Implementation of AI-Powered Medical Diagnosis System

A Project Report

submitted in partial fulfillment of the requirements

of

AICTE Internship on AI: Transformative Learning
with
TechSaksham – A joint CSR initiative of Microsoft & SAP

by

YOGENDRA MISHRA

yogendramishra718@gmail.com

Under the Guidance of

Saomya Chaudhuray

ACKNOWLEDGEMENT

I would like to take this opportunity to express my sincere gratitude to all the individuals who have contributed, directly or indirectly, to the successful completion of this project,

First and foremost, I intend my heartfelt appreciation to my supervisor **Saomya Chaudhary. Sir**, **Pavan Sumohana. Sir** for their invaluable guidance, support, and encouragement throughout this journey. Their expertise, insightful feedback, and constructive criticism have played a crucial role in shaping this project. Their unwavering confidence in my abilities and continuous motivation have been a significant source of inspiration, pushing me to explore and refine my work further.

I am also grateful to my **institution, faculty members, and peers** for providing a conducive leaning environment and necessary resources that helped in the research and development of this project. Their discussions, feedback, and shared knowledge have been instrumental in improving my understanding of the subject matter.

Lastly, I acknowledge the contributions of various **open-source communities, research papers, and online resources** that provided valuable insights, technical support, and learning materials which played a pivotal role in the development of this AI-powered chatbot.

This project has been a significant learning experience, and i am grateful for every opportunity that contributed to its successful completion.

Yogendra Mishra

ABSTRACT

Access to healthcare remains a significant concern, with many individuals unable to obtain immediate medical advice for minor health issues. This project presents an AI-powered healthcare chatbot, *Al Healthcem*, designed to provide initial healthcare consultation using Streamlit, TensorFlow, and NLTK. The chatbot combines rule-based responses for straightforward medical queries with AI-generated text using the DistilGPT-2 model.

Al Healthcem assists users by addressing questions related to symptoms, medications, and appointment scheduling. It employs natural language processing (NLP) techniques, pretrained AI models, and a user-friendly Streamlit interface for seamless interactions. Users can enter healthcare-related queries, and the chatbot responds with contextually relevant information, either through predefined rules or AI-generated content.

Key findings demonstrate that the chatbot delivers fast, accurate, and context-sensitive healthcare advice, reducing the dependency on direct medical consultations for minor issues. Future enhancements include real-time integration with medical databases, multilingual support, and advanced appointment scheduling features. This project highlights the potential of AI in improving healthcare accessibility and efficiency.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

Introduction

1.1Problem Statement:

Access to timely healthcare advice is a major concern, with many unable to consult doctors for minor issues. This project aims to develop an AI-powered medical diagnosis system to provide quick, accurate, and context-sensitive healthcare suggestions, reducing dependency on direct medical consultations for non-critical conditions.

1.2Motivation:

The rising demand for accessible healthcare and the potential of AI-driven solutions inspired this project. By leveraging AI and natural language processing, this system aims to bridge the gap between patients and healthcare providers, offering immediate and reliable preliminary medical consultation while reducing the burden on healthcare systems.

1.3Objective:

- Develop an AI-based medical diagnosis chatbot using Streamlit, TensorFlow, and NLTK.
- Provide instant healthcare advice through rule-based and AI-generated responses.
- Address queries related to symptoms, medications, and appointment scheduling.
- Ensure a user-friendly interface for smooth interactions.

1.4Scope of the Project:

This project covers preliminary healthcare consultation, offering fast, context-sensitive responses. It includes symptom analysis, drug information, and appointment scheduling. Future enhancements include real-time medical database integration, multilingual support, and advanced appointment management, aiming to improve healthcare accessibility and efficiency.

CHAPTER 2

Literature Survey

2.1 Review relevant literature or previous work in this domain.

Several studies and projects have explored AI-driven healthcare systems, focusing on chatbots for medical advice and diagnosis. Existing research highlights the effectiveness of natural language processing (NLP) and machine learning in understanding medical queries and generating accurate responses. Various models have been proposed to enhance virtual healthcare accessibility and efficiency.

