HepaBot

Group members:
Hasnain Sohail 24280029

Scope and Deliverables

🎓 **Project Title:**
HepaBot – An AI-powered Voice Assistant for Liver Diagnostics and Report Generation

📝 **Brief Description:**
Streamlines clinical documentation by transcribing doctor-patient conversations, performing speaker and role identification, and auto-generating structured medical reports.

📊 **System Overview:**

- **Input:** Audio from real-time patient consultation or uploaded recordings
- **Processing:** Whisper for transcription → Pyannote for diarization → ClinicalBERT for role classification
- **Output:** Structured, labeled medical report (D: Doctor / P: Patient) in .txt / .csv formats

✨ **What Makes It Unique:**

- Context-aware retrieval from fragmented medical speech
- Structured doctor-patient dialogue generation
- Role classification using fine-tuned ClinicalBERT
- Granular section-level search (symptoms, diagnoses, treatments)
- Auto-generated clinical summaries from fragmented records
- AI enhanced queries

🎯 **Intended Audience:**

- Clinical QA teams
- Medical researchers
- Hospital digitization staff

Project Progress

📦 **Deliverables & Completion:**

- ✅ Transcription (Whisper) – 100%
- 🔄 Speaker Diarization – 50%
- 🔄 PDF-to-Structured Pipeline – 70%
- 🧠 Vector Search & Retrieval – 40%
- 📈 Analytics Dashboard – 70%
- 📄 Auto-Report Generation – 80%

📌 **Current Status:**

- ✅ Working: Audio pipeline, basic semantic search, role classification, report generation
- ⚠ Blockers: Custom model inference on Hugging Face, UML-based entity extraction

🛠 **Tech Stack:**

- **Frameworks:** Streamlit, LangChain, ChromaDB
- **Models:** Whisper, pyannote.audio v3.x, ClinicalBERT (fine-tuned), LLaMA-3 (via Ollama)
- **Languages & Libraries:** PyTorch, HuggingFace Transformers, Pandas, Scikit-learn

📏 **Evaluation Metrics:**

- Transcription WER (planned)
- Accuracy for role classification (TBD)
- Latency for real-time pipeline

Live Demo Highlights

💻 What You'll Showcase Live:

1. Audio-to-Transcript flow using Whisper
2. Speaker Diarization results
3. Role Identification via ClinicalBERT
4. Downloadable D/P Structured Report
5. Summary Generation
6. Structured Json creation and storing in Vector DB
7. Patient Analytics
8. Semantic Search (Partially)
9. Enhanced Search capabilities with AI

📸 Key Outputs / UI Elements:

- 🎙 Transcription text area
- 🎭 Speaker-labeled segments
- 🧑‍⚕️ Role-tagged final dialogue (D: / P:)
- ⬇ CSV and TXT report download

💡 Technical Wins:

- ClinicalBERT role detection on noisy transcripts
- Pyannote.audio v3.x migration (modern pipeline adaptation)
- Whisper performance optimization on long consultations
- Hybrid retrieval using both vector search and structured metadata
- Fine-tunning Llama2 7b on medical dataset using PEFT

What’s Next:

- Improve diarization speaker-label accuracy
- Refine prompt tuning for LLaMA-3 to enhance semantic search
- Deploy on Streamlit Cloud / Hugging Face Spaces

⚙ **Solving Blockers / Boosting Performance:**

- Enable gated model access with HuggingFace tokens
- Entity extraction via MedSpaCy or UML graph embeddings
- Caching for inference speed-up and latency reduction

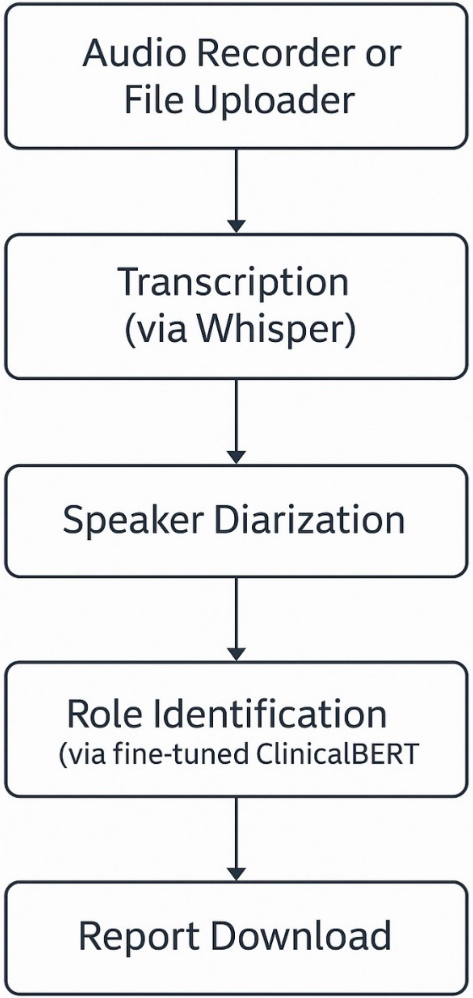
📡 **Hosting Plan:**

- Target: Streamlit Cloud for lightweight deployment
- Backup: Local Dockerized version for hospitals without public cloud access

