

AI-Driven Predictive Diagnosis Chatbot for Healthcare

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AI-Driven Predictive Diagnosis Chatbot for Healthcare

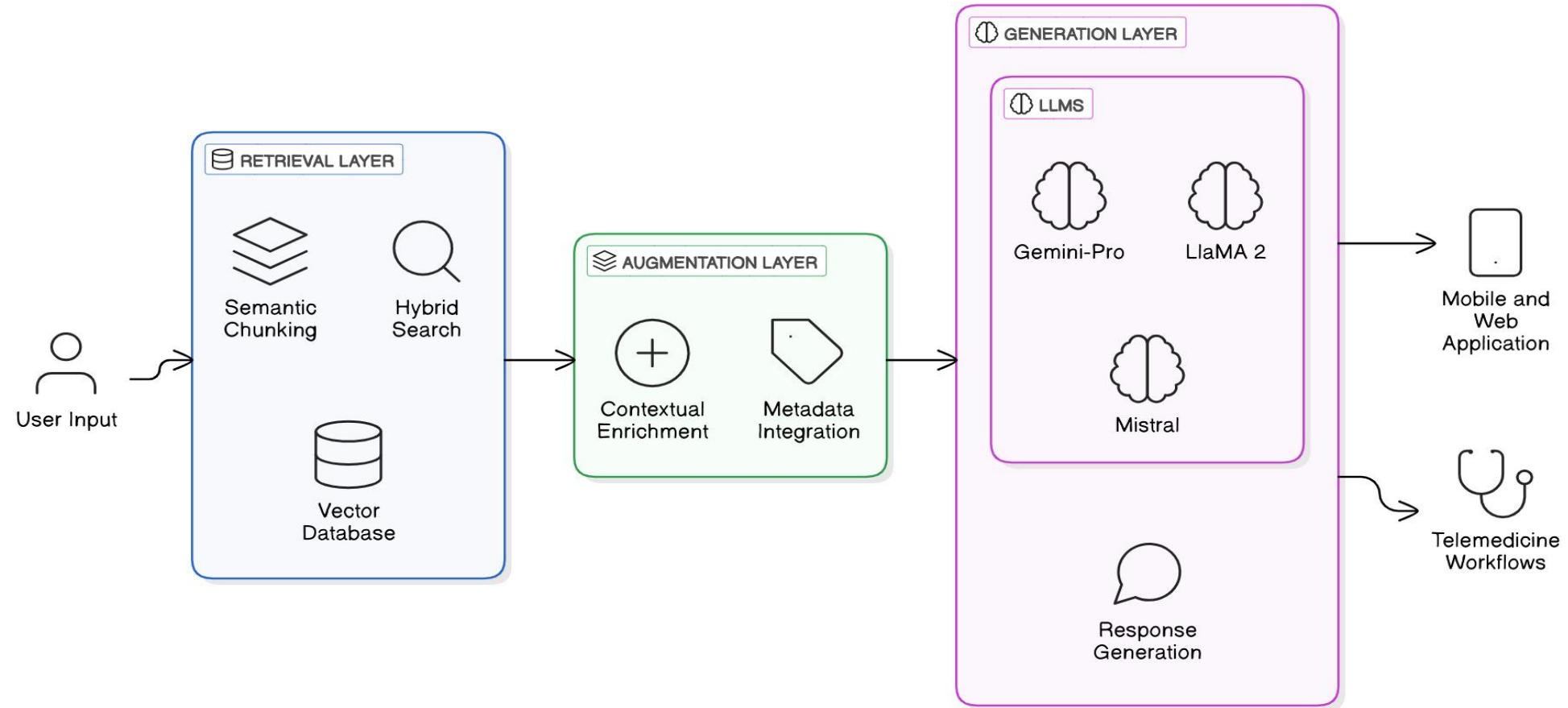
Problem Statement:

- Implementing Retrieval-Augmented Generation (RAG) with lightweight LLMs like LLaMA 2 or Mistral or Gemini-Pro to deliver clear, easy-to-understand guidance on symptoms and medications for common ailments.
- This system combines advanced retrieval techniques with LLMs to simplify medical information, making it more accessible and user-friendly.

