

E-COMMERCE CHAT ASSISTANT

CONVERSATIONAL AI FOR SMARTER SHOPPING
ASSISTANCE

Presented by Vaibhav Garg



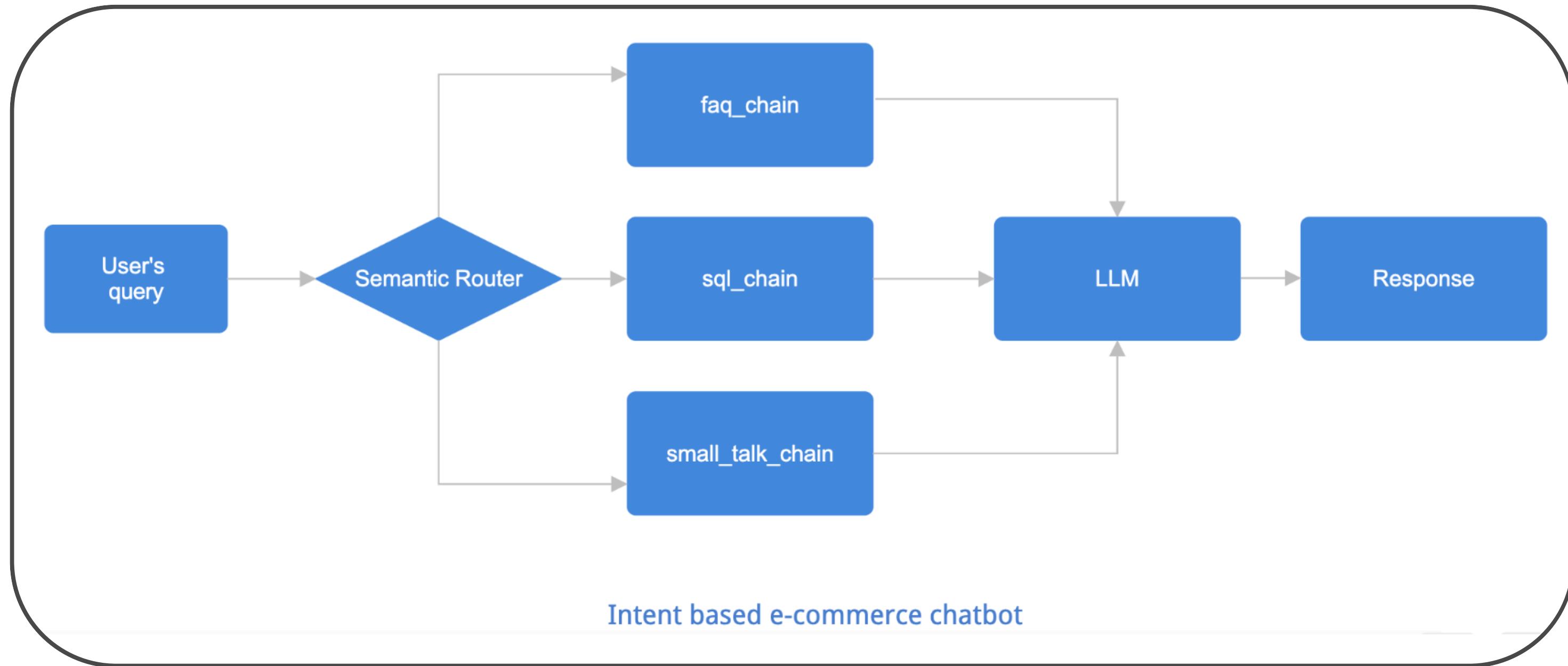
PROBLEM STATEMENT

- Traditional e-commerce platforms often overwhelm users with excessive information, making it difficult to quickly find relevant products or get clear answers to common questions.
- This results in high bounce rates, unanswered FAQs, and dependence on slow or inefficient customer support that diminishes user satisfaction.
- There is a growing need for a personalized, intelligent assistant that can deliver dynamic, helpful responses — whether it's locating products, resolving policy-related queries, or engaging in small talk.
- An AI-powered conversational agent equipped with product search, FAQ resolution, and natural dialogue capabilities can streamline user experience, reduce friction, and enhance engagement on e-commerce platforms.

PROJECT OBJECTIVES

- Develop a conversational AI assistant tailored for e-commerce that intelligently understands and responds to diverse user intents.
- Handle product search queries through semantic-to-SQL translation over a structured product database.
- Retrieve and answer policy-related FAQs using vector similarity from embedded documents stored in a ChromaDB.
- Respond to small talk or general queries with friendly, natural language interactions.
- Deliver a unified, interactive experience via a Streamlit-based web interface powered by large language models and intent-aware routing logic.