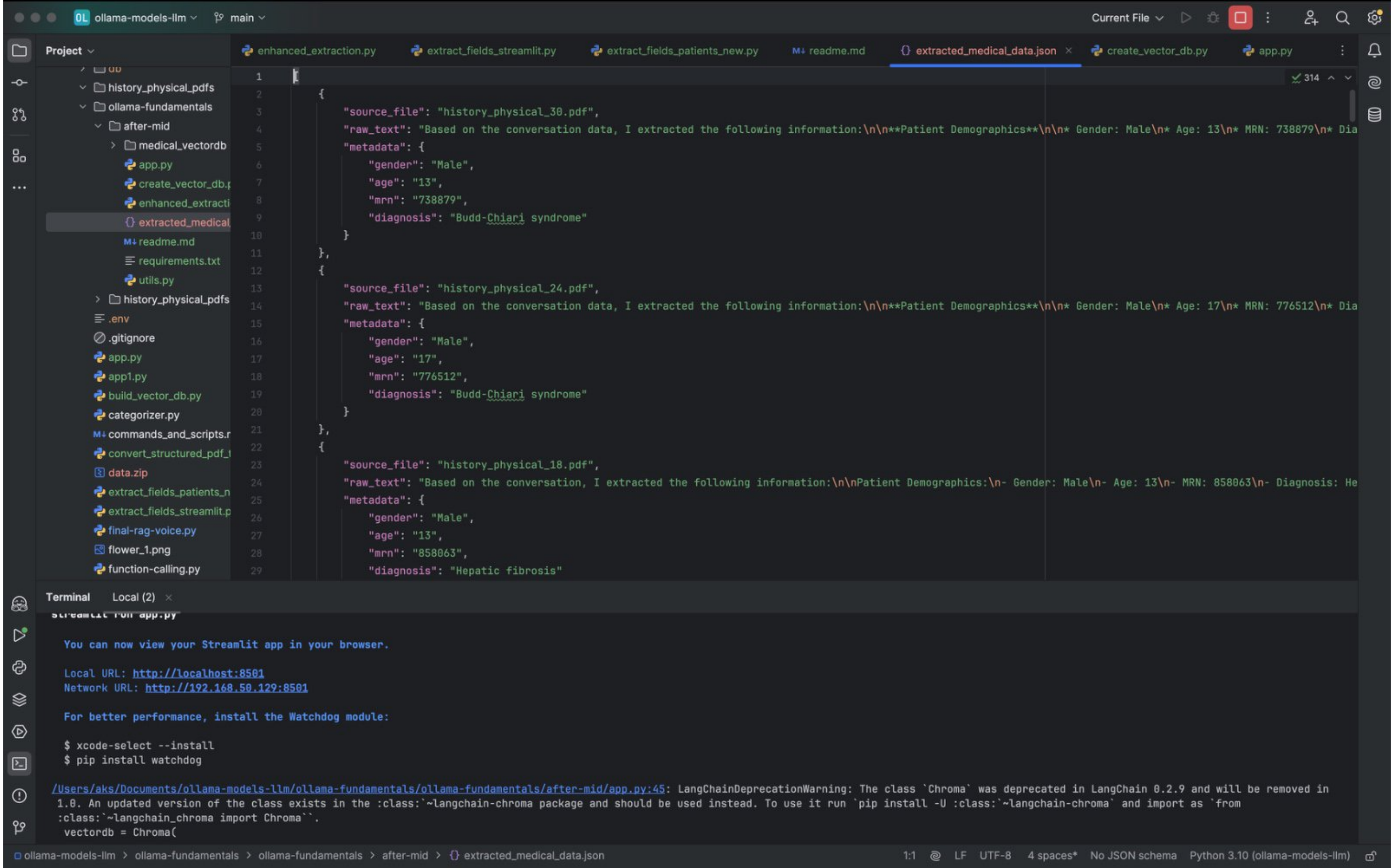
□ **Dependencies / Support Needed:**

- HuggingFace token access to pyannote/speaker-diarization
- Guidance on advanced speaker-role assignment logic (multi-speaker cases)

