System Design: Doctor Recommendation System

1. Overview

The system helps recommend doctors based on patient reports using an embedding-based similarity search with ChromaDB and LLM-generated explanations.

2. Key Components

Frontend (CLI)

- **User Input**: Patients enter symptoms, history, and diagnosis.
- **Rich Console UI**: Uses rich for formatted CLI output.

Backend

- **Database (ChromaDB)**: Stores doctor profiles as vector embeddings for fast retrieval.
- **LLM Integration (Ollama, Groq API)**:
  - **Ollama**: Generates explanations on doctor suitability.
  - **Groq API**: Generates synthetic doctor profiles if the database needs new data.

Data Pipeline

- **Profile Ingestion**: Fetches or generates doctor profiles via an API, formats them into JSON, and stores them in ChromaDB.
- **Query Processing**: Converts patient reports into embeddings and retrieves the most relevant doctor profiles.
- **Ranking & Filtering**: Filters out irrelevant doctors, sorts by similarity, and applies additional heuristics.

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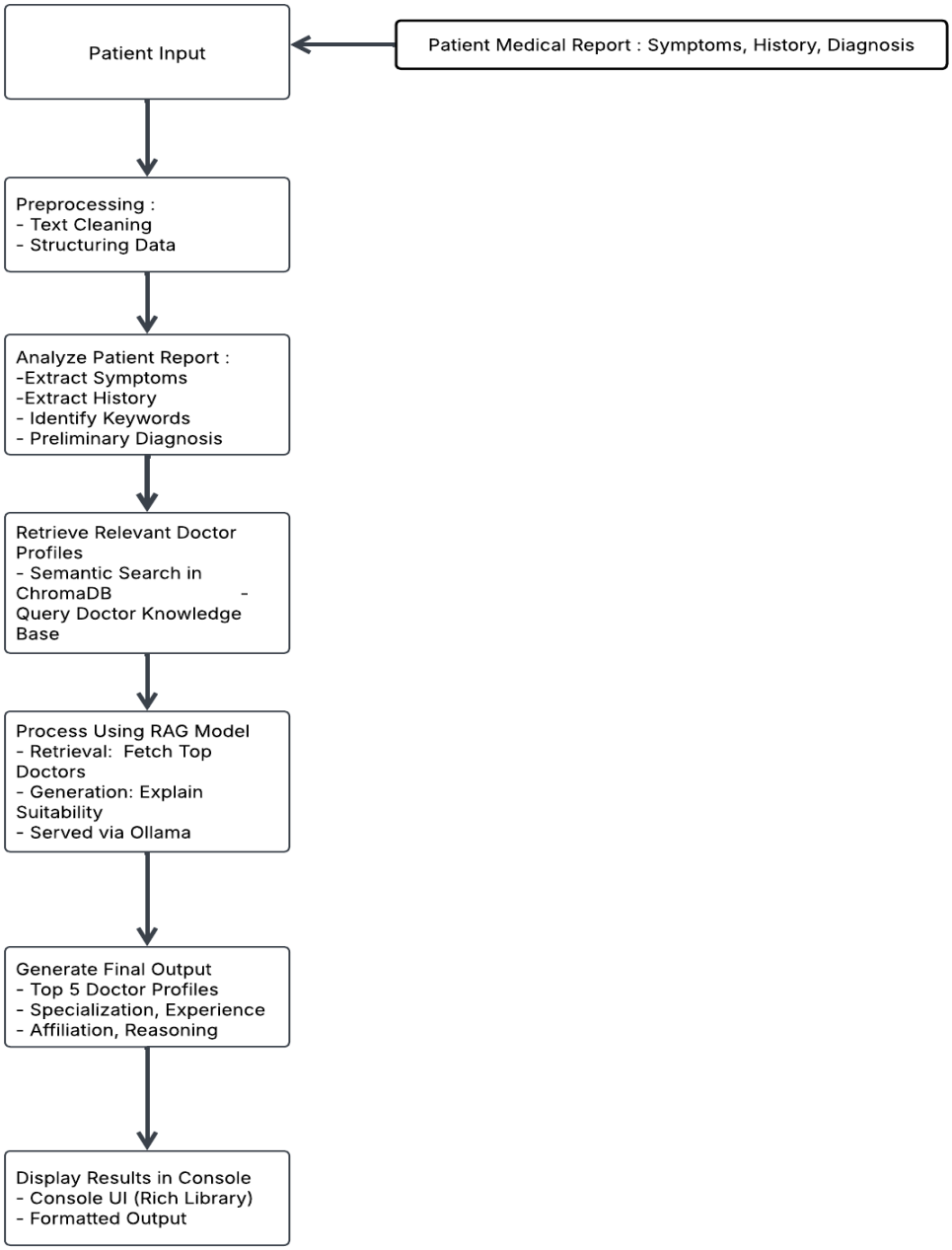
3. Data Flow

