OrderFox

Retrieval-Augmented Generation LLM Agent

Bayes Brigade

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Problem description

Transform messy web data into structured knowledge and build an intelligent agent on top of it.

Problem description

Develop a working prototype of a RAG agent that can answer user questions based on a web-scraped company dataset, built with the target user being a supply chain director

Background

- Large Language Models (LLMs)
- Retrieval-Augmented Generation (RAG)
- Text Embeddings
- Vector Databases
- Inverted Index
- Prompt Engineering

(1) Parsing and Preprocessing

- Removal of non-informative .css and .js pages using regex on URLs
- Filtered out pages with _jb_static or _static in the path
- Skipped files that couldn’t be decoded with UTF-8
- Reduced data from 17 GB → 5 GB after initial cleanup
- Applied MinHash on a subset to remove repetitive text (headers/footers)
- Achieved an additional 60% reduction on the subset

(2) Knowledge base design

- Vector database
    - ChromaDB
    - Used all-MiniLM-L6-v2”to generate embeddings
- Inverted Index
- Named Entity SQL

Split text data into 4096 character chunks with 2048 character overlap
SQL DB for structured info like regions/products, but limited by parsing quality vs speed

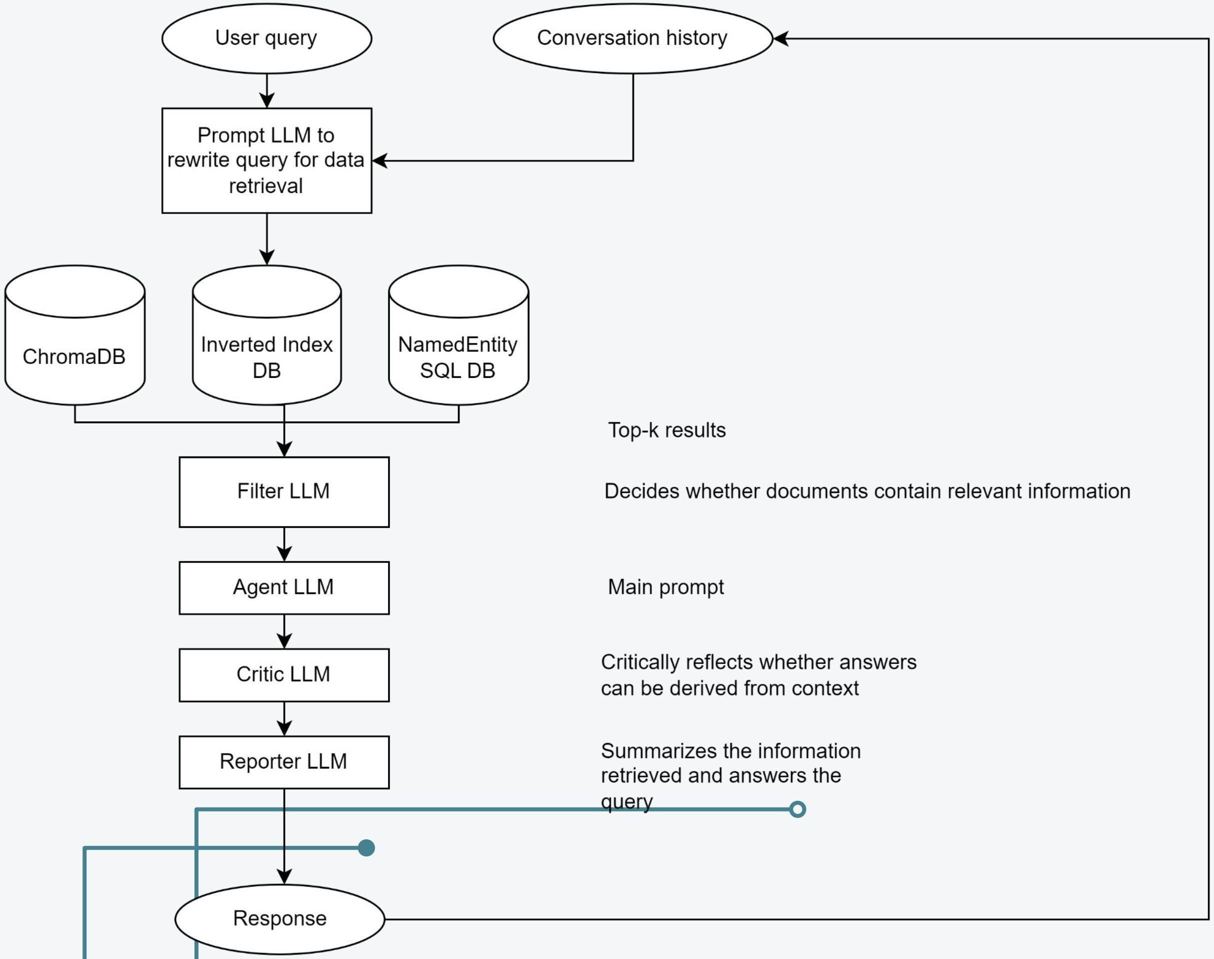
- Inverted Index added for fast keyword-based document matching
- Combined vector and inverted index for hybrid retrieval

(3) Retrieval system

- User query passed through prompt-engineered o1-mini
    - Reformats into an optimized vector DB query
    - Maintains context from prior questions
- Queries Vector, Inverted Index, and Named Entity SQL Database
- Top 5 results from each retrieved using filenames and URLs
- Results re-filtered through o1-mini for context quality
- Final context passed to the generation agent

(4) Generation agent

- Takes filtered context and applies strict or loose RAG settings
- Uses a “critic” agent to validate factual accuracy
- Final output created by a “reporter” agent for clarity and completeness
- Modular pipeline allows layered checks and fine-tuned generation