SCREENSHOTS



Audio Recorder or File Uploader
Transcription (via Whisper)
Speaker Diarization
Role Identification
(via fine-tuned ClinicalBERT
Report Download



```
[
    {
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        "raw_text": "Based on the conversation data, I extracted the following information:\n\n**Patient Demographics**\n\n* Gender: Male\n* Age: 13\n* MRN: 738879\n* Dia
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            "gender": "Male",
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            "diagnosis": "Budd-Chiari syndrome"
        }
    },
    {
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        "metadata": {
            "gender": "Male",
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            "diagnosis": "Budd-Chiari syndrome"
        }
    },
    {
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        "raw_text": "Based on the conversation, I extracted the following information:\n\nPatient Demographics:\n- Gender: Male\n- Age: 13\n- MRN: 858063\n- Diagnosis: He
        "metadata": {
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            "age": "13",
            "mrn": "858063",
            "diagnosis": "Hepatic fibrosis"
```
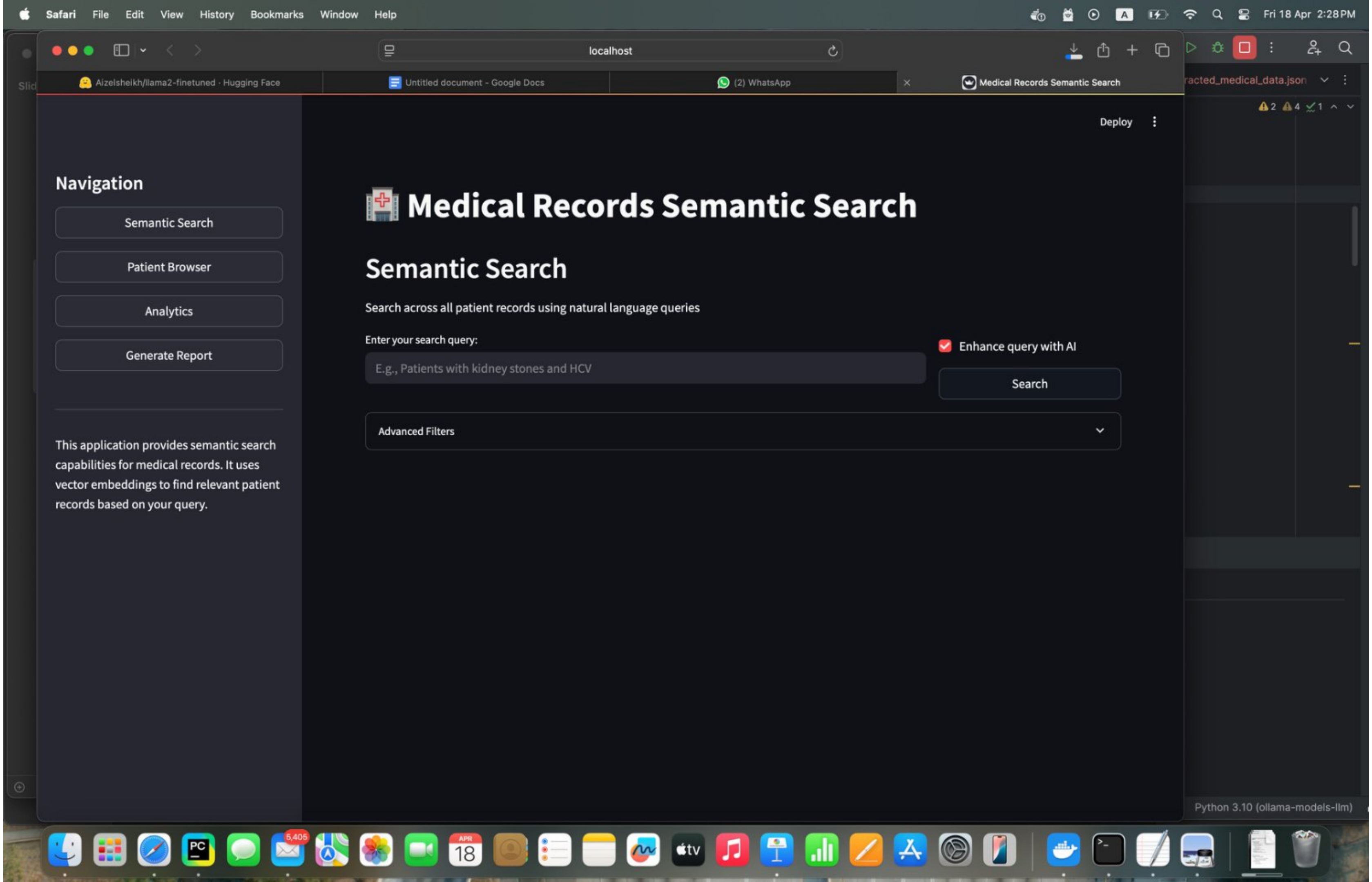

```
streamlit run app.py

  You can now view your Streamlit app in your browser.

  Local URL: http://localhost:8501
  Network URL: http://192.168.50.129:8501

  For better performance, install the Watchdog module:

  $ xcode-select --install
  $ pip install watchdog

/Users/aks/Documents/ollama-models-llm/ollama-fundamentals/ollama-fundamentals/after-mid/app.py:45: LangChainDeprecationWarning: The class `Chroma` was deprecated in LangChain 0.2.9 and will be removed in
 1.0. An updated version of the class exists in the :class:`~langchain-chroma package and should be used instead. To use it run `pip install -U :class:`~langchain-chroma` and import as `from
 :class:`~langchain_chroma import Chroma``.
  vectordb = Chroma(
```



