product is launched in the market or added to the ecommerce portal. Customer action is most important to determine the value of any product. The more interaction a product receives, the easier it is for our model to recommend that product to the right user. We can make use of the Content based filtering algorithms to solve this problem. The system first uses the contents of the new product for recommendations and then eventually the user performs actions on that product.

IV. CONCLUSION AND FUTURE SCOPE

Our System's initiative is to empower the sales in retail sector by using advance technology and we aim to make product as useful and effective in the online ecommerce sector. Our system aims to improve the current online ecommerce scenario drastically and provide an exhilarating shopping experience to its users. To conclude that, we will make a product that is going to satisfy the users and using advanced intelligence would improve itself.

Further we would implement a web crawler which would scrape data from different existing portals and compare the prices of a particular product to help users make better purchase decisions. Also we could develop a Standalone Android App which could function almost as similar to the web providing mobile users an exhilarating shopping experience.

V. REFERENCES

[1] Accessed [February 2019] https://en.wikipedia.org/wiki/Chatbot

[2] Gupta, Siddharth, et al. "An E-Commerce Website based Chatbot." International Journal of Computer Science and Information Technologies 6.2 (2015): 1483-1485.
[Accessed February 2019]

[3] Cui, Lei, et al. "SuperAgent: a customer service chatbot for e-commerce websites." Proceedings of ACL 2017, System Demonstrations (2017): 97-102.

[4] Thomas, N. T. "An E-business Chatbot using AIML and LSA." In Advances in Computing, Communications and Informatics (ICACCI), 2016 International Conference on, pp. 2740-2742. IEEE, 2016.

[5] Ker, David. "METHODS AND SYSTEMS RELATING TO ELECTRONIC COMMERCE." U.S. Patent Application No. 15/830,228.

[6] Stoehr, Mark, et al. "Method and apparatus to increase personalization and enhance chat experiences on the internet." U.S. Patent Application No. 15/090,004.

[7] Image Accessed [February 2019]
https://www.peerbits.com/blog/bots-will-shape-on-demand-services-tomorrow.html

[8] Image Accessed [February 2019] https://dialogflow.com/docs/images/intro/fulfillment-diagram.png

[9] Image Accessed [February 2019]
https://medium.com/@tomar.ankur287/item-item-collaborative-filtering-recommender-system-in-python-cf3c945fae1e

[10] Equation Accessed [February 2019]
https://www.analyticsvidhya.com/blog/2018/06/comprehensive-guide-recommendation-engine-python/

[11] Equation Accessed [February 2019]
https://www.analyticsvidhya.com/blog/2018/06/comprehensive-guide-recommendation-engine-python/