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A

Project Report

on

Paramarsh

submitted as partial fulfillment for the award of

BACHELOR OF TECHNOLOGY DEGREE

SESSION 2022-23

in

Computer Science and Engineering

By

Ayush Kumar (2000290100042)

Sanidhya Sharma (2000290100133)

Shreyansh Gupta (2000290100150)

Under the supervision of

Mr. Dharmendra Kumar

KIET Group of Institutions, Ghaziabad

Affiliated to

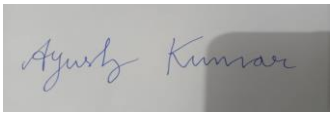
Dr. A.P.J. Abdul Kalam Technical University, Lucknow

(Formerly UPTU)

May, 2023

DECLARATION

We hereby declare that this submission is our own work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

Signature: 

Name: Ayush Kumar

Roll No.: 2000290100042

Date: 22-12-2023

CERTIFICATE

This is to certify that Project Report entitled “Paramarsh” which is submitted by Ayush Kumar (2000290100042), Sanidhya Sharma (2000290100133) and Shreyansh Gupta (2000290100150) in partial fulfillment of the requirement for the award of degree B. Tech. in Department of Computer Science & Engineering of Dr. A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

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Date: 22-12-2023

Supervisor Name

(Designation)

ACKNOWLEDGEMENT

It gives us a great sense of pleasure to present the report of the B. Tech Project undertaken during B. Tech. Final Year. We owe special debt of gratitude to Assistant Professor Mr. Dharmendra Kumar, Department of Computer Science & Engineering, KIET, Ghaziabad, for his constant support and guidance throughout the course of our work. His sincerity, thoroughness and perseverance have been a constant source of inspiration for us. It is only his cognizant efforts that our endeavors have seen light of the day.

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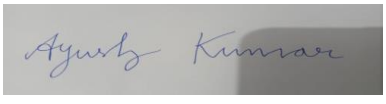
We also do not like to miss the opportunity to acknowledge the contribution of all faculty members, especially faculty/industry person/any person, of the department for their kind assistance and cooperation during the development of our project. Last but not the least, we acknowledge our friends for their contribution in the completion of the project.

Date: 22-12-2023

Signature: 

Name : Ayush Kumar
Roll No.: 2000290100042

ABSTRACT

The vast and growing body of research in mental health necessitates efficient tools for information retrieval and comprehension. This project presents a novel approach to question answering (QA) over PDF-based mental health research documents, leveraging the combined power of vector databases and the large language model LLAMA 2.

Our architecture centers around a vector database built upon ingested PDF documents. We employ semantic sentence embedding techniques to convert textual content into high-dimensional vectors, enabling efficient search and retrieval based on semantic similarity. This vector database serves as the foundation for our QA system.

To answer user queries, we utilize LLAMA 2, a state-of-the-art factual language model with impressive reasoning capabilities. We translate user queries into appropriate search vectors and embed them into the database. LLAMA 2 then analyzes the retrieved documents, focusing on sections semantically relevant to the query. This allows the system to extract salient information and formulate comprehensive, contextually-aware answers.

We anticipate this project to significantly enhance the accessibility and utilization of mental health research findings. Researchers, clinicians, and individuals seeking information can navigate the vast research landscape with ease, gaining valuable insights into mental health conditions, interventions, and best practices. Future work will focus on incorporating user feedback and expanding the system's functionalities to further support knowledge discovery in the mental health domain.

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INTRODUCTION

Exploring the vast and ever-growing body of mental health research presents a significant challenge for those seeking to extract meaningful insights. Traditional keyword-based search approaches often fall short in capturing the nuances of language and semantics, leading to suboptimal results. To address this, we have developed a novel question answering (QA) system specifically designed to effectively navigate PDF-based mental health research documents. Our system harnesses the power of vector databases and the LLAMA 2 language model to deliver accurate and informative answers to user queries.