🏥 Medical Records Semantic Search

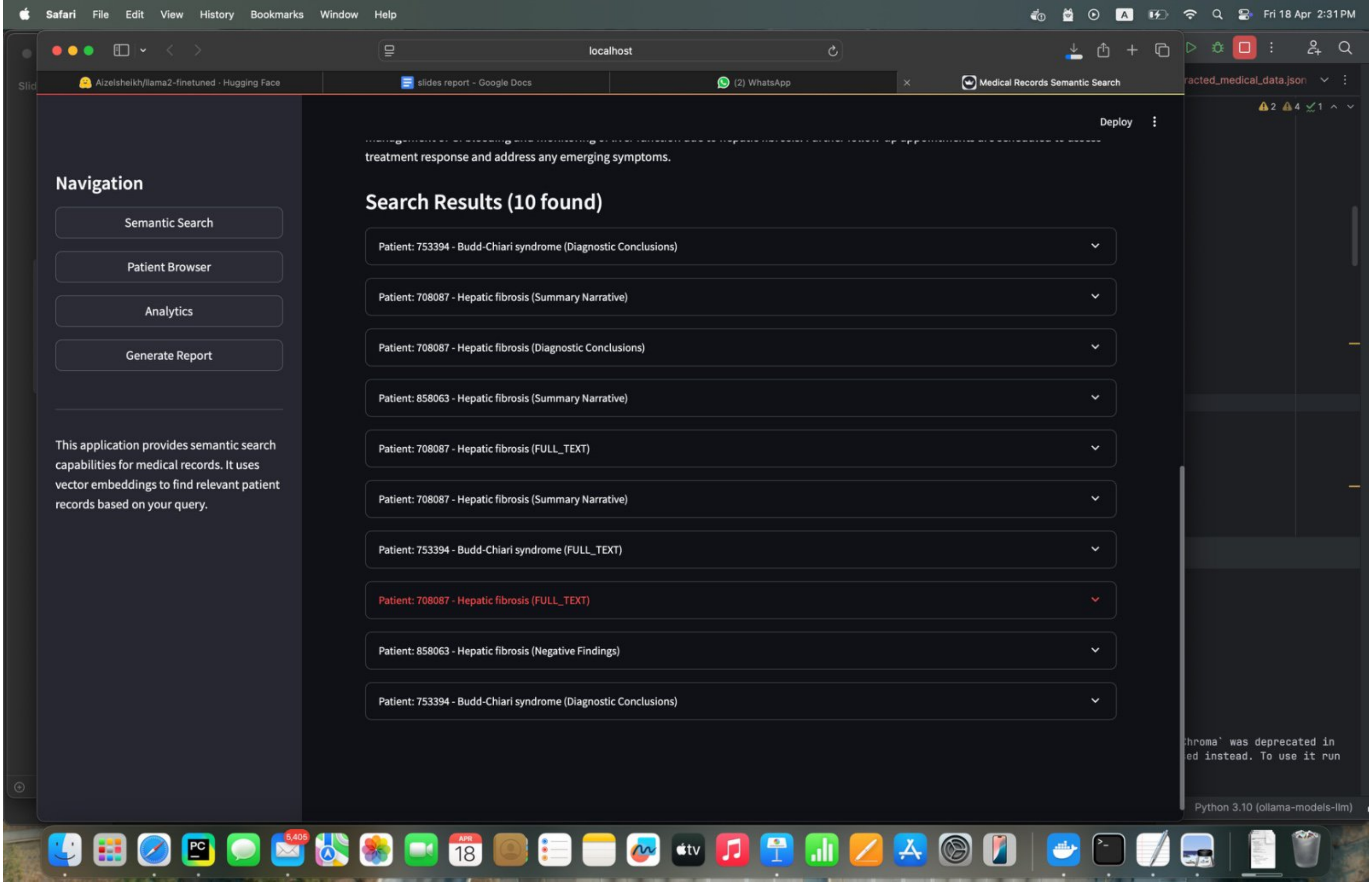
Semantic Search

Search across all patient records using natural language queries

Enter your search query: E.g., Patients with kidney stones and HCV

☑ Enhance query with AI

This application provides semantic search capabilities for medical records. It uses vector embeddings to find relevant patient records based on your query.



treatment response and address any emerging symptoms.

Search Results (10 found)

Patient: 753394 - Budd-Chiari syndrome (Diagnostic Conclusions)

Patient: 708087 - Hepatic fibrosis (Summary Narrative)

Patient: 708087 - Hepatic fibrosis (Diagnostic Conclusions)

Patient: 858063 - Hepatic fibrosis (Summary Narrative)

Patient: 708087 - Hepatic fibrosis (FULL_TEXT)

Patient: 708087 - Hepatic fibrosis (Summary Narrative)

Patient: 753394 - Budd-Chiari syndrome (FULL_TEXT)

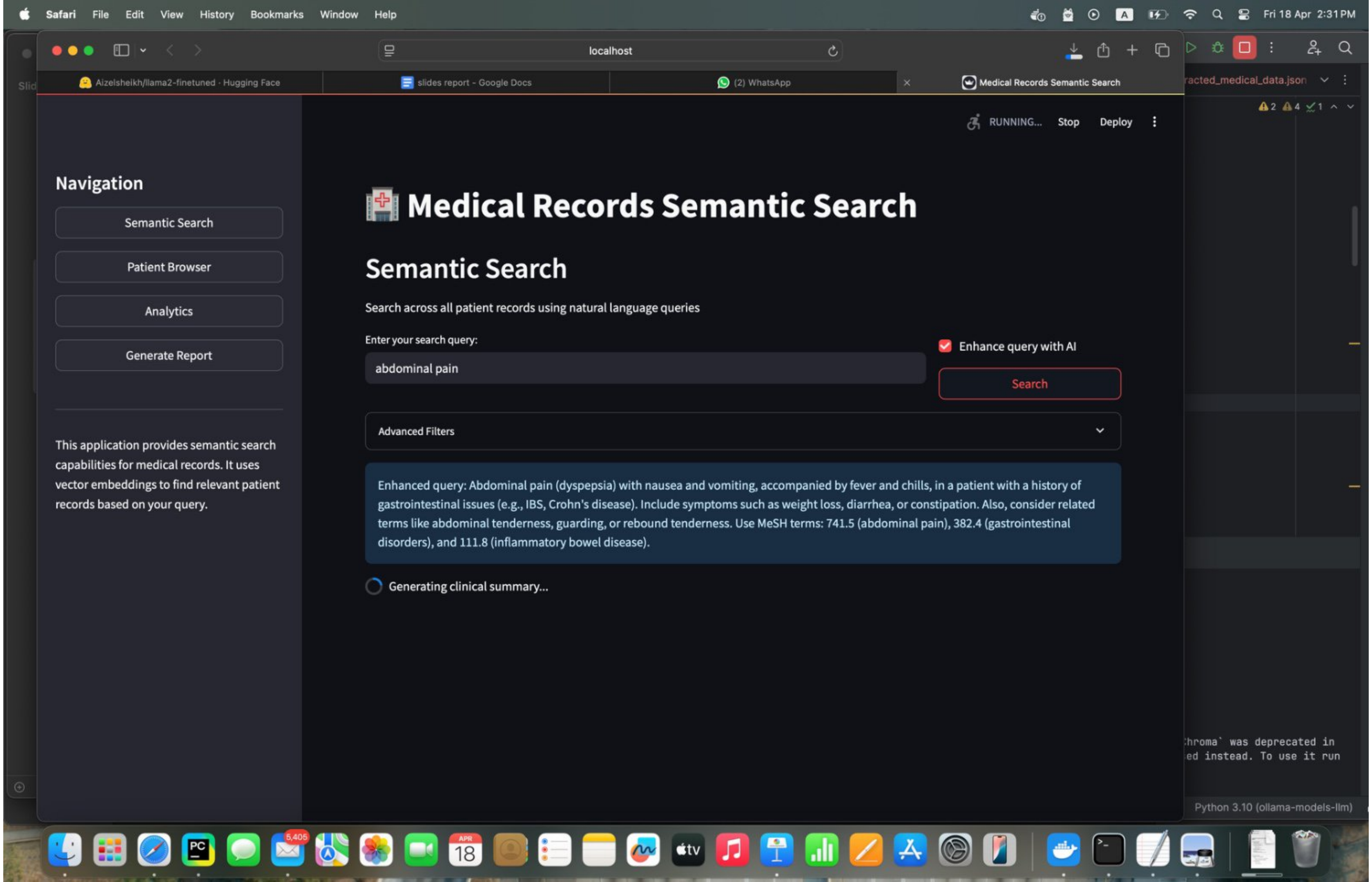
Patient: 708087 - Hepatic fibrosis (FULL_TEXT)