2.2 Mention any existing models, techniques, or methodologies related to the problem.

- **Rule-Based Chatbots:** These use predefined responses for simple, frequently asked questions. While fast, they lack flexibility and adaptability.

- **AI-Driven Models:** Advanced models like DistilGPT-2 generate context-sensitive responses, offering more natural and accurate conversations.

- **NLP Techniques:** Libraries like NLTK process user input, enabling the system to interpret medical terms and symptoms effectively.

2.3 Highlight the gaps or limitations in existing solutions and how your project will address them.

- **Limited Context Sensitivity:** Many chatbots struggle with understanding complex or multi-part queries.
- **Lack of Real-Time Data Integration:** Existing systems often lack access to updated medical databases.
- **Restricted Functionality:** Few chatbots support appointment scheduling or multilingual capabilities.

How This Project Addresses These Gaps:

- **Hybrid Approach:** Combining rule-based and AI-generated responses for more accurate and flexible interactions.
- **Enhanced User Experience:** A Streamlit-based interface ensures smooth and intuitive usability.
- **Future Scalability:** Plans for real-time database integration and multilingual support expand the system's potential.

CHAPTER 3

Proposed Methodology

3.1 System Design

User Interface: Built with Streamlit, enabling easy and interactive communication.

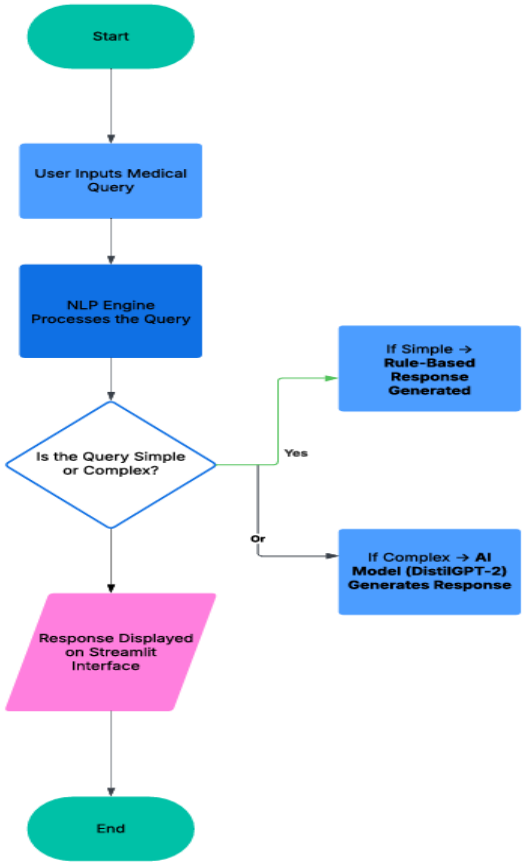
NLP Engine: Using NLTK for text processing and understanding medical queries.

AI Model: DistilGPT-2 for generating context-sensitive responses.

Rule-Based System: Predefined responses for common and simple medical questions.

Response Generator: Chooses between rule-based and AI-generated replies based on query complexity.

3.2 Flowchart Representation:



3.3 Requirement Specification

Mention the tools and technologies required to implement the solution.

3.3.1 Hardware Requirements:

- **Processor:** Intel i5 or higher
- **RAM:** 8 GB or more
- **Storage:** Minimum 256 GB SSD

