BargainBot: AI-Driven Price Negotiation for E-Commerce - A Review

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Abstract—**This paper introduces BargainBot, an AI chatbot that enables real-time price negotiation in e-commerce. It integrates Natural Language Processing (NLP), Machine Learning (ML), and Reinforcement Learning (RL) to conduct multi-turn bargaining dialogues. The system aims to increase customer satisfaction, reduce cart abandonment, and protect seller profitability within predefined margins.**

Index Terms—**E-Commerce, Negotiation Chatbot, Dynamic Pricing, NLP, Machine Learning, Reinforcement Learning.**

I. INTRODUCTION

E-commerce platforms offer convenience and personalized services; however, most systems rely on fixed pricing mechanisms. In contrast, traditional retail environments often involve bargaining, enhancing customer engagement and perceived pricing fairness. Recent advances in AI have enabled conversational agents that support automated price negotiation through natural interaction.

II. LITERATURE SELECTION METHODOLOGY

Relevant literature was collected from IEEE Xplore, Google Scholar, and indexed journals (2021–2025). Studies focusing on NLP-based negotiation systems, ML-based price prediction, RL negotiation agents, and hybrid chatbot architectures were selected.

III. ARCHITECTURE OF AI NEGOTIATION CHATBOT

A typical negotiation chatbot includes a User Interface, NLP module, Price Prediction module, and Negotiation Agent. The NLP module handles intent detection and sentiment analysis. ML models estimate acceptable price ranges. The RL-based agent generates adaptive counter-offers while maintaining seller constraints.
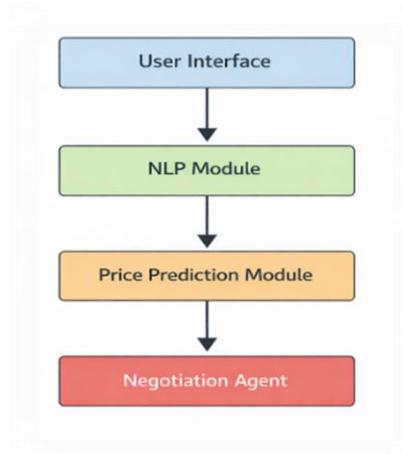

Fig. Architecture Diagram of AI Negotiation Chatbot

IV. REVIEW OF EXISTING APPROACHES

NLP-based systems interpret user intent and sentiment. ML based systems predict acceptable price ranges. RL based systems optimize negotiation strategies using reward-based learning. Hybrid systems combine these approaches for better adaptability.

V. COMPARATIVE ANALYSIS

Hybrid approaches generally demonstrate better adaptability and negotiation performance compared to single-model systems. However, they introduce higher computational complexity and system design challenges.

VI. CHALLENGES AND RESEARCH GAPS

Challenges include maintaining pricing accuracy in dynamic markets, ensuring fairness and transparency, scalability, and multilingual support.

VII. FUTURE RESEARCH DIRECTIONS

Future research should focus on explainable AI, emotion-aware bargaining strategies, integration of real-time market data, and privacy-preserving learning.

VIII. CONCLUSION

AI-driven negotiation chatbots represent a promising approach for interactive pricing in e-commerce. Further advancements in adaptive learning, fairness-aware pricing, and explainable AI are necessary for reliable deployment.

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