Patient: 858063 - Hepatic fibrosis (Negative Findings)

Patient: 753394 - Budd-Chiari syndrome (Diagnostic Conclusions)

This application provides semantic search capabilities for medical records. It uses vector embeddings to find relevant patient records based on your query.

```
hroma` was deprecated in
ed instead. To use it run
```


Safari File Edit View History Bookmarks Window Help
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localhost
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slides report - Google Docs
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Medical Records Semantic Search
racted_medical_data.json
RUNNING...
Stop
Deploy
Navigation
Semantic Search
Patient Browser
Analytics
Generate Report
Search
Advanced Filters
hroma` was deprecated in
ed instead. To use it run
Python 3.10 (ollama-models-llm)

🏥 Medical Records Semantic Search

Semantic Search

Search across all patient records using natural language queries

Enter your search query:

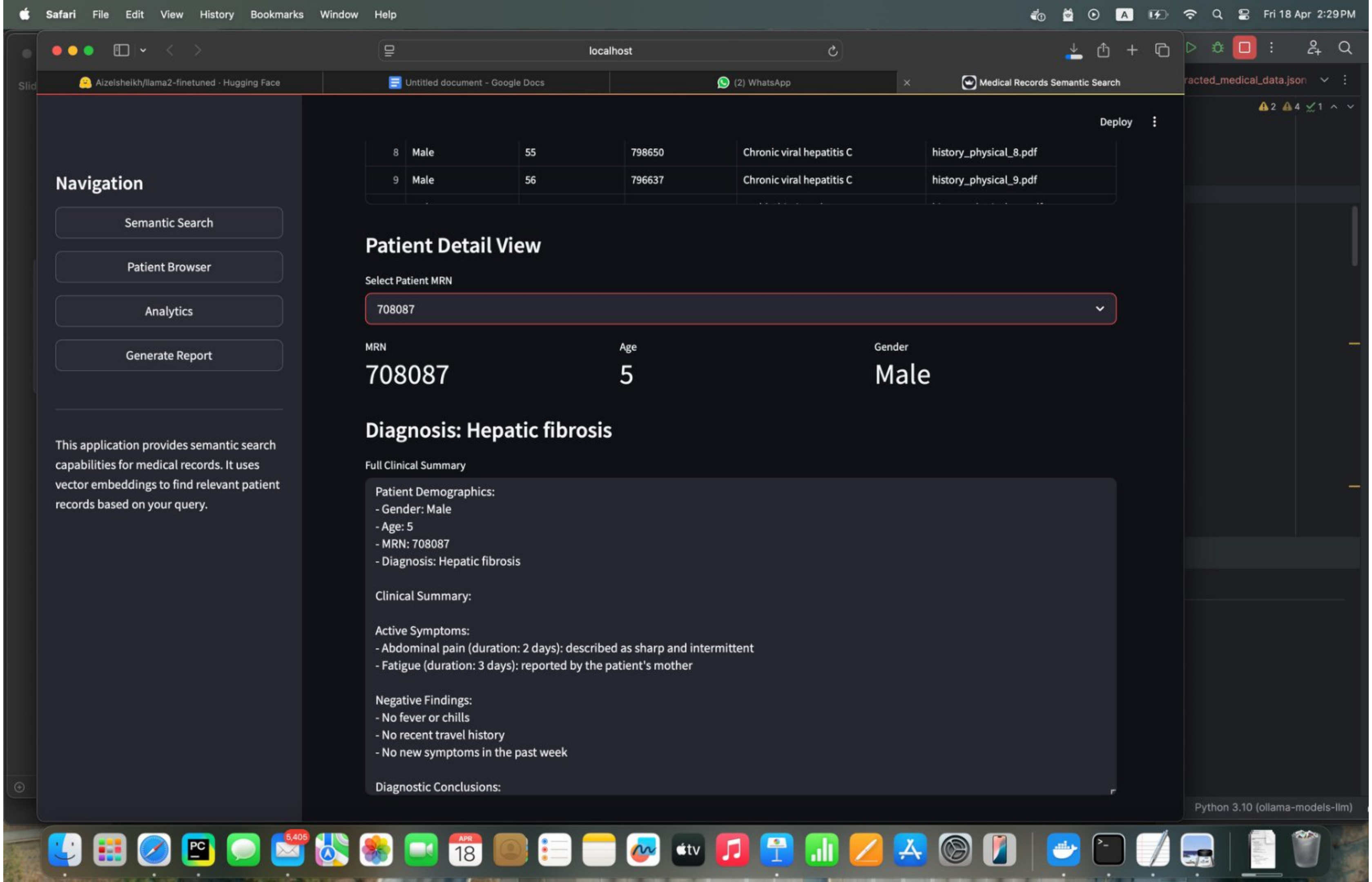
abdominal pain

☑ Enhance query with AI

Enhanced query: Abdominal pain (dyspepsia) with nausea and vomiting, accompanied by fever and chills, in a patient with a history of gastrointestinal issues (e.g., IBS, Crohn's disease). Include symptoms such as weight