Key Components of Our System:

1. Constructing a Semantically Rich Vector Database:
    - We employ the Faiss vector database to create a high-dimensional representation of the research documents.
    - Hugging Face embeddings are utilized to transform text into meaningful numerical vectors, capturing semantic relationships between words and concepts.
    - This enables efficient search and retrieval based on contextual understanding, rather than mere keyword matching.
2. Harnessing the Reasoning Capabilities of LLAMA 2:
    - LLAMA 2, a state-of-the-art factual language model with impressive reasoning abilities, plays a central role in our QA process.
    - It analyzes retrieved documents, focusing on the sections most relevant to the user's query.
    - This allows LLAMA 2 to extract pertinent information and formulate comprehensive answers that go beyond surface-level text matching.
3. Streamlining Interactions with Chainlit:
    - We leverage Chainlit, a framework for building interactive language applications, to facilitate a seamless user experience.
    - This enables users to engage with the QA system through natural language conversations, posing questions and receiving informative responses

PROGRESS

CHAPTER 1

In today's technologically advanced landscape, interactive dialog systems have become an integral part of real-time communication and engagement. These systems play a pivotal role in facilitating seamless interactions between users and computer programs. However, a significant challenge lies in accurately gauging the emotional state of users during communication. The need for a system capable of discerning emotions such as melancholy, surprise, joy, and more is imperative. Such a system can not only identify these emotions in advance but also prompt preventive actions, thereby enhancing user experience and well-being.

Communication of emotions is a complex process, with individuals expressing their feelings through various means. When it comes to written communication, deciphering the emotional nuances becomes even more challenging. This difficulty is compounded by the impact of context on the expression of emotions in text. One of the key aspects of emotion recognition in text is understanding how the surrounding context influences the manifestation of emotions. This intricate task falls under the domain of natural language processing (NLP), a field focused on enabling computers to comprehend human language. Within NLP, a particularly significant application is the recognition of emotions in text, an area closely intertwined with sentiment analysis.

Sentiment analysis, as a subfield of NLP, is dedicated to identifying indications of positive, neutral, or negative emotions within textual content. In this context, emotion recognition and detection are crucial components, contributing to a deeper understanding of user sentiments. The advancement of technology, particularly the utilization of deep learning techniques, has greatly improved the capabilities of applications designed for emotion recognition. Within the realm of dialog systems, the integration of emotion recognition is evident in Chatbot modules, where deep learning techniques are employed to enhance the system's ability to comprehend and respond to user emotions effectively.

In response to these challenges and opportunities, a straightforward yet effective chatbot has been developed, incorporating preprogrammed input patterns and retrieval-based responses. This chatbot leverages the power of deep learning techniques within its Chatbot module to provide a more nuanced and context-aware interaction with users. By addressing the

intricacies of emotion recognition in text, this application stands at the forefront of the evolving landscape of natural language processing

The machine can think through Artificial Intelligence. AI makes machines even more intelligent. The subfield of AI Research is ML. Different researchers think that knowledge cannot be produced without learning's. The objective of ML is on designing computer algorithms that can read and use data to know for themselves. In order to search for trends in data and make informed choices in the future based on the examples we have, the learning process starts with observation or data, such as references, direct experience, or guidance. The primary objective is to allow systems to learn automatically and change behavior according without human involvement or assistance

Proposed System Design

Description: The Art of System Design:

The intricacies of system design involve not just defining the architecture but orchestrating a symphony of components, modules, interfaces, and data to meet specific requirements. It's a meticulous dance, an artful application of systems theory woven into the fabric of product development. This artistry finds resonance with disciplines like systems analysis, systems architecture, and systems engineering, creating a synergy that propels the design process forward. The System Design Document, a narrative masterpiece, unveils the system's intricacies in non-technical terms. It unfurls the system's requirements, operating environment, architecture, file structures, database design, input formats, output layouts, and interfaces. It's a literary journey through detailed design, processing logic, and external interactions. Constraints, assumptions, and contingencies are meticulously addressed, framing the canvas on which the system design unfolds.