Literature survey

YEAR	TITLE	AUTHOR	RESULT	LIMITATION
2024	Leveraging LLM: Implementing an Advanced AI Chatbot for Healthcare"	Ajinkya Mhatre, Sandeep R. Warhade, Sayali Kokate, Omkar Pawar, Samyak Jain	- Result: LLM-based chatbots showed 61% accuracy in general illness queries.	- Issues with accuracy, biases, and ethical concerns remain.
2024	A Medical Chatbot: Your Healthcare Assistance	Harsh Jain	- Llama 2-based ChatBot delivers accurate medical info and improves access.	- Needs more refinement for better functionality.
2024	Efficiency-Driven Custom Chatbot Development: Unleashing LangChain, RAG, and Performance-Optimized LLM Fusion	S. Vidivelli, Manikandan Ramachandran, A. Dharunbalaj	- The chatbot efficiently delivers healthcare information using advanced technologies.	- Requires improvements in accuracy and user interaction.
2024	Integrating RAG with LLMs in Nephrology: Advancing Practical Applications	Jing Miao, Charat Thongprayoon, Supawadee Suppadungsuk, Oscar A. Garcia Valencia, Wisit Cheungpasitporn	- LLMs with RAG improve nephrology care and education.	- Accuracy and reliability of information are still challenging.

langchain Architecture

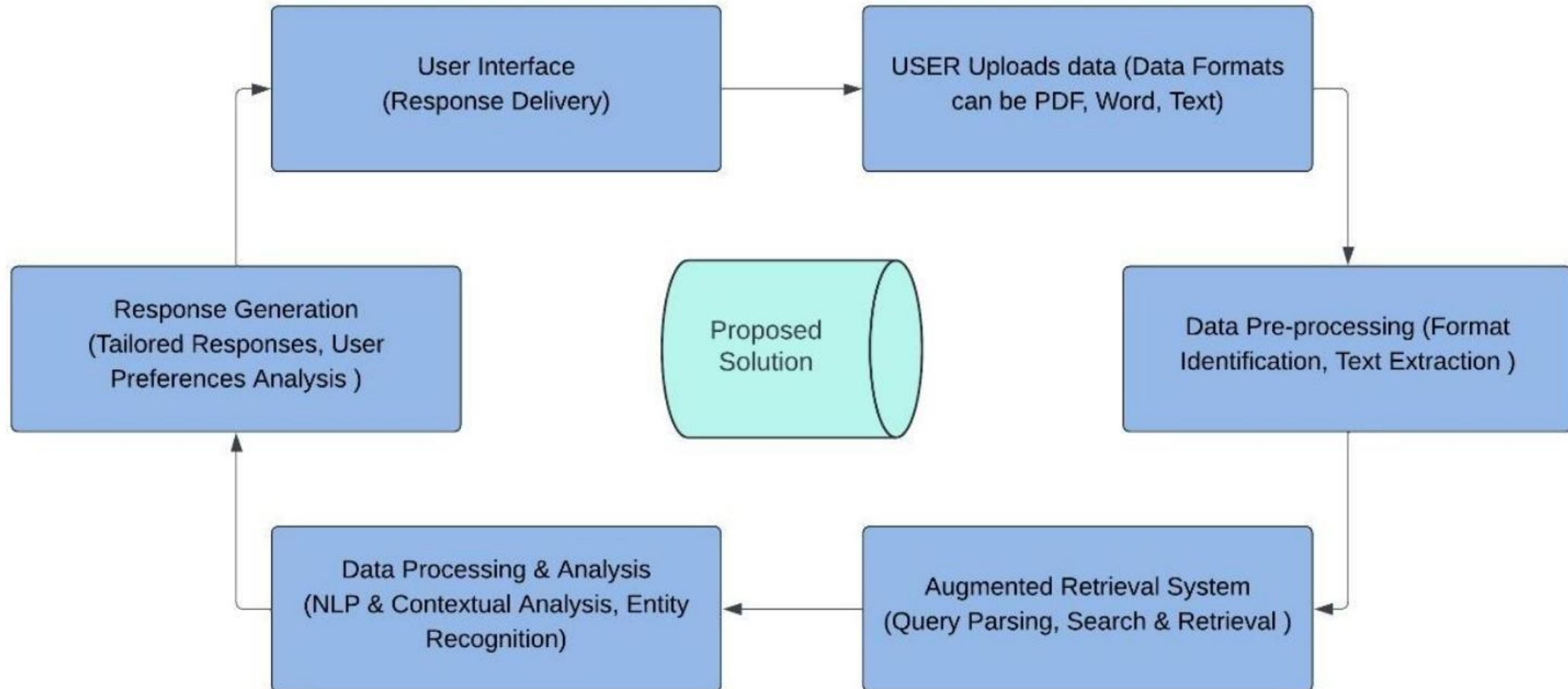


AI-Driven Predictive Diagnosis Chatbot for Healthcare

Proposed Solution:

