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Price Negotiator Bot: Bargain Buddy

Ashwini Bhamre^{*1}, Sampada Kulkarni^{*2}, Srushti Kulkarni^{*3}, Siddhi Khandelwal^{*4}, Amit Jain^{*5}

Professor, Department of Information Technology, Progressive Education Society Modern College of Engineering,
Pune, India^{1,2}

Students, Department of Information Technology, Progressive Education Society Modern College of Engineering,
Pune, India^{3,4,5}

ABSTRACT: Today, E-commerce is growing extremely fast in hand in hand with technology. Over the last few decades, several local-commerce businesses have emerged that sell their merchandise using social media. All these businesses offer a catalogue that customers choose and purchase from. However, there's one key part that most E-Commerce platforms don't provide "Negotiation", which paves the way for Customer-Retailer interaction. A negotiating agent is a method which can make buying experience for clients extra smooth and interactive with the aid of introducing bargaining features, which are otherwise practiced mostly in offline market only. Negotiator Bot utilizes machine learning in order to sell prices for sellers to look at and make a more knowledgeable and proficient selling decision. In This Project, interaction is our main goal. This can also be designed in a way that could provide gains for retailers to attract the majority of the attention and also all offers made by retailers need to have a specific goal to be reached to sell. Through this Bargain Model, Customers get benefited with the aid of buying the product at its quality possible price and retailers get the benefit of making a profit while keeping the customer happy.

I. INTRODUCTION

Customer satisfaction is the most relevant point in any E-commerce platform. This is where Chatbots come to the limelight. It will help them to get their issues resolved quickly without wasting customer's time. Using a chatbot structure to implement a mathematical logic-based bot which has a new skill of negotiating will save seller's time also. The seller need not communicate with hundreds of customers for negotiation.

There is a lot of scope of bargaining in the E-Commerce sites, but it is not possible for the local e-commerce businesses to hire so many persons as it will be impractical and also impossible to have one person per shopper. It will be very costly to have so much staff strength because their expenditure to maintain large staff will be more than their profit. Designing a software is of much need, which can negotiate on behalf of the seller. Not only for all online consumers who are actively buying the product online but it also is made for the seller who wants to communicate in faster and efficient way. This system helps those people by giving a fair amount of discount price so it tempts them to engage more and more. Following this research, we are going to implement a Negotiator Bot known as "Bargain Buddy". Our software will be active on an e-commerce website for every product on the dashboard.

II. EXISTING SYSTEMS AND PROBLEMS

1. **Facebook's FAIR Negotiator bot:** Facebook's team smashed game theory together with deep learning to equip machines to negotiate with humans. Used reinforcement learning to reward the model after achieving an honest outcome.[1]

Problem: The issue was that while the bots were rewarded for negotiating with each other, they were not rewarded for negotiating in English, which led the bots to develop an unintelligible language of their own. This led Facebook researchers to shut down the AI systems.[3]

2. **Negotiation Assistant Bot of Pricing Prediction Based on Machine Learning:** This bot can make decisions by itself via a price prediction function using machine learning algorithms and the tool of decision tree.[13]

Problem: This robot helps customers rather than retailers. The use of negotiator bot is more useful for sellers because sellers need to communicate with multiple customers unlike customer-seller interaction.

3. E-Commerce Chatbot for Price Negotiation: Use of natural language processing, dialogue roll out and sentiment analysis to understand human language.[14]

Problem: No logic implemented for the actual negotiation part. Only works like a chat bot and needs human interference for final logic of negotiation.

4. Genetic algorithm-based bargaining: The work represented in this paper proposes a simple way to implement online bargaining using genetic algorithms. It has a Bargaining agent which uses GA for implementing dynamic pricing.[2]

Problem: Using genetic algorithms makes the model very complex and hence also makes it slow.

III.PROPOSED SYSTEM

1. The bargain buddy does not require to get trained with artificial intelligence for communicating with customers. It uses system given data to interact with them. It helps us to save time on language training while creating the bot and bot cannot develop unintelligible language of their own.
2. The use of negotiator bot is more useful for sellers because sellers need to communicate with multiple customers unlike customer-seller interaction. Keeping this in mind, the proposed system interact with customer on behalf of seller. It works in the favour of both-the seller and customer by providing discounted price to customer and without making loss of seller.
3. The proposed system works on the actual logic of negotiation by providing customer fair chances to lower the price of product by negotiation. After certain negotiation limit bot stick to its final price and sell the product. At every chance the price gets lowered for customer.
4. The model is easy to implement and fast to work it. It supports realtime interaction with customer. Using decision tree in the model implementation makes it faster and more accurate as compared to existing systems.

