

AutoBuddy: A Car Shopping Search Chatbot

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INFO7375 - Prompt Engineering & AI

Summer Full 2024

July 16, 2024

Introduction

Brief Overview:

AutoBuddy is a car shopping search chatbot designed to assist users in finding the perfect car based on their preferences, budget, and specific criteria. It leverages natural language processing and Retrieval-Augmented Generation (RAG) to provide personalized and efficient car search experiences.

Objectives and Goals:

- To develop a user-friendly chatbot for car shopping.
- To integrate advanced search capabilities tailored to user needs.
- To provide a seamless and engaging user experience.

Importance and Relevance:

The project is relevant to the course as it combines AI, machine learning, and practical application development. It addresses a significant market need for efficient car shopping tools, enhancing the buying experience and leveraging AI for consumer benefit.

Project Description

Detailed Description:

AutoBuddy offers users a personalized car search experience by understanding their preferences and providing tailored recommendations. The chatbot handles user queries, searches through car listings, and provides detailed information on selected cars.

Specific Problem:

The project aims to solve the complexity and time-consuming nature of car shopping by offering a streamlined, AI-driven search tool that simplifies the decision-making process.

Scope:

- User interaction through a chatbot interface.
- Advanced search and filtering options.
- Integration with car listings and dealer information.
- Test drive scheduling and notifications.

Conversation Flow Example:

User: Hi, I'm looking for a new car.

AutoBuddy: Hi there! I'd love to help you find the perfect car. Do you have any specific preferences or requirements? For example, budget, car type, brand, fuel efficiency, or any specific features

User: I'm looking for an SUV under \$30,000, preferably a hybrid.

AutoBuddy: Great choice! SUVs are versatile and hybrids are excellent for fuel efficiency. Let me find some options for you. Do you have any preferred brands or additional features in mind

User: I like Toyota and Honda. I'd like a car with a sunroof and good safety ratings.

AutoBuddy: Excellent preferences! Here are a few options that match your criteria:

Toyota RAV4 Hybrid

Price: \$28,500

Features: Sunroof, excellent safety ratings, fuel efficiency of 40 MPG

Dealer: Green Motors, 123 Main St.

Honda CR-V Hybrid

Price: \$29,800

Features: Sunroof, top safety ratings, fuel efficiency of 38 MPG

Dealer: Eco Auto, 456 Elm St.

User: I'd like more details on the Toyota RAV4 Hybrid.

AutoBuddy: Sure! Here are the details for the Toyota RAV4 Hybrid:

Price: \$28,500

Engine: 2.5L 4-cylinder hybrid

Fuel Efficiency: 40 MPG combined

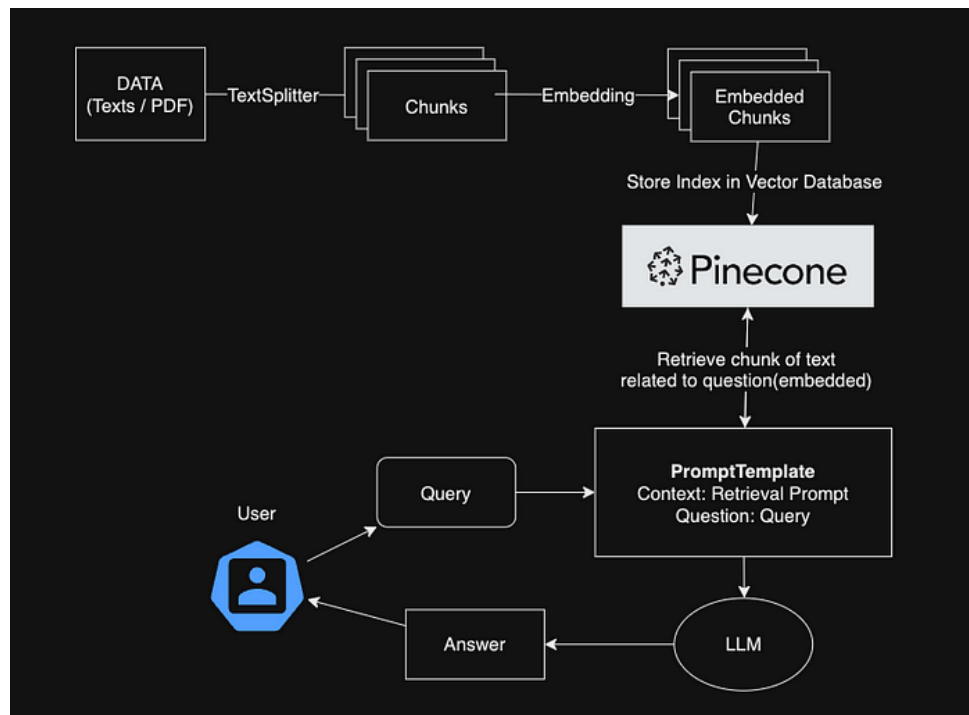
Safety Ratings: 5-star overall rating from NHTSA