- Users upload medical documents in various formats.
- The system processes and extracts relevant medical information from these documents.
- Extracted data is indexed and organized into a searchable knowledge base.
- When a user queries the system, it retrieves pertinent information from the indexed data.
- A lightweight Large Language Model (LLM) generates a clear, concise response based on the retrieved information.
- The system delivers personalized and accurate medical guidance efficiently.

PROPOSED SOLUTION



CODE

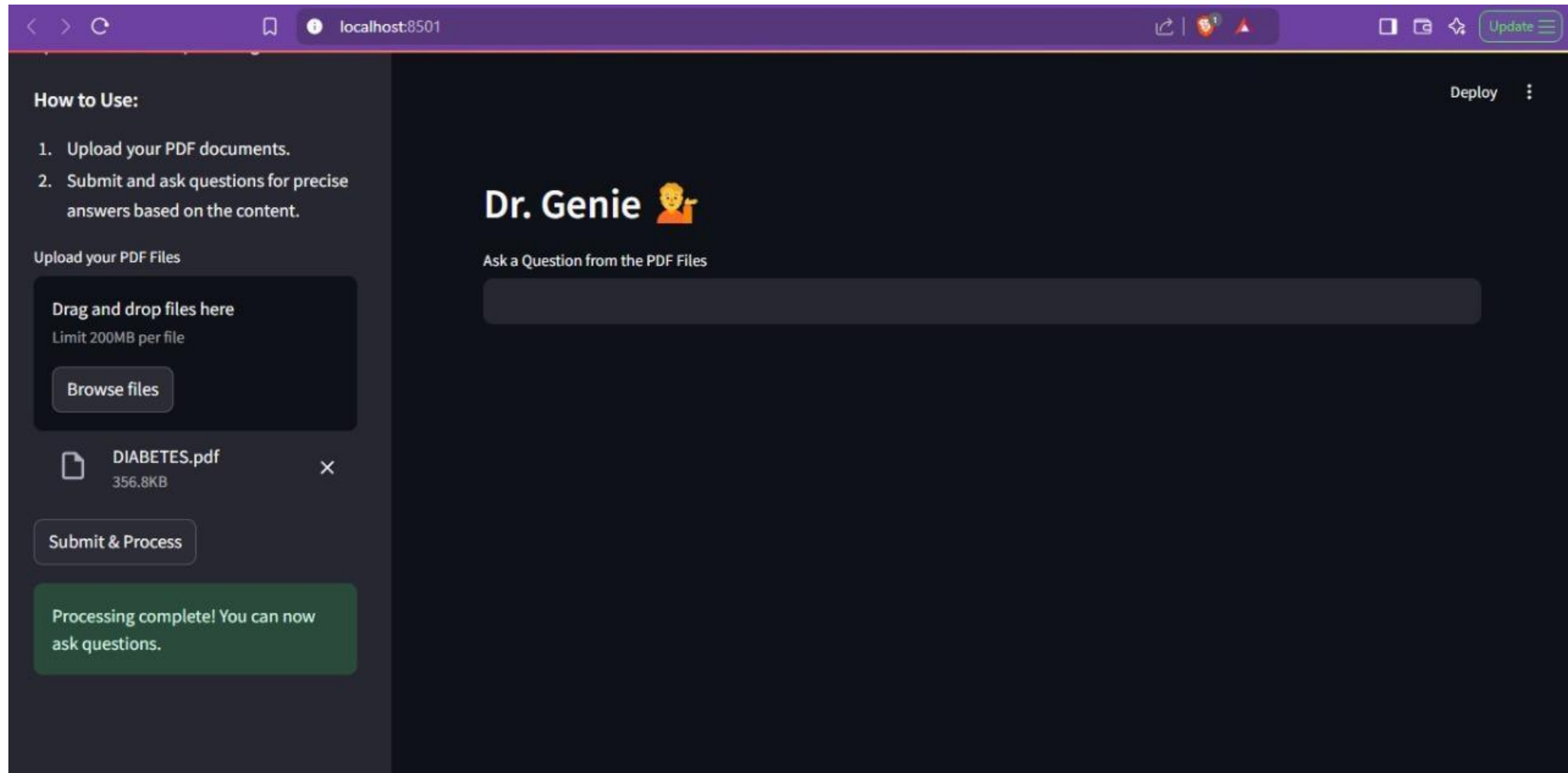
```
File Edit Selection View Go Run ... Docs_genie

EXPLORER
DOCS_GENIE
  include
  Lib
  Scripts
    activate
    activate.bat
    Activate.ps1
    chroma.exe
    coloredlogs.exe
    deactivate.bat
    dotenv.exe
    f2py.exe
    fastapi.exe
    httpx.exe
    huggingface-cli.exe
    humanfriendly.exe
    isympy.exe
    jsondiff
    jsonpatch
    jsonpointer
    jsonschema.exe
    langchain-server.exe
    langsmith.exe
    markdown-it.exe
    normalizer.exe
    onnxruntime_test.exe
    opentelemetry-boot...
    opentelemetry-instr...
    pip.exe
    pip3.11.exe
    pip3.exe
    pygmentize.exe
    pyproject-build.exe
  TIMELINE
  APPLICATION BUILDER

main* 0 0 0 0 Connect AWS

app.py
1 import streamlit as st # type: ignore