IV.METHODOLOGY

Dataset Collection: Real life dataset to be used from a local business owner and converting the dataset into the required format. The dataset will contain:

- Quantity: Indicates the quantity available and can be availed for each transaction
- Unit Price: It indicates pricing per unit.
- CustomerID: A unique number assigned to each customer who is visiting the site.
- ProductID: A unique number assigned to each product which is on the site

Data Pre-processing: In this stage feature engineering is done which will include data cleaning, outlier detection, feature scaling, etc.

Training a model: The first step is to use a machine learning algorithm to train a model based on your use case. Make sure to do this in a virtual environment, as it helps isolate multiple Python environments and pack all required dependencies into separate folders.

Machine learning model: The implementation process can split the data into training and test data. We will be having a large amount of data, so we will use 75% as training data and the remaining 25% as test data.

We will be needing ProductID, CustomerID, and Quantity as independent variables and Discount as the dependent variable in the regression model. We are considering Decision Tree Algorithm because of the reasonable results observed after implementation with a decision tree regression model in other projects. Decision trees are a type of supervised learning algorithm mainly used in classification problems. This works for both continuous and categorical input and output variables. A decision tree divides data or samples into two or more units based on the greatest common divisor of the input variables.

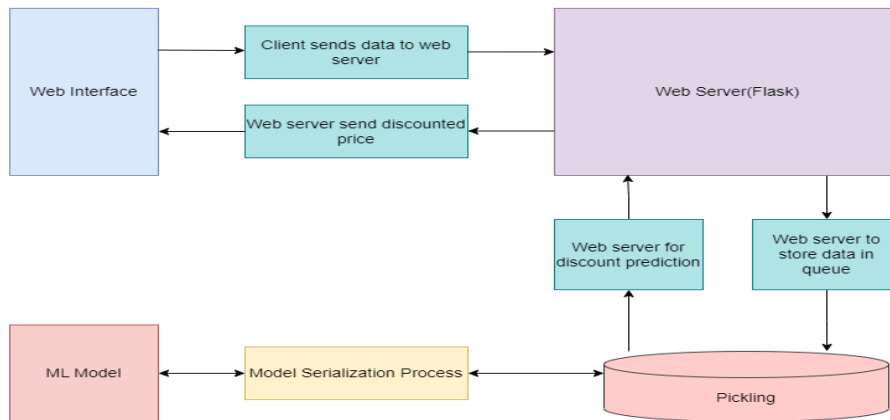


Fig1.1 System Architecture

Working:

The main negotiation parameters are set here before the result is passed. We are limiting the negotiations to a maximum of 3 times, so we will proceed as follows.

This three-phase negotiation process works as follows:

50% of the expected discount is taken into account the first time. $Discounted_price = (Actual_price) * ((Predicted_result / 100) * (1/2))$ The second time 75% of the predicted discount is taken into account. $Discounted_price = (Actual_price) * ((Predicted_result / 100) * (3/4))$ Lastly, the entire result 100% is considered. $Discounted_price = (Actual_price) * (Predicted_result / 100)$

This is how the negotiation process works. Therefore, the projected value of the discount is useful in negotiating with customers.

Once this discount is complete, the code for the final price will be: $Final_price = (Actual_price) - Discounted_price$

V.CONCLUSION

The Project is very useful to negotiate with the price of the product on an E-commerce site. Which will not only help the seller but it will also help the customers.

Seller Benefits:

- Identify the customers who already spend a lot with them and purchased categories like health and beauty care, electronics, and household cleaners.
- Decide (based on the discussions/exchanges) which additional products they will order to customers and at what prices they are buying it.
- The seller would benefit by increasing sales with known profitability.

Customer Benefits:

- Customers would benefit from an engaging way to capture more value from the retailer, and at the same time simplify their lives by reducing the number of retailers they have to transact with.
- The customers would get the discount in 3 phases.

In addition, e-commerce-oriented negotiation is going to play a vital role in many organizations and its significance are increasing day by day.

VI.FUTURE SCOPE

This project is a preliminary attempt to combine artificial intelligence and trading technology, and there are still many places that need to be changed and improved. In the future, if you can choose a Siri-like AI as an advisor bot, the bot will be more human-like and more likely to get more feedback from users, thus improving trading quality and

satisfaction. Today, negotiations are almost based on experience. Although there are courses for people to learn negotiation skills, people do not necessarily find an entry point immediately when negotiating. Therefore, we try to quantify, analyze and refine the trading elements as a basis for creating a trading assistant robot.

The used shopping website is just one situation we are aware of. This bargaining assistant can also be used in other occasions where there are negotiations, such as trading when you go to the market or find a job, as long as you collect enough data to train the machine learning model. In the future, we may also improve the Advisor Bot part and add Siri-like artificial intelligence to talk to people, so that our app can meet more diverse user needs.

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