User query

Conversation history

Prompt LLM to rewrite query for data retrieval

ChromaDB

Inverted Index DB

NamedEntity SQL DB

Top-k results

Filter LLM

Decides whether documents contain relevant information

Agent LLM

Main prompt

Critic LLM

Critically reflects whether answers can be derived from context

Reporter LLM

Summarizes the information retrieved and answers the query

Response

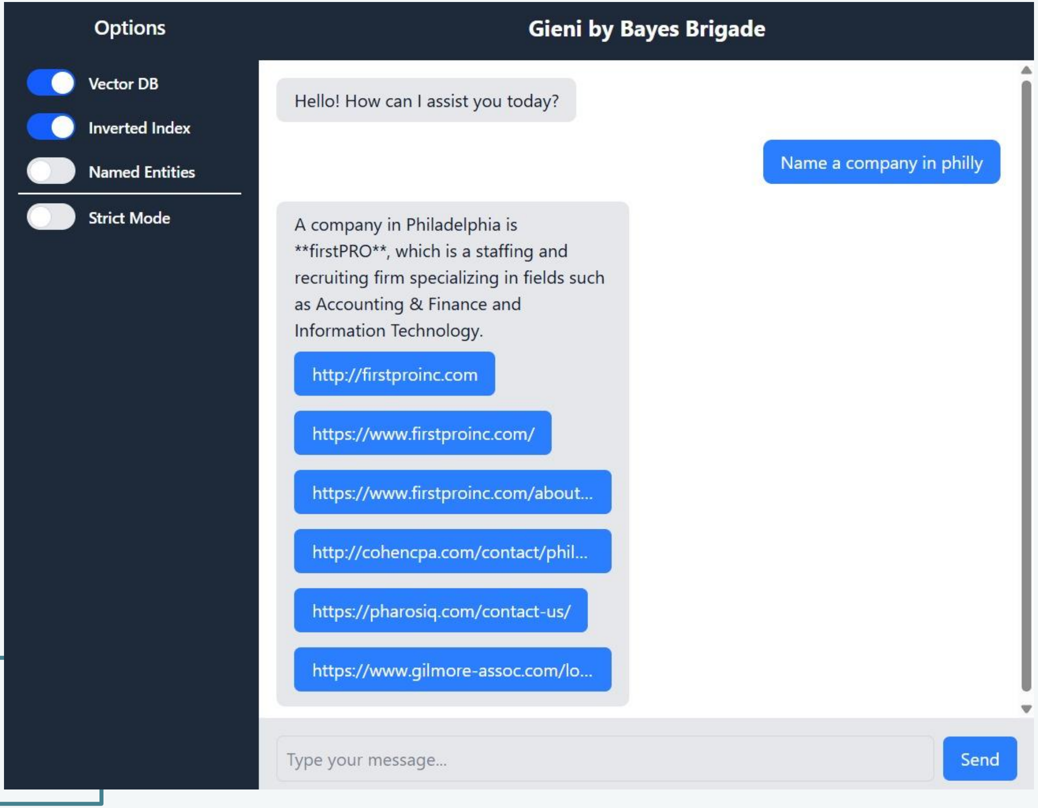
(5) Bonus

- Designed a simple user chat interface for easy interaction
- Hosted interface through a tunnel for quick access by judges
- User settings available to:
  - Enable/disable each database (Vector, Inverted Index, SQL Entity)
  - Enable/disable strict RAG generation
- Positive Results:
  - Answered example and constructed queries effectively
  - Returned clear and relevant responses in a reasonable amount of time
  - Responses were helpful and aligned with the company’s HTML data

Results

User query: How can i contact American Cruise Lines?
Ground Truth example: By phone: 800-460-4518 or by mail
Strict RAG answer: You can contact American Cruise Lines by calling their toll-free number at 800-460-4518. For customer inquiries, you can also reach them via email at Inquiry@AmericanCruiseLines.com. If you have a media-related inquiry, you can email Media@AmericanCruiseLines.com.

The Tool speaks for itself (and the report)



Vector DB ●
Inverted Index ●
Named Entities ○
Strict Mode ○

Hello! How can I assist you today?

Name a company in philly

A company in Philadelphia is **firstPRO**, which is a staffing and recruiting firm specializing in fields such as Accounting & Finance and Information Technology.

http://firstproinc.com

https://www.firstproinc.com/

https://www.firstproinc.com/about...

http://cohencpa.com/contact/phil...

https://pharosiq.com/contact-us/

https://www.gilmore-assoc.com/lo...

The Tool speaks for itself

http://go.snb.li/datathon

Results

Retrieved Documents: ['https://www.starmark.com', 'https://interexy.com’, 'http://starmark.com', 'https://stuenterprises.com', 'https://thinkstrategic.com', 'http://stearnsweaver.com', 'https://1105media.com, 'https://stuenterprises.com']
Ground Truth example: starmark.com (and others possible)
Loose RAG answer: Starmark, an agency based in Fort Lauderdale, FL, utilizes Agile Methodologies in their marketing practices. They emphasize a team-driven environment, fostering collaboration throughout the project lifecycle, and implement bi-weekly sprints to enhance teamwork and effectiveness.

```
[ResponseOutputMessage(id='msg_67f23b8893688192adae2966b998c80c0b9bd7377460
a2d8', content=[ResponseOutputText(annotations=[], text='New Query: What is the annual
number of orders processed by amsfulfillment?', type='output_text')], role='assistant',
status='completed', type='message')]
Response(id='resp_67f23b923edc8192b226f4f368c22f7b0100903590214767',
created_at=1743928210.0, error=None, incomplete_details=None, instructions=None,
```