2 from PyPDF2 import PdfReader # type: ignore
3 from langchain.text_splitter import RecursiveCharacterTextSplitter # type: ignore
4 from langchain_google_genai import GoogleGenerativeAIEmbeddings # type: ignore
5 import google.generativeai as genai # type: ignore
6 from langchain.vectorstores import FAISS # type: ignore
7 from langchain_google_genai import ChatGoogleGenerativeAI # type: ignore
8 from langchain.chains.question_answering import load_qa_chain # type: ignore
9 from langchain.prompts import PromptTemplate # type: ignore
10
11 # Streamlit page configuration
12 st.set_page_config(page_title="Document Genie", layout="wide")
13
14 # Sidebar Instructions
15 st.sidebar.markdown("""
16 ## Document Genie: Instant Insights from Your Documents
17
18 This chatbot uses Google's Generative AI (Gemini-PRO) to process and analyze uploaded PDFs for quick insights.
19
20 ### How to Use:
21 1. Upload your PDF documents.
22 2. Submit and ask questions for precise answers based on the content.
23 """)
24
25 # API key setup
26 api_key = "AIzaSyBT7Gt1CvFuAU2wHAtbUOFu0eHtAeEuQqA"
27
28 def get_pdf_text(pdf_docs):
29     """Extract text from uploaded PDF files."""
30     text = ""
31     for pdf in pdf_docs:
32         try:
33             pdf_reader = PdfReader(pdf)
```


