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An Intelligent Chatbot Haggling with Ensemble ML Model

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***Abstract*—In recent years online shopping has gained a huge boom. With this increase, most of the features of online shopping are developed but some features like negotiating with shopkeepers are not available which is sometimes possible in offline purchasing. In this paper we have proposed a Chatbot to conduct product negotiations. Customers can interact with the Chatbot to receive help obtaining a fair price for a product (s). With such a system, which has an impact on key aspects of online buying, there is a chance that the budget of the customer or the product seller could be compromised. To avoid such situations, we have developed an algorithm in Machine learning which works along with prediction of old available data to provide a product price. Sometimes, price prediction is less accurate because some algorithms are inappropriate for a given dataset or because irrelevant features or properties of the data are employed. Due to the potential financial losses associated with even one incorrect price prediction, Ecommerce businesses do not only rely on price prediction systems. Some models also fail when data scales or some feature is unavailable after time on which model prediction was dependent. Our model's accuracy and dependability are maintained by managing these modifications.**

***Index Terms*—Price Negotiation, E-Commerce Negotiation, Online shopping, Chatbot system**

I. INTRODUCTION

Today's e-commerce websites use a variety of AI techniques to identify the most popular or best-selling products, which are then calculated to offer customers shopping on their website a simple way to search. Customers must make product compromises, though, when the best products are priced highly. Additional issues may arise for customers when purchasing inexpensive goods. Giving them the chance to haggle over the products will solve these issues. Language and reasoning issues are combined in negotiations. Negotiation is the act of exchanging ideas that have the best chance of meeting everyone's needs. The first party, the product seller, will offer a minimum price that is within his or her means to sell the product at. The upper and lower bounds of our algorithm are this price and the item's original price. The chatbot is implemented on the website, which connects to UI using flask APIs so that we can show how our model would actually be used in practice. An artificial intelligence (AI) programme called a Chatbot can mimic a natural language conversation (or chat) with a user over messaging services, websites, mobile apps, and the phone. Most customer questions can be answered by Chatbot's without the help of a customer service representative. The Chatbot determines the user's intent using NLP techniques and responds appropriately. In addition to all these techniques, Chatbots will also automate the negotiation process on e-commerce websites. With the aid of such a system, users will be able to freely interact with the software and upload their budgetary and product-related queries to receive relevant answers. Similar to how logistics and retail businesses use data to plan the most effective delivery routes. It will have a significant impact on the website's sales and user base. Due to the availability of products online at reasonable prices, the number of customers will probably increase. To create an online shopping application that enables user registration, login, Chatbot-assisted negotiation, product browsing, order viewing, review posting, review reading, and review sentiment The Chatbot converses with customers and helps them negotiate a fair price for the product. The price of the products should be negotiated using both voice and text, i.e., the option to use voice commands or a chat box

In our paper, we proposed different machine learning algorithms namely KNN and SVM with ensemble learning by providing both Chatbot and voice assistant for negotiating.

II. RELATED WORK

This study suggests an intelligent Chatbot system that can serve as an e-commerce assistant and is based on Artificial Intelligence Markup Language (AIML). This Chatbot is integrated into the Telegram application. Users' input queries will be processed in three steps utilizing AIML, including parsing, pattern matching, and data crawling. The three categories of user requests in the AIML process are general inquiries, calculations, and stock checks. Where the order and payment processes are caught up in the computation request. The proposed method can satisfactorily respond to all user requests

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with an average response time of 3.4 seconds, according to the findings of 300 experiments [1].

FAIR researchers developed the idea of dialogue rollout for creating a dialogue agent for long-term planning. While it has been demonstrated that each of these agents is effective at negotiating with others in specific contexts, they frequently lack the natural language processing support needed to facilitate interactions of the sort that occur in everyday life. This study offers an E-Negotiator chat-bot agent that combines numerous research efforts to overcome this restriction. First, it was discovered that developing those agents requires more than merely adding an NLP module to existing agents. Instead, some of the tactics that should be used by the agents that enable Natural Language are issue-by-issue discussions and partial agreements. Based on restricted rationality, in particular anchoring and Aspiration Adaptation Theory, this agent operates (AAT). Complete offers are made at the outset of encounters, acting as the agent's anchor. In the event that this offer is rejected, the agent moves on to partial agreements and suggests the following matter for discussion in light of the outcomes of earlier conversations [2].

Extensible Markup Language (XML) [19], which is used to create conversational agents (chatbots), is the ancestor of Artificial Intelligence Markup Language (AIML). Many efforts have been created in order to create conversational agents. However, its accessibility, flexibility, and low price make a variety of applications conceivable. This study provides a quick overview of a few applications that employ AIML chatbots for their conversational services in this paper. These applications pertain to e-government, e-learning, cultural heritage, web base models, dialogue models, semantic analysis frameworks, humorist experts, network management, and adaptive modular architecture as wed. In this instance, in addition to offering helpful services, they also communicate with clients and offer solutions to their problems using AIML chatbots rather than actual people. To give effective service, this is becoming more and more popular among business owners and users [3].