loss, diarrhea, or constipation. Also, consider related terms like abdominal tenderness, guarding, or rebound tenderness. Use MeSH terms: 741.5 (abdominal pain), 382.4 (gastrointestinal disorders), and 111.8 (inflammatory bowel disease).

Generating clinical summary...

This application provides semantic search capabilities for medical records. It uses vector embeddings to find relevant patient records based on your query.



This application provides semantic search capabilities for medical records. It uses vector embeddings to find relevant patient records based on your query.

8	Male	55	798650	Chronic viral hepatitis C	history_physical_8.pdf
9	Male	56	796637	Chronic viral hepatitis C	history_physical_9.pdf

Patient Detail View

Select Patient MRN

708087

MRN	Age	Gender
708087	5	Male

Diagnosis: Hepatic fibrosis

Full Clinical Summary

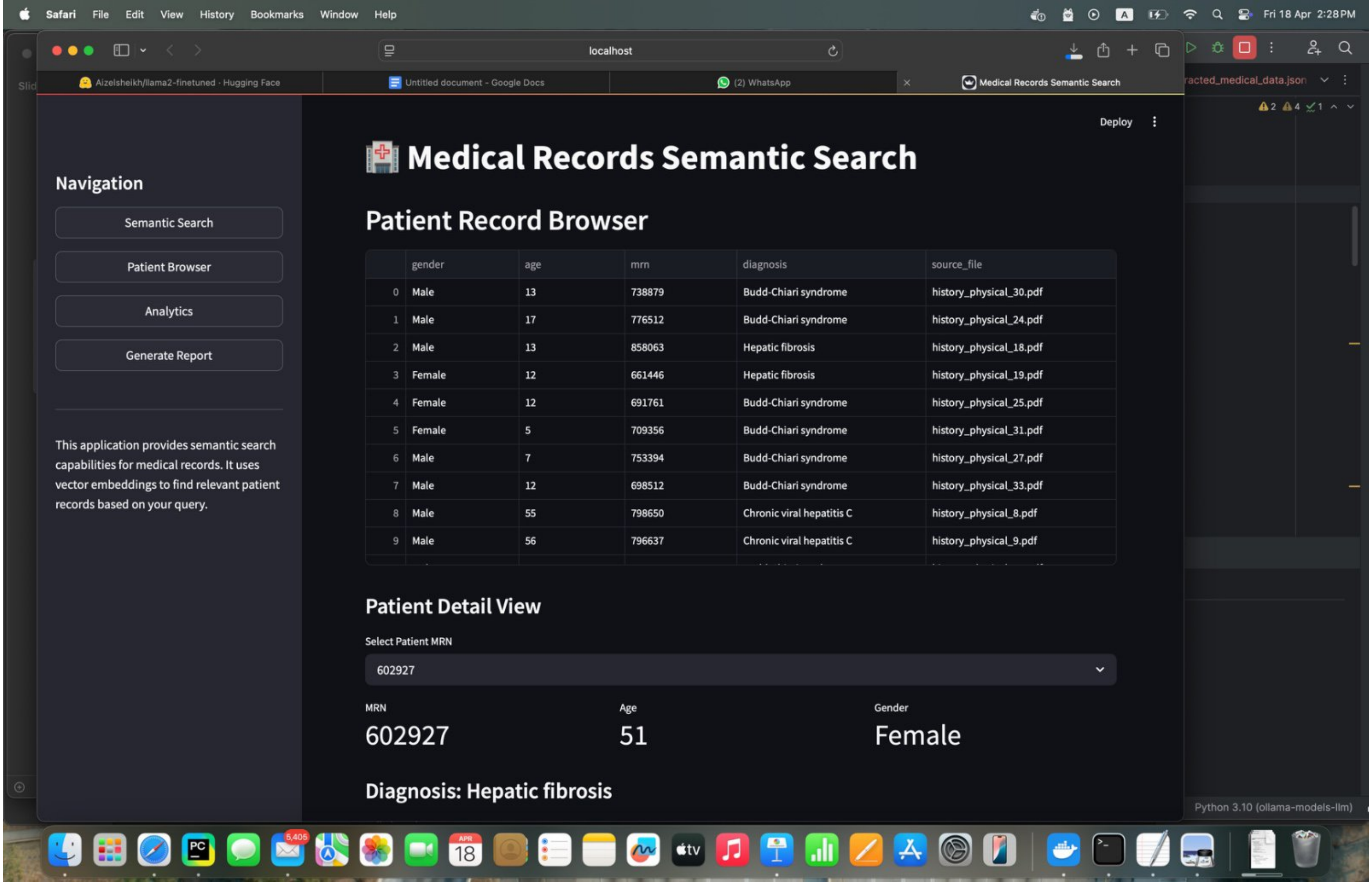
```
Patient Demographics:
- Gender: Male
- Age: 5
- MRN: 708087
- Diagnosis: Hepatic fibrosis

Clinical Summary:

Active Symptoms:
- Abdominal pain (duration: 2 days): described as sharp and intermittent
- Fatigue (duration: 3 days): reported by the patient's mother

Negative Findings:
- No fever or chills
- No recent travel history
- No new symptoms in the past week

Diagnostic Conclusions:
```