OUTPUT



OUTPUT

The screenshot displays the 'Document Genie' web application. The left sidebar contains the title 'Document Genie: Instant Insights from Your Documents', a description of the chatbot's functionality using Google's Gemini-PRO, and instructions on how to use it. It also features a file upload section with a 'Browse files' button and a 'Submit & Process' button. A PDF file named 'DIABETES.pdf' (356.8KB) is shown as uploaded. The main chat area is titled 'Dr. Genie' and shows a user query 'explain types of diabetes?' and a detailed response listing three types of diabetes: Type 1 (T1D), Type 2 (T2D or NIDDM), and Gestational diabetes.

Document Genie: Instant Insights from Your Documents

This chatbot uses Google's Generative AI (Gemini-PRO) to process and analyze uploaded PDFs for quick insights.

How to Use:

1. Upload your PDF documents.
2. Submit and ask questions for precise answers based on the content.

Upload your PDF Files

Drag and drop files here
Limit 200MB per file

Browse files

DIABETES.pdf
356.8KB

Submit & Process

Dr. Genie

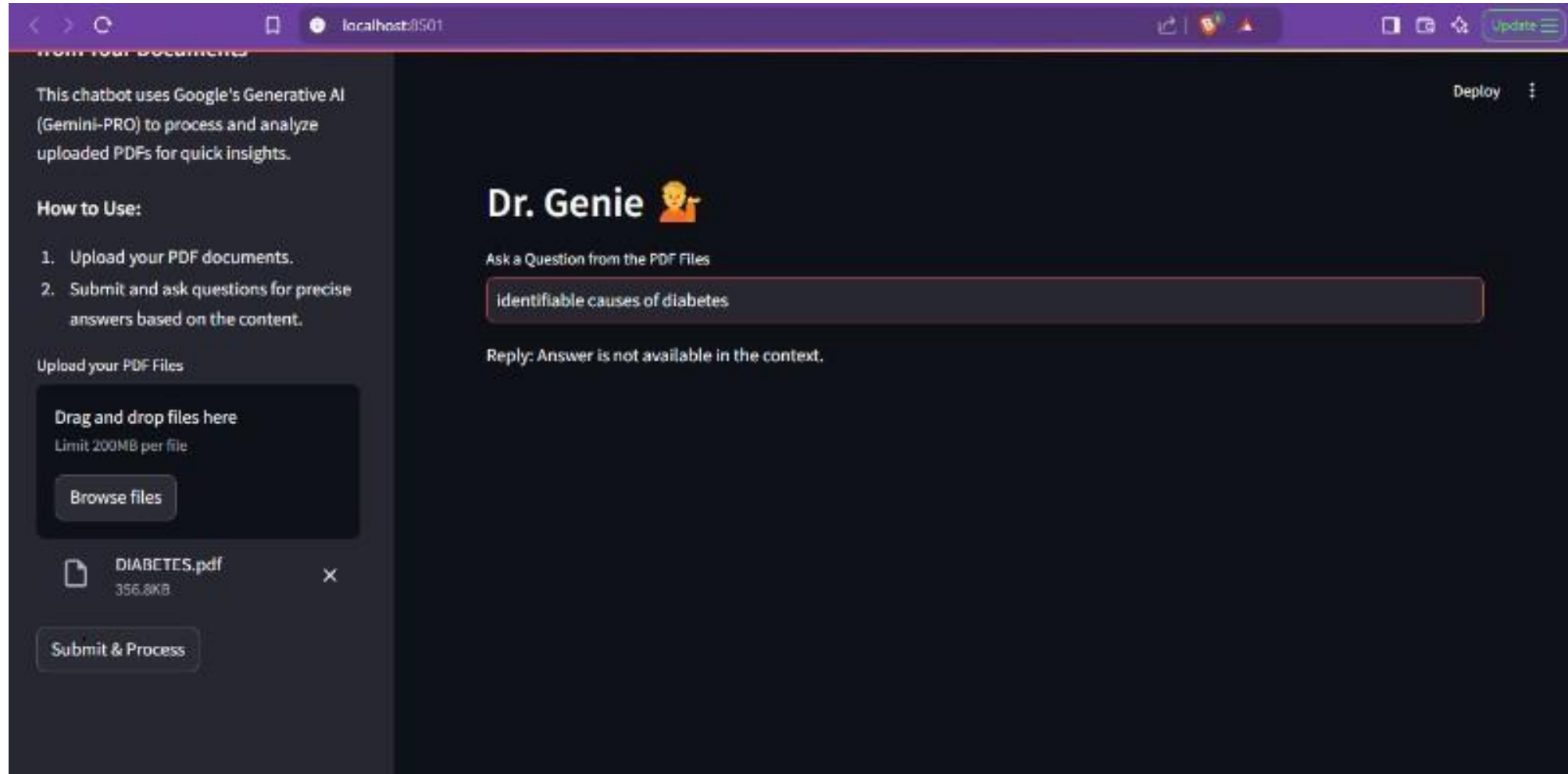
Ask a Question from the PDF Files

explain types of diabetes?