In the realm of sentiment analysis chatbot design, the intricacies transcend mere architecture definition, evolving into a symphony of meticulously orchestrated components, modules, interfaces, and data. This process mirrors an artful application of systems theory intricately woven into the fabric of product development. The System Design Document, akin to a narrative masterpiece, unveils the chatbot's intricacies in accessible terms, revealing requirements, operating environment, architecture, file structures, database design, input formats, output layouts, and interfaces. This literary journey navigates through the detailed design, processing logic, and external interactions, painting a comprehensive picture.

To tackle the challenge of crafting a sentiment analysis chatbot using NLP and LSTM, the journey unfolds strategically. It involves steps such as Data Collection, Data Preprocessing, Model Training, Model Selection, Model Evaluation, and the creation of an intuitive User Interface that serves as a gateway to accurate emotion detection and sentiment analysis. This design endeavor meticulously addresses constraints, assumptions, and contingencies, shaping the canvas on which the sentiment analysis chatbot design unfolds.

System Architecture: Architecting the Future:

System architecture serves as the blueprint that shapes a system's structure, behavior, and diverse perspectives. It acts as a conceptual model where various components and subsystems come together in a seamless union. Architecture description languages endeavor to formalize this conceptual dance, offering a structured language for understanding system structures and behaviors. In the context of machine learning, the architecture diagram becomes a focal point, presenting a comprehensive view of key components and their intricate interconnections. It's a visual journey, providing insight into the grand design and showcasing how different elements harmonize to create a well-functioning and cohesive system. This section unveils the architectural framework, outlining the core components and their reationships, painting a vivid picture of the system's overarching structure and functionality.

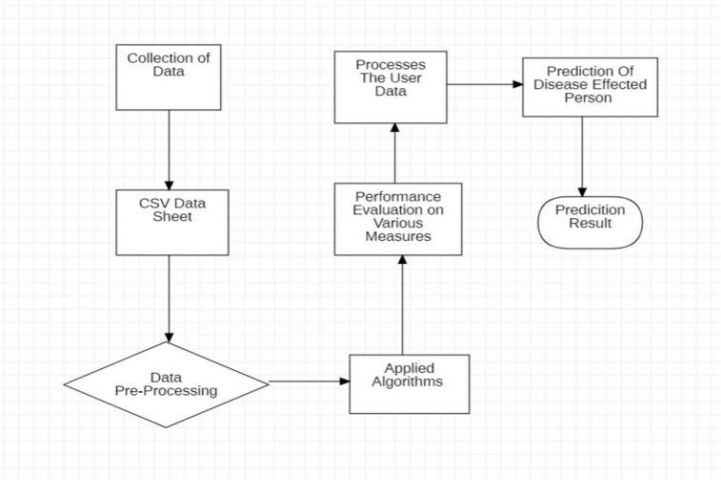
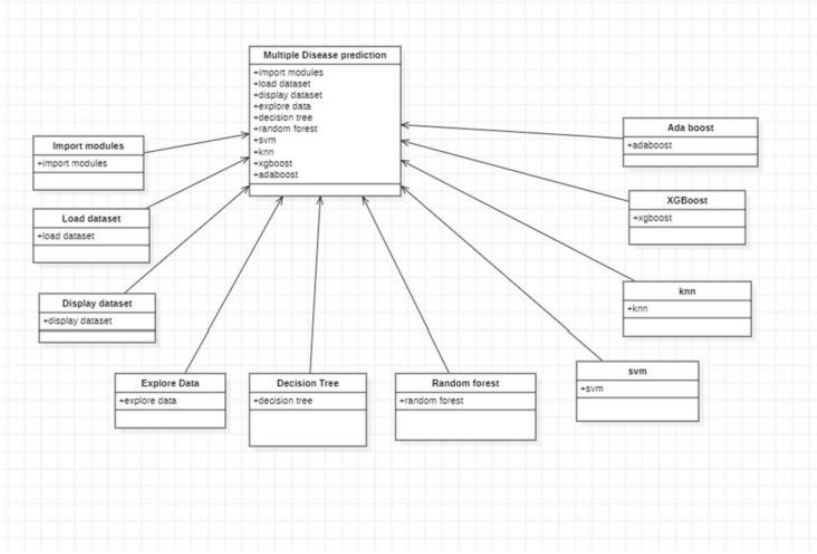


FIGURE 4.2.1 SYSTEM ARCHITECTURE DIAGRAM

UML Diagrams: Decoding the Visual Language:

Class Diagram:

In the visual lexicon of system design, the class diagram emerges as a panoramic painting, portraying classes and their interplay. In our Multiple Disease Prediction system, classes become the protagonists, embodying modules for disease prediction and various machine learning algorithms.