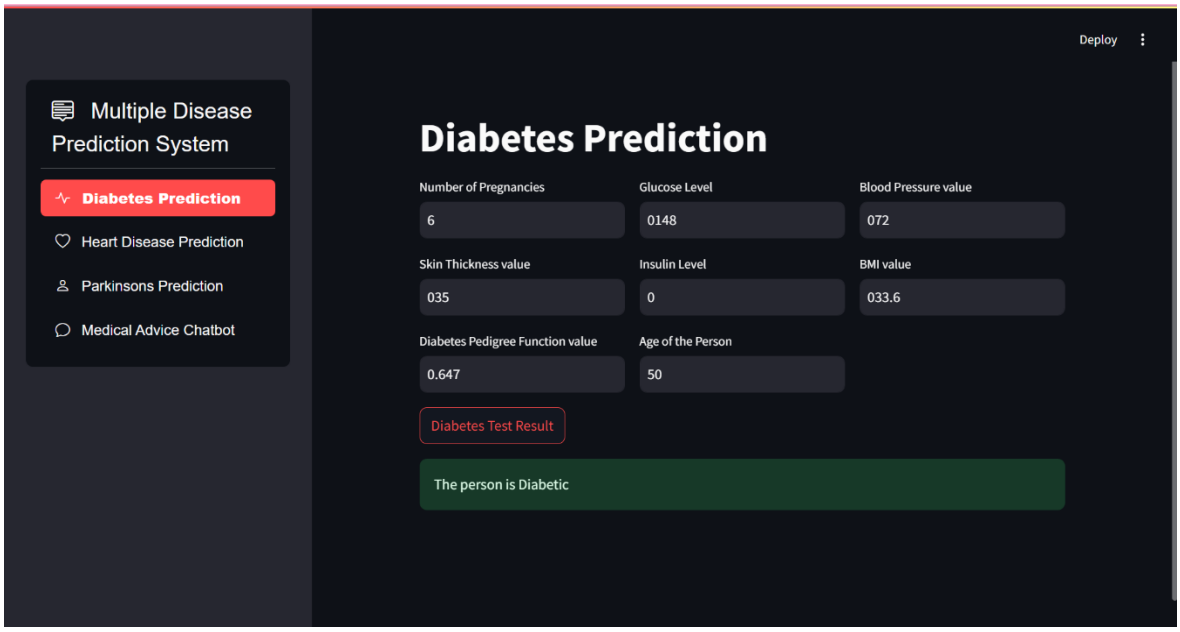
3.3.2 Software Requirements:

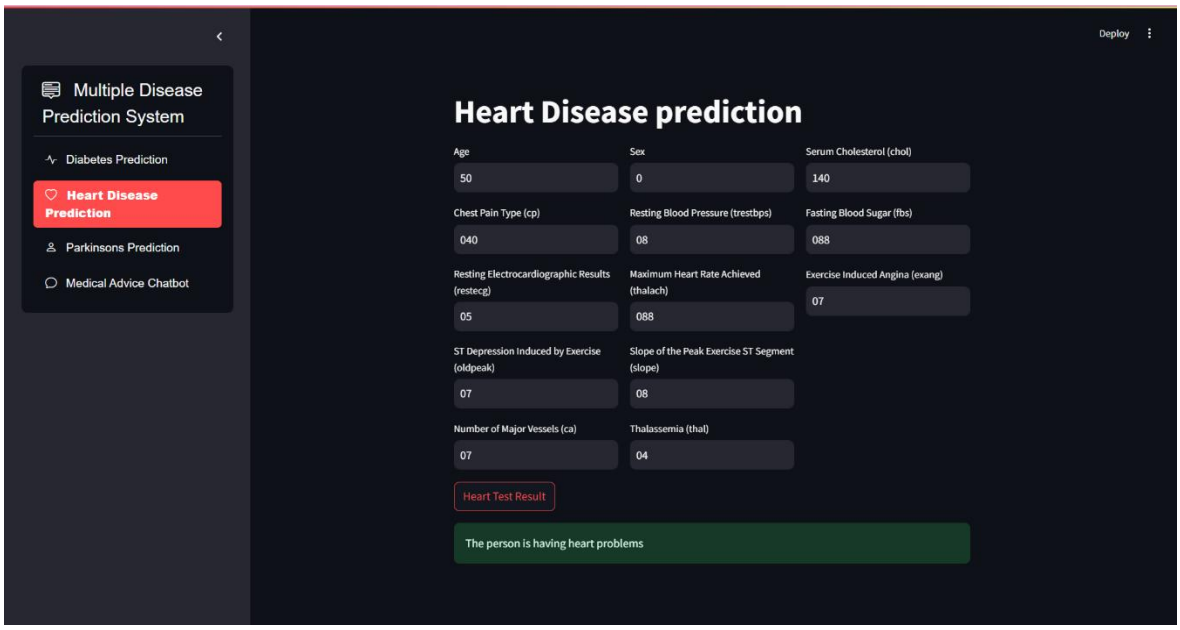
- **Programming Language:** Python
- **Framework:** Streamlit
- **Libraries:** TensorFlow, NLTK, Transformers (DistilGPT-2)
- **Development Environment:** Jupyter Notebook, VS Code
- **Version Control:** GitHub

