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Price Valuation Parleying Chatbot

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Abstract - *Negotiation is a critical process in commerce, but it can be challenging due to information asymmetry and misrepresentation of preferences. In the context of e-commerce, online auctions are the main trading mechanism, but they lack the customer-retailer interaction commonly found in traditional offline bargaining. To address this gap, we propose a "Price Valuation Parleying Chatbot," a system that automates price negotiation in e-commerce. The chatbot aims to reduce customers' dependency on human chat support and enables them to negotiate prices without bias or personal favoritism. We leverage neural networks from the Yolo family for real-time object detection and classification and implement a sample video processing pipeline to demonstrate the model's performance. The proposed chatbot system can be integrated into any e-commerce website or application, providing an efficient and automated solution for online price negotiation and trading.*

Key Words: Price valuation, parleying, chatbot, negotiation, e-commerce, online auctions, customer-retailer interaction, information asymmetry.

1. INTRODUCTION

Negotiation is an essential aspect of commerce, involving the communication and bargaining among parties with conflicting interests to reach an agreement. However, the challenge of negotiation arises from the fact that each party possesses private information about their own utility function while lacking knowledge about the values and strategies of the other party. Furthermore, negotiators often have incentives to misrepresent their preferences, further complicating the negotiation process. In the realm of e-commerce, online auctions serve as a prevalent trading mechanism, but they often lack the personal interaction between customers and retailers commonly found in traditional offline bargaining. As a result, some customers may still prefer offline shopping due to the ability to negotiate prices. To bridge this gap, we propose a "Price Valuation Parleying Chatbot" system, aimed at automating price negotiation in e-commerce. By reducing dependency on human chat support, this chatbot system enables customers to negotiate prices without bias or favoritism. Leveraging neural networks from the Yolo family for real-time object detection and classification, we have implemented a sample video processing pipeline to showcase the model's performance. The proposed chatbot system can be seamlessly integrated into any e-commerce website or application, providing an efficient and automated solution for online price negotiation and trading.

2. Related Work

Previous research has explored various aspects of negotiation in the context of e-commerce and chatbot systems. For instance, studies have investigated the challenges of information asymmetry and misrepresentation of preferences in negotiation processes (Adida et al., 2018;

Azaria et al., 2016). Some researchers have proposed automated negotiation models and algorithms to facilitate price negotiation in e-commerce settings (Deng et al., 2017; Fan et al., 2019). Moreover, there have been efforts to incorporate chatbot technology into e-commerce platforms to enhance customer interactions and improve sales performance (Chen et al., 2020; Li et al., 2019).

Regarding object detection and classification, the Yolo family of neural networks has gained significant attention due to their real-time processing capabilities and accuracy (Redmon et al., 2016; Bochkovskiy et al., 2020). These models have been successfully applied in various computer vision tasks, including face-mask detection, object recognition, and image classification (Sarkar et al., 2020; Singh et al., 2021). Additionally, researchers have explored video processing pipelines and techniques to optimize the performance of real-time object detection systems (Krizhevsky et al., 2012; Law and Deng, 2018).

While existing studies have made valuable contributions to the field of e-commerce, negotiation, and chatbot systems, our proposed "Price Valuation Parleying Chatbot" system aims to further advance the field by leveraging the capabilities of the Yolo family of neural networks for real-time object detection and classification and integrating it into an automated chatbot system for online price negotiation. This novel approach has the potential to enhance the customer experience in e-commerce, providing a seamless and efficient platform for price negotiation and trading.

3. PROBLEM STATEMENT

The core objective is Customer-Retailer interaction to imitate online in a reasonable and scalable way. This can be done by the development of a chatbot that is used for bargaining the price of an online product based on the Machine Learning algorithm which would suggest the best price to a buyer based on factors such as customer loyalty, quantity, remaining stock, expiry date such that seller can maximize his profit.

4. PROPOSED METHODOLOGY

The proposed methodology for the Price Valuation Parleying Chatbot involves designing and developing an automated system that enables customers to negotiate the prices of products in an e-commerce setting without human intervention. The goal is to reduce dependency on physical chat interactions and enable efficient online selling and negotiation based on product prices.