Features: Sunroof, adaptive cruise control, lane-keeping assist, Apple CarPlay, Android Auto

Dealer Information: Green Motors, 123 Main St., Contact: (123) 456-7890

Project Architecture

Diagram:



Explanation:

- **User Interface:** Chatbot interface for user interactions, built using Streamlit.
- **Backend:** Handles user queries, processes requests, and retrieves data using LangChain and RAG.
- **Data Sources:** Integration with car listings databases and dealer information, stored in Pinecone for fast retrieval.
- **LLM:** OpenAI API for natural language processing and generating responses.

Technologies and Tools:

- **Natural Language Processing (NLP):** For understanding and processing user queries, using OpenAI API.
 - **APIs:** For data retrieval from car listings.
 - **Deployment Tools:** Docker, AWS for hosting and scalability.
 - **Vector Database:** Pinecone for managing and searching embeddings efficiently.
 - **User Interface:** Streamlit for building a responsive and interactive UI.
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Data Collection and Preprocessing

Source and Nature of Data:

Data is collected from various online new car company and dealer inventories websites. The data includes car specifications, prices, features, and dealer contact information.

Steps for Data Collection:

- Web scraping from car listing websites.
 - API integration with car dealer databases.
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RAG Pipeline Implementation

Overview:

The RAG pipeline combines retrieval-based and generative models to provide accurate and contextually relevant responses.

Steps Involved:

1. **Query Understanding:** NLP techniques to parse user queries.
2. **Document Retrieval:** Retrieve relevant documents or data snippets using Pinecone.
3. **Response Generation:** Generate responses based on retrieved data using OpenAI API.
4. **Integration:** Combine retrieval and generation outputs for final response using LangChain.

Challenges and Solutions:

- **Data Quality:** Ensured high-quality data through rigorous preprocessing.
 - **Response Accuracy:** Fine-tuned models to improve response relevance.
 - **Scalability:** Used scalable infrastructure to handle large volumes of queries.
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Performance Metrics

Key Metrics:

- **Response Accuracy:** Measure of how accurately the chatbot provides relevant information.
- **User Satisfaction:** User feedback and ratings on the chatbot's performance.

Methods to Calculate:

- **Accuracy:** Manual evaluation of response relevance.
 - **User Satisfaction:** Surveys and feedback forms.
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Methods to Improve Metrics

Strategies:

- Incorporating user feedback for improvements.
- Enhancing data sources and expanding database.

Expected Impact:

- Improved user experience and satisfaction.
 - Higher accuracy and relevance of responses.
 - Reduced response time and increased efficiency.
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Deployment Plan

Steps to Deploy:

1. **Development:** Finalize and test the chatbot application.
2. **Containerization:** Use Docker for creating a deployable image.
3. **Hosting:** Deploy on AWS for scalability and reliability.

User Testing and Feedback:

- Conduct beta testing with a select group of users.
 - Gather feedback and iterate on improvements.
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Future Work

Potential Extensions:

- Integrate with more car listing platforms.
- Add more advanced search filters.

Long-term Vision:

- Expand to other markets (e.g., used cars, electric vehicles).
- Develop partnerships with car dealerships for exclusive deals.
- Enhance AI capabilities for more personalized experiences.

Further Development:

- Continuous improvement based on user feedback.
 - Explore additional AI and machine learning techniques.
 - Extend the chatbot's capabilities to other domains (e.g., car maintenance advice).
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Conclusion

Summary:

AutoBuddy aims to revolutionize the car shopping experience by providing a personalized, efficient, and user-friendly chatbot interface. It addresses the complexity of car shopping with advanced AI techniques.

Key Takeaways:

Successful integration of RAG pipeline for accurate responses.

Positive initial user feedback and high response accuracy.

Clear deployment and future development plan.

Final Thoughts:

The project showcases the practical application of AI in real-world scenarios, emphasizing the importance of user-centric design and continuous improvement.