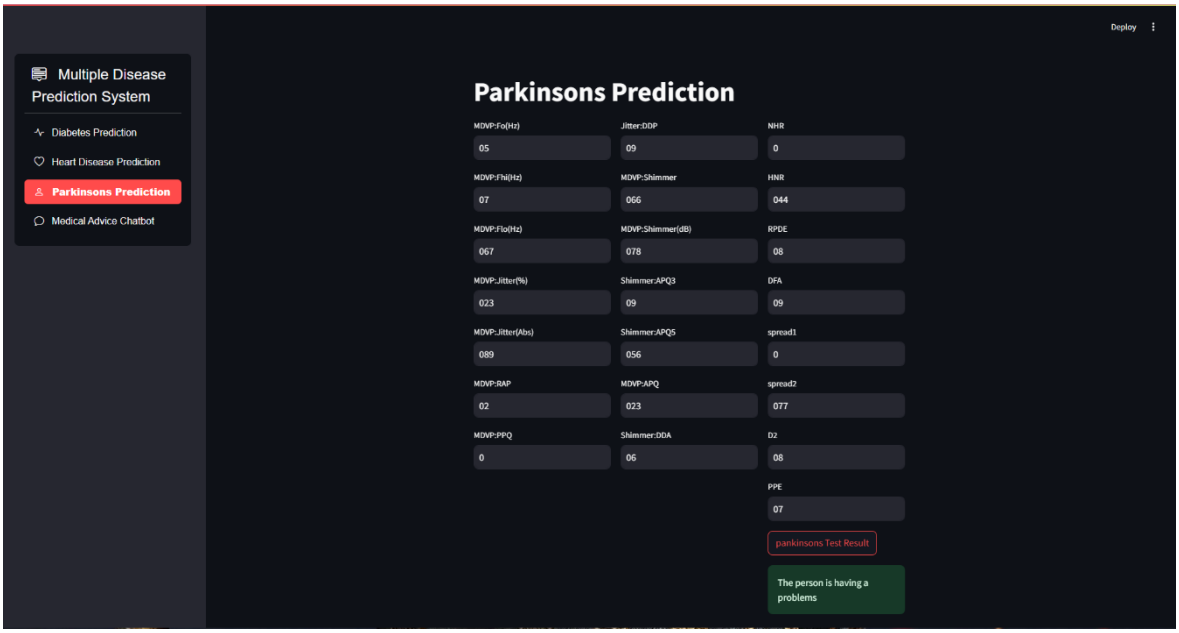
CHAPTER 4

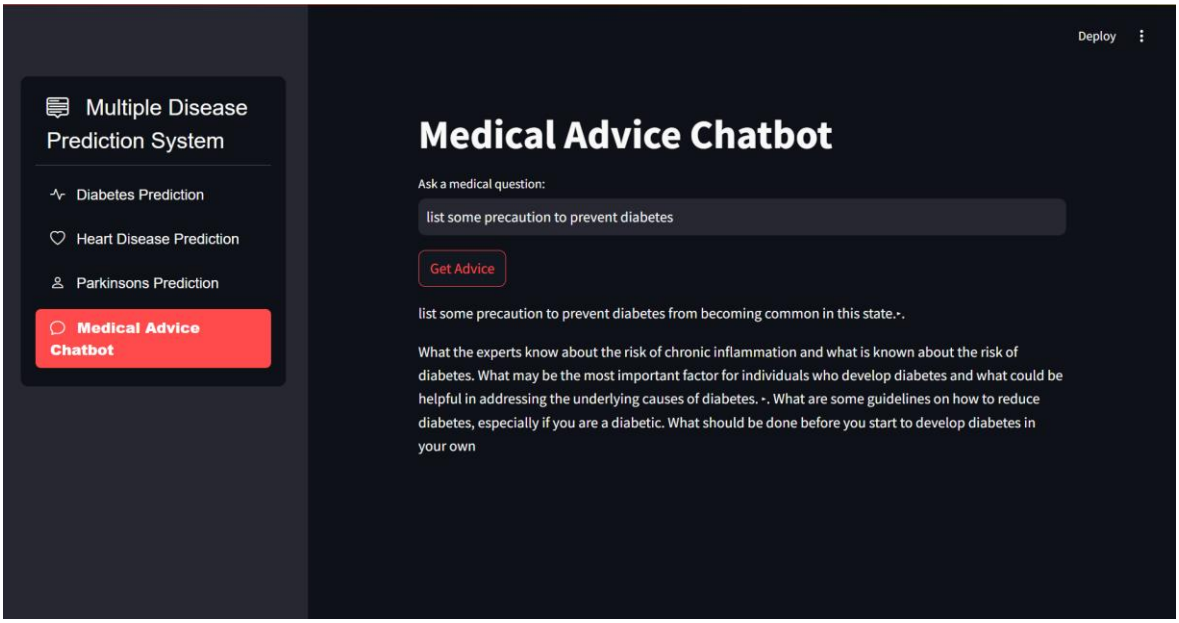
Implementation and Result

4.1 Snap Shots of Result:









4.2 GitHub Link for Code:

[yogendra007-github/AI-Powered-Medical-Diagnosis-System]

4.3 Demo Video Link:

https://drive.google.com/file/d/1Z6oZ6kwE7NrnZQS2jCRxirzK6lvGrPpp/view?usp=sharing

CHAPTER 5

Discussion and Conclusion

5.1 Future Work:

The AI-powered medical diagnosis system has shown promising results in predicting diseases like diabetes, heart disease, and Parkinson's with reasonable accuracy. However, there is still scope for further enhancement. Future work can focus on improving the model's performance by integrating more advanced machine learning algorithms and larger datasets. Incorporating real-time data from medical devices and electronic health records can also make predictions more accurate and timely. Furthermore, adding more diseases and refining the chatbot's medical advice with domain-specific language models can make the system more comprehensive and reliable.

5.2 Conclusion:

This project successfully demonstrates the application of AI in the healthcare sector by building a multiple-disease prediction system and a medical advice chatbot. The models for diabetes, heart disease, and Parkinson's prediction leverage machine learning techniques to provide quick and accurate results based on patient data. The chatbot, powered by natural language processing, offers medical advice, enhancing user engagement. This system can assist medical professionals in early diagnosis and treatment planning, ultimately improving patient care and health outcomes.

REFERENCES

1. Pedregosa, F., Varoquaux, G., Gramfort, A., et al. (2011). Scikit-learn: Machine Learning in Python. Journal of Machine Learning Research, 12, 2825–2830.

2. Vaswani, A., Shazeer, N., Parmar, N., et al. (2017). Attention Is All You Need. Advances in Neural Information Processing Systems, 30.

3. Streamlit Documentation: https://docs.streamlit.io

4. Hugging Face Transformers Library: https://huggingface.co/transformers/

5. UCI Machine Learning Repository: https://archive.ics.uci.edu/ml/index.php

6. Data set: https://edunetfoundationorg-my.sharepoint.com/:f:/g/personal/schaudhury_edunetfoundation_org/ErXoRVnF_4VChKRTQp2tBTwBr29tLzTRkN1kuzifO9HK6A?e=rPccIq