Safari
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Bookmarks
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Help
Fri 18 Apr 2:28 PM
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Untitled document - Google Docs
(2) WhatsApp
Medical Records Semantic Search
racted_medical_data.json
Deploy
Python 3.10 (ollama-models-llm)

Navigation

Semantic Search

Patient Browser

Analytics

Generate Report

This application provides semantic search capabilities for medical records. It uses vector embeddings to find relevant patient records based on your query.

🏥 Medical Records Semantic Search

Patient Record Browser

	gender	age	mrn	diagnosis	source_file
0	Male	13	738879	Budd-Chiari syndrome	history_physical_30.pdf
1	Male	17	776512	Budd-Chiari syndrome	history_physical_24.pdf
2	Male	13	858063	Hepatic fibrosis	history_physical_18.pdf
3	Female	12	661446	Hepatic fibrosis	history_physical_19.pdf
4	Female	12	691761	Budd-Chiari syndrome	history_physical_25.pdf
5	Female	5	709356	Budd-Chiari syndrome	history_physical_31.pdf
6	Male	7	753394	Budd-Chiari syndrome	history_physical_27.pdf
7	Male	12	698512	Budd-Chiari syndrome	history_physical_33.pdf
8	Male	55	798650	Chronic viral hepatitis C	history_physical_8.pdf
9	Male	56	796637	Chronic viral hepatitis C	history_physical_9.pdf