Use Case Diagram:

The use case diagram serves as a narrative tool, depicting user interactions within the system. Actors, both human and system, engage in key actions like "User Input," "Sentiment Analysis," and "Feedback Submission," shaping the dynamic storyline of the sentiment analysis chatbot system.

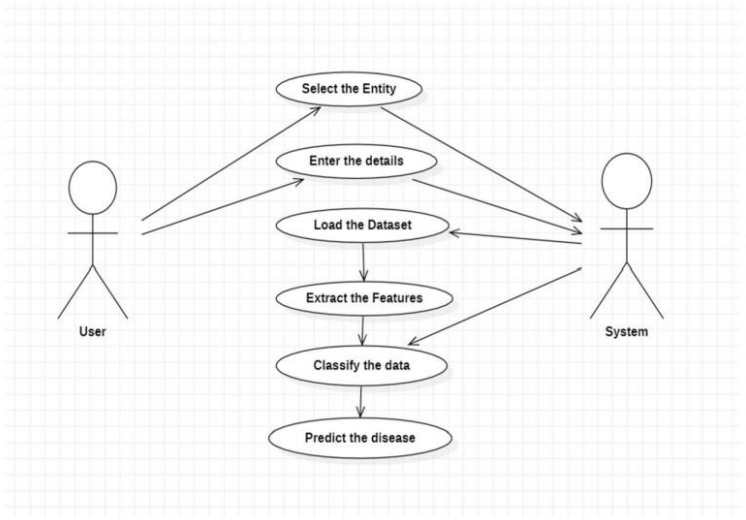


Fig 4.3.2 Use Case Diagram

Sequence Diagram:

A dynamic tapestry of interactions over time, the sequence diagram unfolds the saga of data collection, processing, and result retrieval within the prediction system.

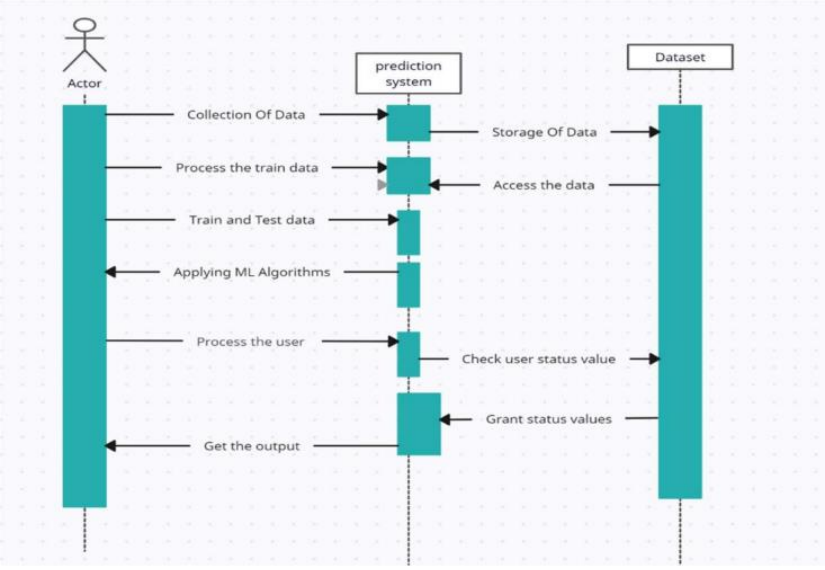


Fig 4.3.3 Sequence Diagram

Component Diagram:

The component diagram visualizes the building blocks of our project. Key components like "Flutter UI," "Python Backend," and "NLP Module" collaborate to create a cohesive system. This diagram illustrates the interconnected elements that contribute to the seamless functionality of our sentiment analysis chatbot.