1. **User submits patient report** → CLI captures input.
2. **Query doctor profiles** → Convert patient report to embeddings and retrieve the top N matches from ChromaDB.
3. **Filter relevant specializations** → Ensures returned doctors match the required specialization.
4. **Generate doctor suitability explanation** → Uses Ollama LLM to justify recommendations.
5. **Display recommendations** → Outputs top 5 results with formatted details.

4. Technology Stack

- **Programming Language**: Python
- **Database**: ChromaDB (Vector DB)
- **LLM Models**: MedLlama2 (Ollama), Llama3 (Groq API)
- **Memory Optimization**: psutil (to monitor and prevent high memory usage)



Profiles saving to ChromaDB:

```
Sleeping for 29.90 seconds...

4 profiles added to ChromaDB.
Batch Processed: 10 profiles
Total Profiles in ChromaDB: 95
Sleeping for 28.75 seconds...

1 profiles added to ChromaDB.
Batch Processed: 10 profiles
Total Profiles in ChromaDB: 96
Sleeping for 17.47 seconds...

No new profiles to add.
Batch Processed: 10 profiles
Total Profiles in ChromaDB: 96
Sleeping for 15.91 seconds...

1 profiles added to ChromaDB.
Batch Processed: 10 profiles
Total Profiles in ChromaDB: 97
Sleeping for 19.73 seconds...

2 profiles added to ChromaDB.
Batch Processed: 10 profiles
Total Profiles in ChromaDB: 99
Sleeping for 22.27 seconds...
```

Generation and Retrieval of Top 5 Doctor Profiles:

would be necessary. The patient may need to consult with an oncologist for more detailed advice and management of their condition.

A pulmonologist can provide early detection and management of this serious disease, while the multidisciplinary team will help coordinate care across specialties if needed.

3. Dr. David Lee

- Specialization: **Oncology**
- Experience: **18 years**
- Similarity Score: **1.4562686459276624**
- Why: Dr. David Lee's specialization in Oncology, combined with his long experience as a practicing physician (18 years), and patient history that suggests smoking and a family history of lung cancer, suggest that he would be well-equipped to make an accurate diagnosis. Smoking is one of the primary risk factors for lung cancer. He could consider ordering further testing such as chest X-rays or CT scans to confirm his suspicion.

4. Dr. Alexander White

- Specialization: **Pulmonology**
- Experience: **12 years**
- Similarity Score: **1.4991760854369018**
- Why: This doctor has the relevant training and experience in Pulmonology to diagnose and manage Lung Cancer. As a smoker himself, Dr White would be aware of the increased risk of developing lung cancer compared to non-smokers. However, he should also consider other potential causes of coughing, shortness of breath, and chest pain such as asthma or pneumonia. A CT scan and biopsy may be necessary for diagnosis, followed by further consultation with a radiation oncologist to discuss treatment options.

5. Dr. Liam Brooks

- Specialization: **Oncology**
- Experience: **14 years**
- Similarity Score: **1.5231346108250647**
- Why: This oncologist has the right level of experience (14) to handle this case. She's also a specialist in her field and likely has experience with lung cancer cases.