**Development of a Customer Service Chatbot for a Computer Hardware Store**

# Executive Summary

This project involves the development of a chatbot for a computer hardware store, designed to handle customer queries regarding FAQs, product details, and transaction history. The chatbot uses natural language processing (NLP) to understand customer inquiries, filter through a database of products, and retrieve transaction information for logged-in users. Key features include user login for old and new customers, product filtering based on user-defined criteria, and transaction queries restricted to authenticated users.

# 1. Introduction

The objective of this project is to automate customer service for a computer hardware store by implementing a chatbot capable of handling frequently asked questions (FAQs), product queries, and transaction history for customers. The project leverages natural language processing (NLP) algorithms to improve query accuracy and user experience, integrating with a SQL database to provide real-time responses. This report details the chatbot's development, challenges encountered, and future goals.

# 2. Implementation Details

## 2.1 Login and User Registration

The chatbot features a login system where old users can log in using their registered mobile numbers and a password, while new users can register by providing their details (name, email, mobile, city, and state). Passwords are stored securely using hashing mechanisms. Guest users can use the chatbot without registration, but their access is limited to FAQs and product queries.

## 2.2 FAQ System

The FAQ system employs a natural language processing algorithm using TF-IDF vectorization and cosine similarity to match user queries to pre-defined answers in the FAQ database. The chatbot processes user inputs by removing stop words and lemmatizing them, enhancing the matching accuracy. By refining the threshold for cosine similarity, the chatbot ensures that users receive the most relevant responses to their inquiries.

## 2.3 Product Query System

Users can filter products based on specifications such as processor type, RAM, graphics, and laptop category (gaming, student, business). Dynamic SQL queries are constructed based on user input to retrieve products that match the selected criteria. If no products match the query, the chatbot returns a 'no results found' message.

## 2.4 Transaction Query System

Only logged-in users can access their transaction history. The chatbot retrieves transaction data from the database, displaying order details, delivery status, and other relevant information. For users with no transactions, the chatbot returns a 'no order found' response.

# 3. NLP Algorithm for FAQ Matching

The chatbot uses natural language processing (NLP) techniques to handle user queries and provide accurate responses from the FAQ database. User input is tokenized, lemmatized, and stripped of stop words using Spacy. The TF-IDF vectorizer converts the processed text into numerical vectors, which are then compared using cosine similarity. By fine-tuning the similarity threshold, the chatbot is able to handle ambiguous queries and return the most relevant answers.

# 4. Challenges Encountered

Several technical challenges were encountered during the development of the chatbot, including improving the accuracy of FAQ responses, optimizing SQL queries for product filtering, and securing the login and registration system.

- \*\*Improving FAQ Accuracy\*\*: Achieving a high accuracy rate in matching FAQs to user queries was challenging due to the ambiguity of some questions. Adjustments to the cosine similarity threshold helped improve matching accuracy.

- \*\*Optimizing SQL Queries\*\*: Handling multiple filters for product queries required careful construction of SQL queries to ensure efficient retrieval without performance degradation.

- \*\*Secure Login and Registration\*\*: Ensuring password encryption and preventing duplicate user entries required robust error handling and validation processes.

# 5. Future Goals and Enhancements

## 5.1 AI Integration for Enhanced Customer Feedback

One of the key goals for future development is to integrate the chatbot with an advanced AI engine, such as GPT or Dialogflow, to provide more dynamic and contextual responses. This will allow the chatbot to handle more complex queries and provide conversational responses beyond the current FAQ framework.

## 5.2 Real-Time Learning Capabilities

To enhance the chatbot's ability to handle new queries, a future enhancement will enable real-time learning. When a new question is asked and answered by a human representative, the chatbot will automatically update its knowledge base, allowing it to respond to similar queries in the future.

## 5.3 Improving Product and Transaction Handling

Future improvements in product queries will include additional filtering options, such as customer reviews and stock availability. For transaction queries, the system will provide more detailed tracking information, including estimated delivery times and real-time shipment tracking.

# 6. Lessons Learned and Key Takeaways

The development of the chatbot has provided several key lessons, including the importance of selecting the right NLP techniques for improving query accuracy and the need for efficient database design to handle dynamic queries. Ensuring a secure and user-friendly login system was also crucial to the success of the project.

# 7. Conclusion

In conclusion, the chatbot has successfully automated customer interactions for the computer hardware store, handling FAQs, product queries, and transaction history for logged-in users. Future enhancements will focus on AI integration and real-time learning capabilities, further improving the chatbot's ability to assist customers and provide accurate, timely responses.

# Project Links

To access the project, use the following links:  
GitHub Repository: <https://github.com/Vairabharathi-VR/Chat_bot>