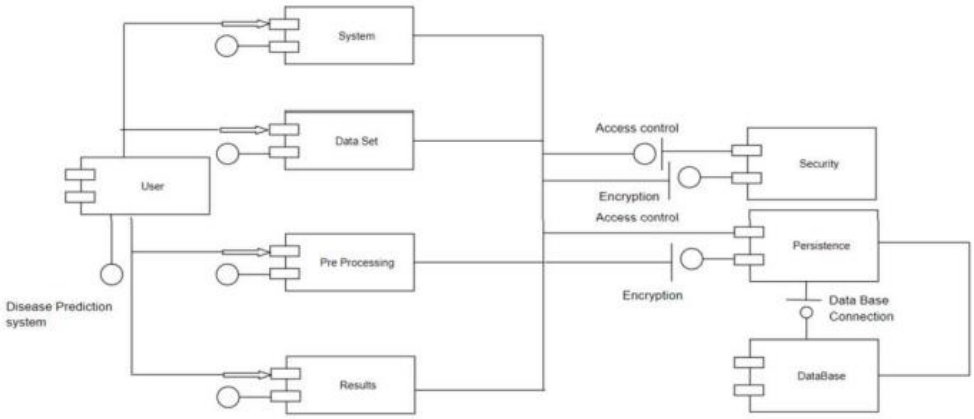


Fig 4.3.4 Component Diagram

Deployment Diagram:

This diagram unveils the tangible deployment of software on hardware. Components like sentiment analysis models, NLP processors, and user interfaces find their physical positions, orchestrating a harmonious deployment ballet for the sentiment analysis chatbot.