SYSTEM ARCHITECTURE



TECHNOLOGY STACK

This project integrates cutting-edge AI and lightweight web technologies to deliver a seamless and intelligent conversational experience on e-commerce platforms:

- **Frontend**
 - **Streamlit** : Used to build a responsive and interactive chat interface for handling product queries, FAQs, and casual conversation.
- **Language Model**
 - **Groq + LLaMA 3.3** : Provides ultra-fast inference for real-time natural language understanding and response generation across all user intents.
- **Semantic Routing & Embeddings**
 - **Sentence Transformers** : Uses the all-MiniLM-L6-v2 model for semantic embedding of user queries and intent classification.
 - **Semantic Router** : Determines whether the input query is a product search, FAQ, or small talk using embedding similarity

- **FAQ Retrieval**

- **ChromaDB** : Stores embedded FAQs locally and enables semantic similarity search for answering frequently asked questions accurately.

- **Product Query Handling**

- **SQLite** : Manages the e-commerce product catalog and enables dynamic SQL query execution for relevant product retrieval.

FUNCTIONAL WORKFLOW:

MULTI-INTENT CONVERSATIONAL AI AGENT

This chatbot system intelligently routes user queries through semantic understanding to provide instant, relevant responses across FAQs, product searches, and casual conversation — all within a unified interface.

1. Input & Preprocessing

- Users interact via a clean Streamlit UI.
- Each input is preprocessed (e.g., normalization, tokenization).
- Sentence Transformers encode the input into a semantic vector.

2. Intent Classification (Semantic Routing)

- The embedded input is compared to pre-defined intent embeddings using cosine similarity.
- The most probable intent is selected:
 - FAQ
 - Product Search (SQL)
 - Small Talk

3. Intent-Specific Processing

a. FAQ (Knowledge Base Retrieval)

- Query is used to perform a similarity search in ChromaDB (pre-embedded FAQ corpus).
- Relevant chunks are retrieved.
- A grounded response is generated using Groq LLM (LLaMA 3.3) based on the retrieved context.

b. Product Search (Dynamic SQL Execution)

- Natural language query is translated into a SQL query by the LLM.
- The SQL query is executed on the SQLite product database.
- Retrieved product info is formatted into a human-readable reply by the LLM.

c. Small Talk (Direct LLM Response)

- Casual conversation is directly handled by the LLM.
- No database or retrieval step involved.

4. Response Generation & Delivery


- Responses are grounded in actual product data, FAQs, or retrieval context.
- Groq-hosted LLaMA 3.3 ensures coherent, fluent replies.
- Multi-intent support ensures smooth, consistent interactions.
- Streamlit UI delivers responses in real time with a human-like tone.


KEY FEATURES

- **End-to-End Conversational Agent**
 - From understanding user intent to delivering precise answers, the system automates the full conversational flow across FAQs, product queries, and small talk.
- **Natural Language Q&A**
 - Users can interact using plain English, and receive accurate, context-aware responses using the LLaMA 3.3 model via Groq's ultra-fast inference engine.
- **AI-Powered Intent Routing & Retrieval**
 - Leverages Sentence Transformers for semantic intent classification and ChromaDB for retrieving the most relevant FAQ content, enabling personalized and intelligent responses.
- **Streamlit-Powered Web UI**
 - An interactive, easy-to-use chat interface allows users to engage naturally with the assistant, offering a seamless and responsive experience.
- **Modular & Scalable Architecture**
 - Designed with separation of concerns—intent classification, response generation, and data access—making it easily extendable to new domains or functionality.


USER INTERACTION PREVIEW


E-commerce Chat Assistant


 Do you sleep?

 I'm a computer program, so I don't need sleep, and I'm always here to help you shop. How can I assist you with your shopping today?

 What should I do if I receive a damaged product?

 You should contact our support team within 48 hours for a replacement or refund.

 List high-rated shoes (rating ≥ 4.5) with at least 200 reviews.

-  1. GO WALK JOY-CENTERPIECE Walking Shoes For Women: ₹2999 (40% off), Rating: 4.5
[View Product](#)
2. LITE RACER 3.0 Running Shoes For Women: ₹2500 (49% off), Rating: 4.5
[View Product](#)
3. BOOND Running Shoes For Women: ₹1447 (19% off), Rating: 4.5
[View Product](#)

Type your query here (e.g., refund policy, track order, or say hi)



PROJECT SUMMARY

- Built a conversational AI agent for e-commerce that understands diverse user intents — including FAQs, product search, and casual small talk — via a unified interface.
- Preprocessed FAQs and product data; stored FAQ embeddings in ChromaDB and product listings in a dynamic SQLite database.
- Used Sentence Transformers for semantic intent classification and Groq's LLaMA 3.3 model for ultra-fast, context-aware response generation.
- Implemented intent routing logic:
 - FAQ queries use context-grounded document retrieval from ChromaDB.
 - Product queries are converted into SQL via LLM and executed on SQLite.
 - Small talk is directly handled via LLM prompts.
- Integrated the full workflow into an interactive Streamlit app that allows users to chat naturally and receive fast, relevant answers in real time.
- Live App: <https://vaibhav-project-e-commerce-chat-assistant.streamlit.app/>
- GitHub Repository: <https://github.com/vaibhavgarg2004/E-commerce-Chat-Assistant>



THANK YOU