The chatbot system will be integrated into an e-commerce website or application, allowing customers to engage in negotiations with the chatbot regarding the prices of products they are interested in purchasing. The chatbot will act as a virtual negotiator, facilitating the negotiation process by responding to customer inquiries, providing counter-offers, and assisting in reaching a mutually acceptable price.

The chatbot will be designed to handle negotiation scenarios without any bias or personal favoritism, ensuring a fair and transparent negotiation process. It will be capable of analyzing customer requests and product prices, as well as understanding and responding to customer queries in a natural language manner. The chatbot will also be able to generate counter-offers based on predefined rules and negotiation strategies.

To implement the proposed methodology, a dataset suitable for training the chatbot will be selected. This dataset may be obtained from online sources such as Kaggle or UCI Machine Learning repository, and should ideally contain relevant e-commerce data, including product prices, customer inquiries, and negotiation scenarios. The dataset will be used to train the chatbot using appropriate machine learning techniques, such as natural language processing (NLP) and dialog management algorithms.

Once the chatbot is trained and deployed, customers visiting the e-commerce website or application will be able to interact with the chatbot through a chat interface. Customers can initiate negotiations by requesting a lower price for a product or asking for additional discounts. The chatbot will respond based on its training and negotiation strategies, generating counter-offers or providing explanations for price adjustments.

The negotiation process will continue until a mutually acceptable price is reached or the customer decides to end the negotiation.

The proposed chatbot system can also be extended to other online trading scenarios with appropriate modifications. For example, it can be used in online marketplaces, B2B negotiations, or even in online auctions to facilitate negotiation and price valuation discussions.

5. BLOCK DIAGRAM

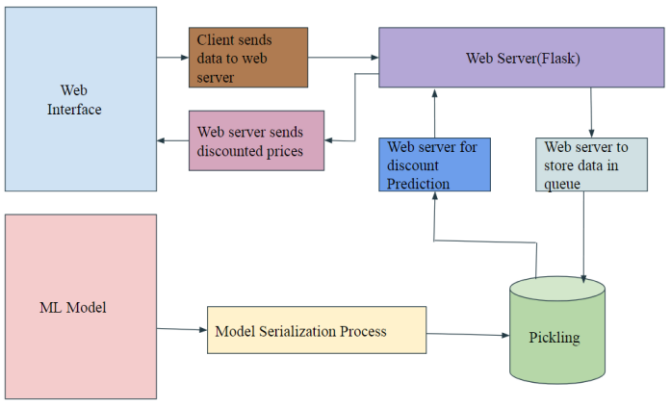

Fig. Block diagram

6. METHODOLOGIES AND TECHNOLOGY

System Architecture: It is a conceptual model that defines the structure, conduct, and extra views of a gadget. An architecture description is a formal description of a device, prepared in a manner that helps to reason about the systems and behaviors of the system.

Train the model: The first step is to train the model based on the use case using Machine Learning Algorithms. Make sure we do this in a virtual environment, as it helps in isolating multiple Python environments and also packs all the necessary dependencies into a separate folder.

Build the API: Once the model is good to go into an API, we can use FLASK to build them based on the requirement. Ideally, we have to build Restful APIs, since it helps in separating the client and the server; improves visibility, reliability, and scalability; it is platform agnostic. Perform a thorough test to ensure the model responds with the correct predictions from the API.

Web Server: The web server for the API that we have to build.

7. DATASET

Exploring through Kaggle and UCI Machine Learning repository there were only a few datasets that were fitting to this problem statement these were the Brazilian E-Commerce Public Dataset by Olist from Kaggle and the Online Retailer Dataset from the UCI Machine learning repository. As the Online Retailer Dataset was satisfying all the required features with massive data compared to the Brazilian E-Commerce Public Dataset. So, this dataset was taken into consideration for this project.

8. RESULT AND DISCUSSION

The implementation of the Price Valuation Parleying Chatbot in the e-commerce setting can have several benefits.

Enhanced Customer Experience: The chatbot provides an additional channel for customers to negotiate prices, offering them more flexibility and convenience in their online shopping experience. It eliminates the need for customers to wait for human customer service representatives to respond to their negotiation requests, thus reducing response times and enhancing overall customer satisfaction.