Reply:

1. Type 1 diabetes (T1D) / Juvenile diabetes/ Insulin dependent diabetes: T1D affects both adults and children at any age and occurs when the person's pancreas stop producing insulin due to destruction of the pancreatic beta cells or by inactivity of these insulin -producing cells . Affected individuals depend on daily injections of insulin to maintain normal blood glucose levels . The causes of T1D are not entirely understood however; scientists believe that both genetic and environmental factors are involved.
2. Type 2 diabetes/ Non -insulin dependent diabetes mellitus (T2D or NIDDM): This is the most common form of diabetes that most often occurs in adulthood. However, because of increased obesity rates and sedentary lifestyles, teens and young adults are also being diagnosed with T2D or the precursor, pre -diabetes. In T2D, fat, muscle and liver cells do not respond correctly to insulin. This is called insulin resistance. As a result, blood sugar cannot enter these cells to be stored for energy and build s up in the blood. Insulin resistance is a gradual process that develop s slowly over time.
3. Gestational diabetes: This refers to diabetes that is first diagnosed during pregnancy. As many as eight out of 100 pregnant women in the U.S develop gestational diabetes. Weight gain and changing hormones that occur during pregnancy can impair insulin function, resulting in high blood sugar. This form of diabetes usually disappears after pregnancy, however, women who have had gestational diabetes have a 40-60% chance of developing T2D within 5 to 10 years.

OUTPUT



FEASIBILITY AND VIABILITY



Potential Challenges and Risks:

Presentations are communication tools that can be used as demonstrations.



Data Privacy and Security

Presentations are communication tools that can be used as demonstrations.



Data Quality and Bias

Presentations are communication tools that can be used as demonstrations.



Your title here

Symptom analysis,
medication
recommendations

IMPACT AND BENEFITS

Early Detection of Health Issues:

Benefit: Identifies potential health problems before they become serious.

Outcome: Enables earlier treatment, potentially preventing severe conditions.

Personalized Treatment:

Benefit: Moves away from a one-size-fits-all approach.

Outcome: Tailors treatment plans based on individual health data, improving patient care.

Economic Savings:

Benefit: Reduces the need for expensive treatments and hospital stays.

Outcome: Lowers healthcare costs, reduces missed workdays, and boosts productivity.

Environmental Benefits:

Benefit: Minimizes unnecessary tests and treatments.

Outcome: Reduces medical waste and, if remote monitoring is used, decreases travel to healthcare facilities.

Improved Quality of Life:

Benefit: Healthier individuals with fewer severe health issues.

Outcome: Enhances overall well-being and quality of life.

FUTURE SCOPE

- 1. Enhanced Diagnostic Accuracy:** Achieve greater precision by integrating real-time data streams and training the system in specialized medical domains.
- 2. Integration of Multiple LLMs:** Leverage multiple lightweight Large Language Models for improved context understanding and diverse query handling.
- 3. Chat History Functionality:** Provide users with access to past queries and responses for better continuity and reference.
- 4. Support for Multiple Input Formats:** Enable compatibility with various file types to streamline data ingestion and processing.

RESEARCH AND REFERENCES

1. Leveraging LLM: Implementing an Advanced AI Chatbot for Healthcare, Ajinkya Mhatre, Sandeep R. Warhade, Sayali Kokate, Omkar awar, Samyak Jain, May 2024
<https://ijisrt.com/assets/upload/files/IJISRT24MAY1964.pdf>
2. A Medical Chatbot: Your Healthcare Assistance, Harsh Jain, June 2024
https://www.irjmets.com/uploadedfiles/paper//issue_6_june_2024/58850/final/fin_irjmets1717770049.pdf
3. Efficiency-Driven Custom Chatbot Development: Unleashing LangChain, S. Vidivelli, Manikandan Ramachandran, A. Dharunbalaji, August 2024
https://file.techscience.com/files/cmc/2024/TSP_CMC-80-2/TSP_CMC_54360/TSP_CMC_54360.pdf
4. Integrating RAG with LLMs in Nephrology: Advancing Practical Applications, Jing Miao, Charat Thongprayoon, Supawadee Suppadungsuk, Oscar A. Garcia Valencia, Wisit Cheungpasitporn, March 2024
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10972059/>
5. Health-LLM: Personalized Retrieval-Augmented Disease Prediction Model, Mingyu Jin, Qinkai Yu, Chong Zhang, Dong Shu, February 2024
https://www.researchgate.net/publication/377968117_Health_x0002_LLM_Personalized_Retrieval-Augmented_Disease_Prediction_Model

Thank You !!!