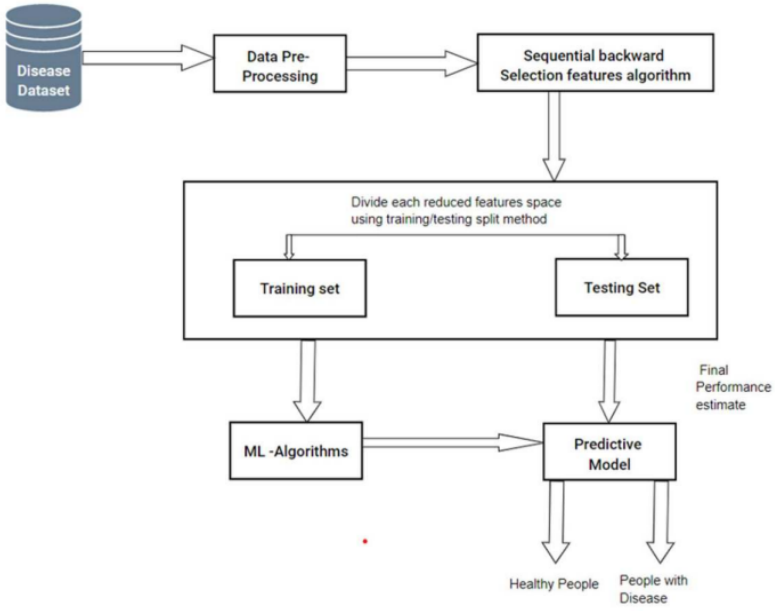
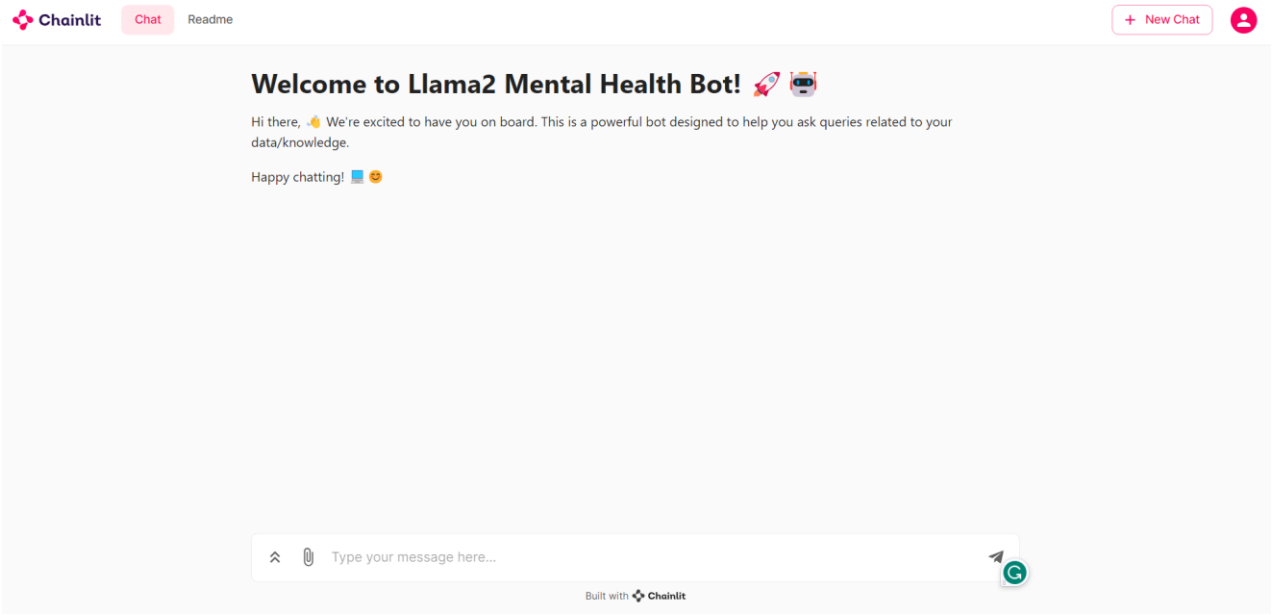
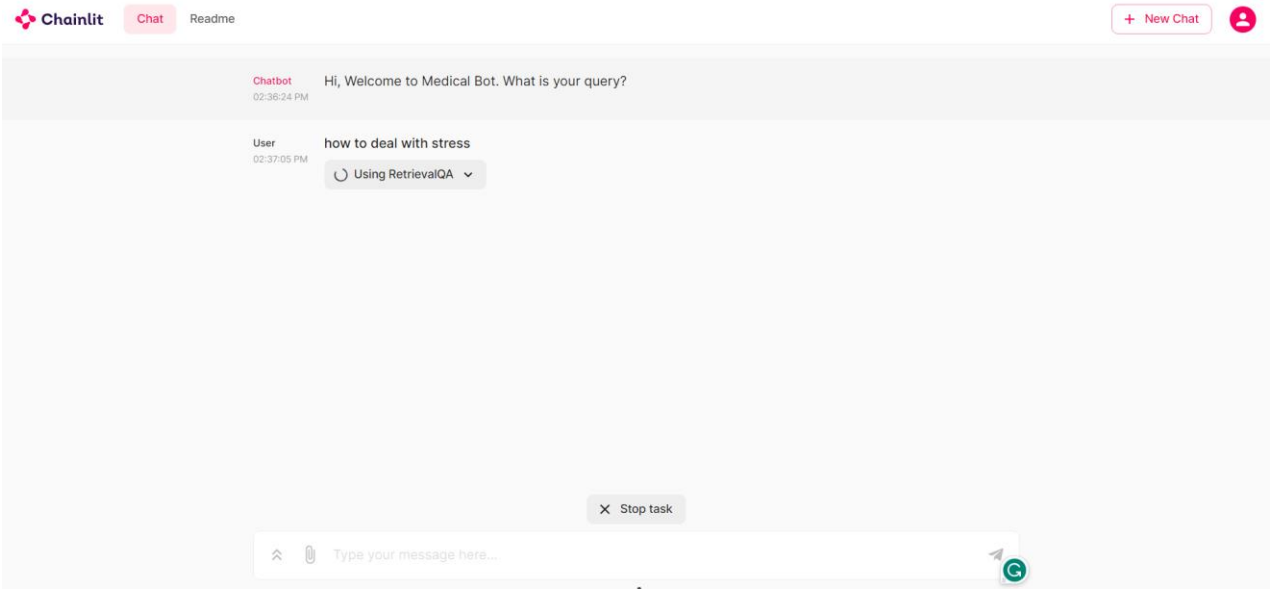
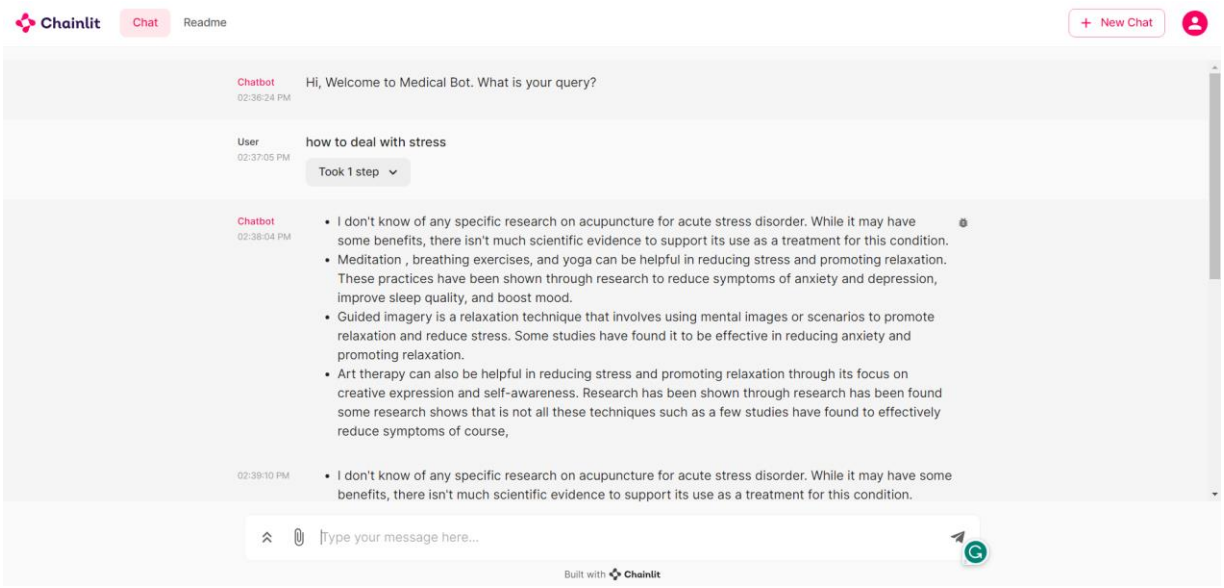


Fig 4.3.5 Deployment Diagram

List of Images






Chainlit
Chat
Readme
+ New Chat
Chatbot
02:36:24 PM
Hi, Welcome to Medical Bot. What is your query?
User
02:37:05 PM
how to deal with stress
Took 1 step
Chatbot
02:38:04 PM
• I don't know of any specific research on acupuncture for acute stress disorder. While it may have some benefits, there isn't much scientific evidence to support its use as a treatment for this condition.
• Meditation , breathing exercises, and yoga can be helpful in reducing stress and promoting relaxation. These practices have been shown through research to reduce symptoms of anxiety and depression, improve sleep quality, and boost mood.
• Guided imagery is a relaxation technique that involves using mental images or scenarios to promote relaxation and reduce stress. Some studies have found it to be effective in reducing anxiety and promoting relaxation.
• Art therapy can also be helpful in reducing stress and promoting relaxation through its focus on creative expression and self-awareness. Research has been shown through research has been found some research shows that is not all these techniques such as a few studies have found to effectively reduce symptoms of course,
02:39:10 PM
• I don't know of any specific research on acupuncture for acute stress disorder. While it may have some benefits, there isn't much scientific evidence to support its use as a treatment for this condition.
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