Numerous computerized negotiation agents have been developed to this point. Although it has been demonstrated that each of these agents may successfully bargain with individuals in particular settings, they lack the natural language processing (NLP) tools necessary to support interactions of the sort that occur in everyday life. In this research, we investigate how this constraint can be addressed by modifying the current agents. After conducting a thorough analysis of how agents bargain with human beings, we discovered that merely adding an NLP module to already-existing agents is insufficient to produce these agents. Instead, to handle partial agreements and issue-by-issue interactions, the agents' methods must be changed [4].

Automated negotiation agents that can successfully negotiate with people must consider the fact that people differ in their behavior and that each person may negotiate in a different way. As a result, automated agents must rely on an effective opponent modelling component to simulate their partner and modify their behavior accordingly. This study introduces the KBAgent. The KBAgent is an automated negotiator that only engages in one negotiation with each person while using data from prior negotiations to model opponents generally. The probability of acceptance and potential counter proposals are extracted from the database. In experiments involving real subjects, the KBAgent outperforms another automated negotiator who has been demonstrated to be effective in negotiations with real subjects in terms of utility values. In terms of individual utility, the KBAgent also achieves agreements much more successfully than its human counterparts in the same job [5].

III. METHODOLOGY

The application Price negotiating Chatbot with Text & Voice on E-commerce website has sign up page, login page which allows user sign up, login respectively. Then user can browse products list and then select Chatbot as Text or Voice and then negotiate with Chatbot. Chatbot will understand two types of commands ‘starting price’ and ‘final price’. Starting price is the amount given by the ensembled model of two machine learning algorithms SVM and KNN [6]. Final price is calculated by addition of further 5% discount. After placing of the order at a price at which customer negotiated there is also a provision to view orders, post reviews, view reviews and view the sentiment of reviews.

To increase the model's stability and predictive power, ensemble techniques combine different models. With this method, predictive performance is improved. It creates a single predictive model [7] out of several machine learning models. While some models are good at modeling one aspect of the data, others are better at modeling another. Learn several straightforward models, hence combines the results to arrive at the final judgments. The variances and biases of each model are balanced by the models' combined strength. The composite prediction that results from this has a final accuracy that is higher than the accuracy of the individual model predictions. The model's overall

performance can be improved. It is utilized wherever parallel base learners are produced.
Because there is no transformation of training examples into generalized statements, the KNN algorithm is an instance-based algorithm [8]. In most cases, instance-based learning is also known as lazy learning. Instead, it assigns the new scenario to a category that is suitable among the available scenarios and does not rely on any assumptions from the available data. For example, in our scenario, we have two diseased orange images that are similar to both scan and canker, so the KNN algorithm identifies the similar features and predicts whether the orange falls under scan or canker. KNN calculates distance between points in terms of Euclidean distance [9]. If we have a large dataset, KNN can be more effective. KNN has a high computational cost.

The linear support vector machine algorithm One can imagine it having a linear algorithm at its core. Strong supervised learning algorithms for both classification and regression include support vector machines. A separating hyperplane formally defines it as a discriminative classifier [10]. As a result, the algorithm generates an ideal hyperplane that classifies new examples from labelled training data. For particular machine learning problems, you can use particular types of SVMs, such as support vector regression (SVR), which is an extension of support vector classification (SVC). SVM [11] makes use of the idea of margins and seeks to maximize class differentiation. SVM is quick and effective in large dimensions.

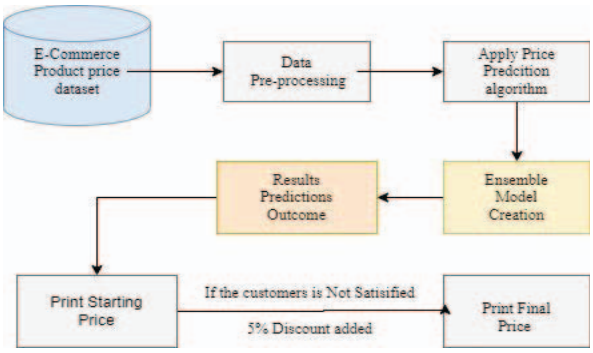

Figure 1: Implementation Methodology

Without bartering, a user can purchase the product immediately. However, if the customer decides to bargain, the Chatbot will get information from the database. You can ask basic questions of the chatbot. When the negotiation process begins, the backend will run the machine learning algorithms [12] to provide the predicted price, which is then given to the client. The negotiation process can continue until the minimum price after the chatbot identifies the negotiation intentions and, if discovered, applies the appropriate negotiation algorithm [18]. At any intermediate price, the buyer may proceed with the purchase or may add the item to their shopping cart with a discounted price.