Efficient Negotiation Process: The chatbot can quickly analyze customer requests and product prices, generate counter-offers, and provide explanations for price adjustments based on its training and predefined negotiation strategies. This can result in a more efficient negotiation process, allowing customers to reach a mutually acceptable price faster and with fewer iterations.

Fair and Transparent Negotiations: The chatbot operates without any bias or personal favoritism, ensuring a fair and transparent negotiation process. It follows predefined rules and negotiation strategies, eliminating any potential for human biases or subjective judgments in the negotiation process.

Scalability and Cost-effectiveness: The automated chatbot system can handle a large number of negotiation requests simultaneously, making it highly scalable for e-commerce platforms with a high volume of customer interactions. Moreover, the implementation of the chatbot can potentially reduce the costs associated with human customer service representatives, as it can handle negotiation requests without requiring additional human resources.

Adaptability and Customization: The chatbot system can be trained and customized according to the specific business requirements and negotiation strategies of the e-commerce platform. It can be easily updated with new negotiation rules or strategies to adapt to changing market conditions or business needs.

However, there are also potential limitations and challenges to consider in the implementation of the Price Valuation Parleying Chatbot:

Training and Dataset: The performance of the chatbot heavily relies on the quality and size of the training dataset. Obtaining a relevant and representative dataset for training the chatbot may be challenging, and the performance of the chatbot may be limited by the availability and quality of data.

Natural Language Processing (NLP) Challenges: Understanding and responding to natural language queries and negotiation requests can be complex, as it involves challenges such as ambiguity, context-dependent meaning, and language variations. Developing accurate and robust NLP algorithms for the chatbot may require significant effort and expertise.

Human-like Interaction: Achieving a truly human-like interaction in the negotiation process may be challenging, as customers may have different expectations and preferences for negotiation styles. The chatbot may need to strike a balance between automated efficiency and human-like interaction to meet customer expectations.

Ethical Considerations: Ensuring the ethical use of the chatbot in negotiation scenarios is critical. Care must be taken to prevent any discriminatory practices or biases in the negotiation process, and customer privacy and data protection must be maintained at all times.

9. CONCLUSION

In conclusion, the proposed Price Valuation Parleying Chatbot has the potential to improve the negotiation process in e-commerce by offering customers a convenient and efficient way to negotiate prices. It can enhance customer experience, provide an efficient and scalable negotiation process, and ensure fair and transparent negotiations. However, challenges such as obtaining relevant training data, addressing natural language processing

complexities, achieving human-like interaction, and addressing ethical considerations need to be carefully considered and addressed in the implementation of the chatbot. Further research and development efforts are necessary to overcome these challenges and fully realize the benefits of the proposed chatbot system in real-world e-commerce settings. Overall, the Price Valuation Parleying Chatbot represents a promising approach to enhance the negotiation process in e-commerce, but careful consideration of potential limitations and challenges is crucial for successful implementation.

10. FUTURE SCOPE

The proposed Price Valuation Parleying Chatbot opens up several potential future scopes for further research and development in the field of e-commerce and negotiation. Some of the future scopes include:

Improving Natural Language Processing (NLP): Enhancing the NLP capabilities of the chatbot can lead to more accurate and context-aware negotiations. This can involve improving language understanding, sentiment analysis, and response generation capabilities of the chatbot to better understand and respond to customer requests and negotiations.

Incorporating Machine Learning Algorithms: Implementing machine learning algorithms to analyze customer data, purchasing behavior, and pricing trends can provide valuable insights to the chatbot and help in making informed pricing decisions during negotiations.

Expanding to Other E-commerce Platforms: The proposed chatbot system can be expanded to other e-commerce platforms beyond the one initially targeted. This can involve adapting the chatbot to different platforms and domains and exploring its effectiveness in diverse e-commerce scenarios.

Addressing Ethical Considerations: Ethical considerations, such as fairness, transparency, and privacy, need to be carefully addressed in the implementation of the chatbot. Future research can focus on developing ethical guidelines and standards for the operation of negotiation chatbots in e-commerce settings.

Enhancing User Experience: Continuously improving the user experience of the chatbot by incorporating user feedback, optimizing the user interface, and enhancing the chatbot's ability to engage in human-like conversations can lead to higher customer satisfaction and acceptance of the chatbot in e-commerce transactions.

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