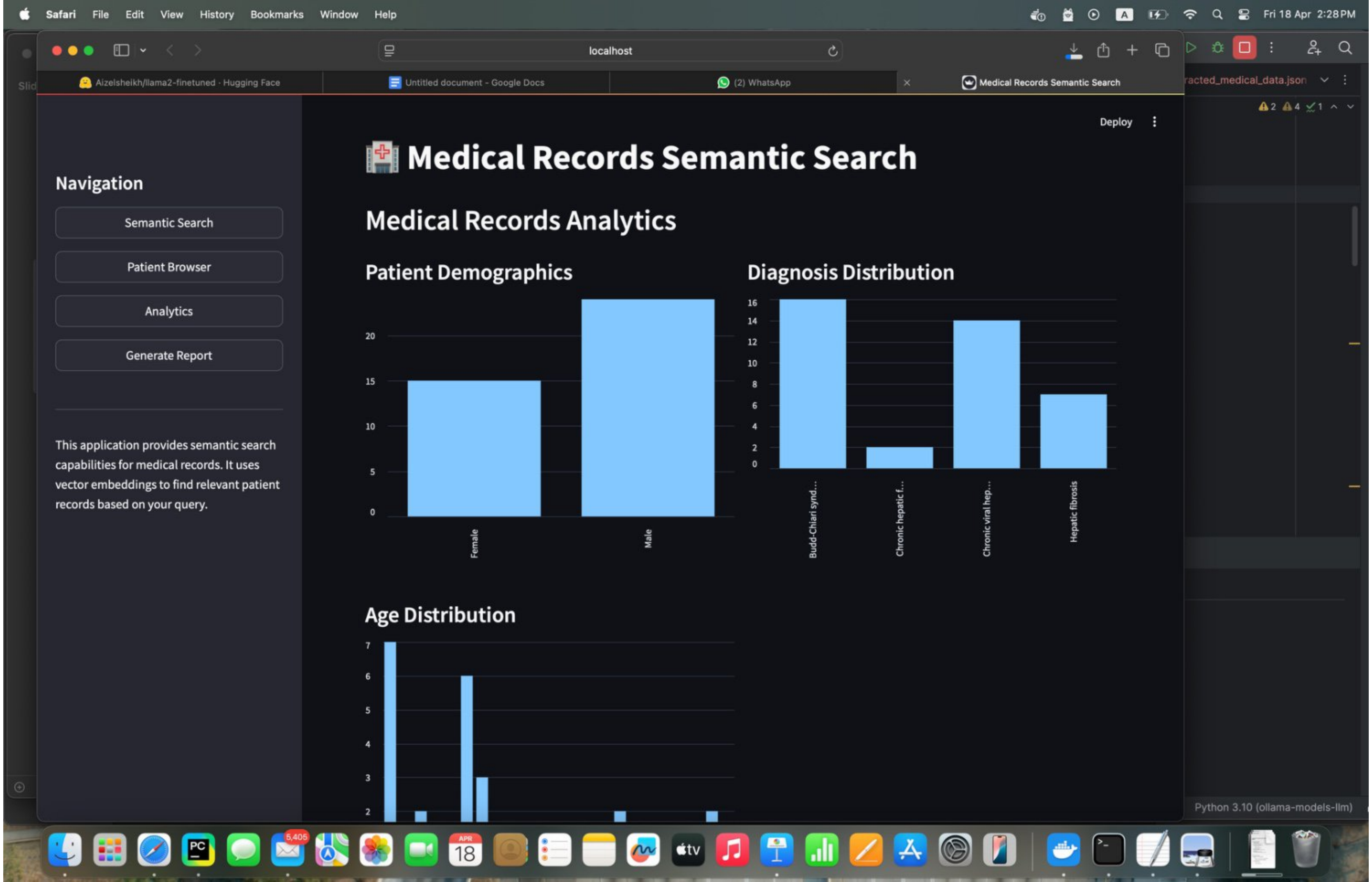
Patient Detail View

Select Patient MRN

602927

MRN	Age	Gender
602927	51	Female

Diagnosis: Hepatic fibrosis



🏥 Medical Records Semantic Search

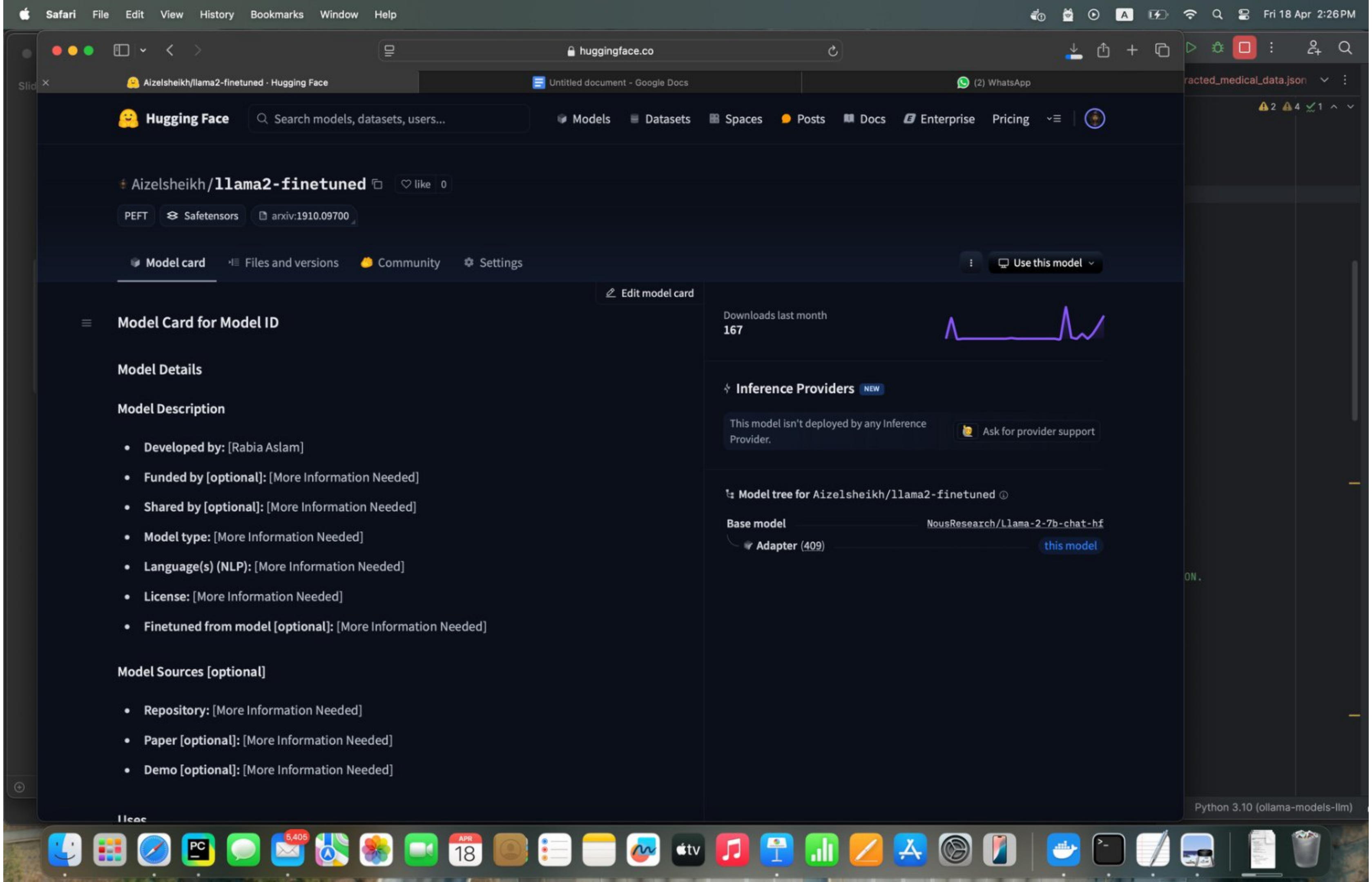
Medical Records Analytics

Patient Demographics

Diagnosis Distribution

Age Distribution

This application provides semantic search capabilities for medical records. It uses vector embeddings to find relevant patient records based on your query.



Aizelsheikh/llama2-finetuned

Model Card for Model ID

Model Details

Model Description

- **Developed by:** [Rabia Aslam]
- **Funded by [optional]:** [More Information Needed]
- **Shared by [optional]:** [More Information Needed]
- **Model type:** [More Information Needed]
- **Language(s) (NLP):** [More Information Needed]
- **License:** [More Information Needed]
- **Finetuned from model [optional]:** [More Information Needed]

Model Sources [optional]

- **Repository:** [More Information Needed]
- **Paper [optional]:** [More Information Needed]
- **Demo [optional]:** [More Information Needed]

Uses

Downloads last month
167

Inference Providers NEW

This model isn't deployed by any Inference Provider.

Ask for provider support

Model tree for Aizelsheikh/llama2-finetuned

Base model	NousResearch/Llama-2-7b-chat-hf
Adapter (409)	this model