The product seller has the right to change the lowest price, and the prices that customers pay will adjust in line with that change. To use such a system in real life e-commerce websites the websites have to cut on some offers and exclusive discounts to maintain the sales and profit while allowing customers to negotiate on products.

Algorithm for Negotiation [13]:

1) The ensemble model of SVM and KNN is used for price prediction which will be the first negotiated price given to the customer.
2) If the predicted price is less than minimum price or higher than the product price or is too less as first price, the price is product-price-(product_price-min_price)*0.1 (i.e giving 5% less of the total available discount)
3) If the customer is satisfied with the price, then they can buy the product else can go for further negotiation.
4) Else calculate the maximum discount available for the product in percentage
5) The decreased price will be return previous_price - (previous_price)*0.05
6) If customer is satisfied with the price then they can buy product
7) Else repeat from step 5
(previous price will be stored and next time it will start negotiate from previous price rather than the Product's initial price)

IV. Results

In this Work the main motto is to design E-commerce application where user can browse products list and then select Chatbot [14] as Text or Voice and then negotiate with Chatbot. Users can look all the reviews given by other user on a specific product before buying the product and finalize their price after having various interactions with Chatbot. Chatbot will understand two types of voice command such as 'first price' which will give reasonable price to the customer and if customer does not satisfy then it will ask for 'final price' and then Chatbot will add another 5% discount as final price and then serve to customer [15].

If say another word other than ‘first price’ or ‘final price’ then Chatbot will give error

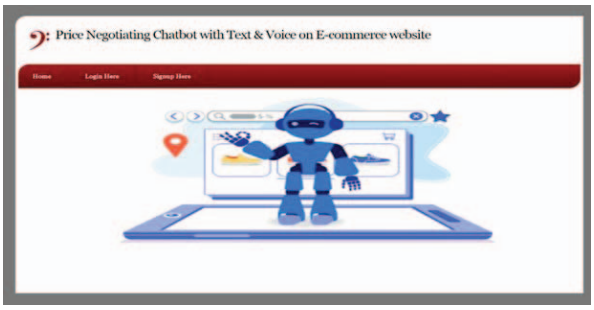

Figure 2: User Interface of Chatbot

Figure 3: Login Page of Chatbot

Figure 4: Price Negotiation with Chatbot

User has to enter first price to start the negotiating process in the above Chatbot and has to enter final price to end the negotiating process and buy the product.

Figure 5: Price on a Product is Negotiated with Chatbot Interaction

User has selected an Item Divine Engine String Bag whose Price is $19.99. The price is negotiated with Chatbot and the final price is $17.09145.

Figure 6: Voice Interaction with ChatBot for Negotation

User can interact with Chat by sending Voice Based message, hence can negotiate the price for a product, thereby the final price of product can be predicted.

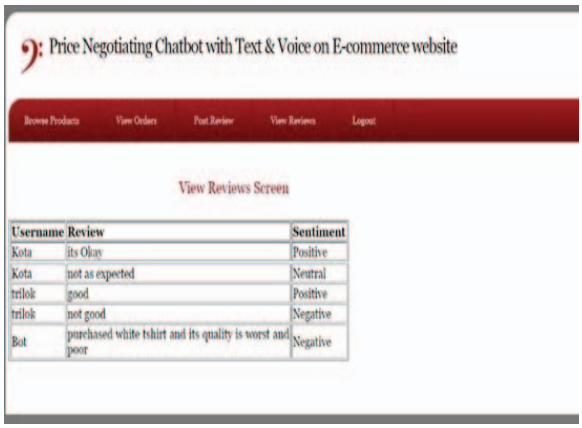

Figure 7: Review of all the Sentiments on a Specific Product.

In above screen all users can view all reviews given by other users and their sentiments. Similarly, you can sign up, login and view products list and negotiate with Chatbot using text and voice.

V. Conclusion

With the advent of e-commerce systems, the negotiation of product prices has become a difficult task. We tried a primary Chatbot that can discuss a variety of subjects and situations, but it's unclear whether it would lead to the best results. The Chatbot that we developed occasionally accepts the price that customers request, even though this price is always higher than the minimum price. If this happens to many customers, however, the seller may suffer a loss. Such circumstances need to be managed. Although there may be better price prediction algorithms in the future, we used a variety of algorithms, including SVM [16] and KNN [17]. When it comes to negotiating, KB Agent is thought to be superior; this can be added to our application. Apple's Siri is one example, which has a vast knowledge base and can produce satisfying results.

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