Real-time Health Care Analytics

Project Advisor: Weider Yu

Computer Engineering Department

Billa, Preethi (MS Software Engineering)
Janugani, Thanuj Kumar (MS Software Engineering)
Kandi, Mounica Reddy (MS Software Engineering)
Maguluri, Varun Teja (MS Software Engineering)

Introduction

Health prediction analysis using big data is a rapidly growing field that uses large amounts of data to predict and prevent potential health issues. This analysis can identify patterns and trends in health data, which can help to detect diseases early and develop preventative measures. Machine learning and data mining are used to analyze the data and make predictions.

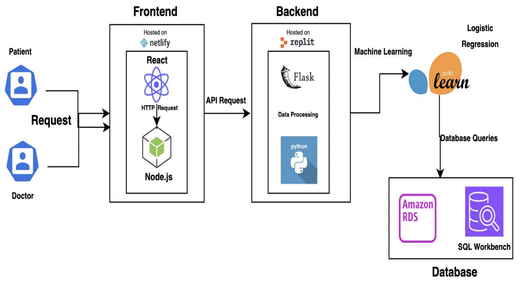
The main goal of this project is to develop a data-driven solution for predicting heart problems in individuals with the aim of improving the accuracy and efficiency of health prediction.

This project uses the Statlog (Heart) dataset from the UCI Machine Learning Repository as a source of truth for training the system. The dataset contains various attributes such as age, gender, type of chest pain, cholesterol, sugar, and score that can be used to train the system and predict heart problems.
The project rationale emphasizes the importance of providing accurate and efficient health predictions for people with heart problems.

Methodology

System Architecture

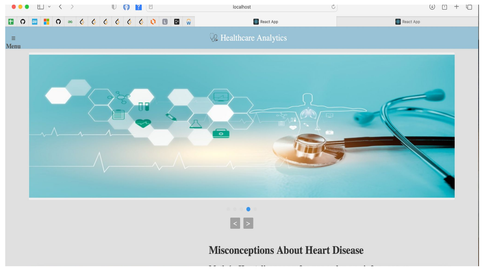
The healthcare analytics system has an advanced andwell-integrated architecture. In order to ensure a responsive and user-friendly experience for patients and healthcare providers, the user interface was first designed using React.js and Node.js. Machine learning for health analysis and prediction is provided by Scikit-Learn, and Flask-powered Python back-end handles API services. The MySQL database managed by XAMPP enables safe data storage and retrieval.

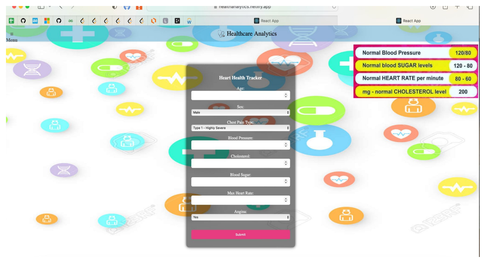


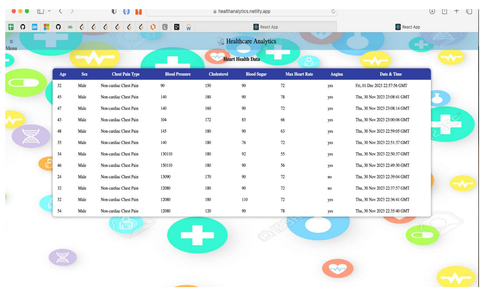
Project Design

User Interface

The User Interface for HealthCare Analytics depicts the various features as in patient login and doctor login, track the health status, view the previous search entries, calculate BMI and check and update profile page.



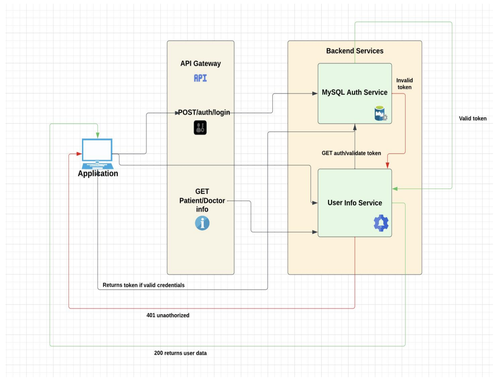




Backend

The Backend Design is responsible to store and manage data and in our application too, the backend is held responsible to manage and store data of users and doctors.

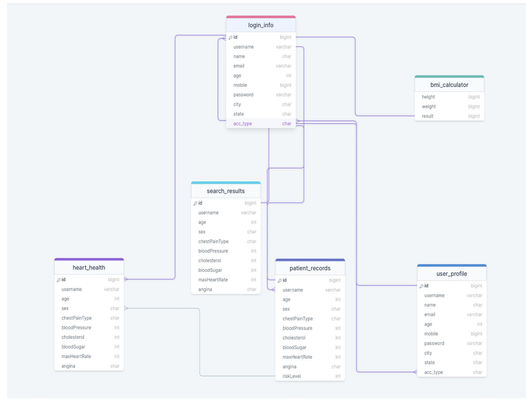
Our backend setup takes authentication very seriously and no unauthorized person can login to another user's profile. Token Authentication Filter which will be present in all the services will validate this token and provide access to the landing page if the token is valid.



Authentication Flow Diagram

Database Design

Our HealthCare Analytics database schema consists of 6 main entities. Login Info, Heart Health, Search Results, Patient Records, User Profile and BMI Calculator.



Database Schema

Deployment

In this project we used Netlify for deploying the front-end, Replit for deploying the back-end, and AWS RDS along with SQL Workbench for managing the database. It leverages cloud-based services and tools to streamline the deployment and management of both front-end and back-end components while ensuring efficient handling of the database-related tasks.

Summary

The project promises enhanced healthcare decision-making through data-driven insights and analysis. By amalgamating front-end sophistication, real-time data processing, and machine learning capabilities, it aims to revolutionize healthcare practices, enabling early identification of health issues and personalized patient care.

This real-time healthcare analytics solution holds immense potential to transform healthcare delivery, offering immediate and predictive insights to medical professionals for improved patient outcomes and proactive health management.

Conclusion

This Healthcare Analytics project stands at the forefront of revolutionizing healthcare decision-making. Its innovative architecture empowers healthcare professionals with immediate insights, aiding in precise diagnostics, personalized treatment plans, and proactive health management. As it continues to evolve, this project holds significant promise in reshaping the healthcare landscape toward a more data-informed and patient-centric approach.

Key References

[1] Wang, L., & Alexander, C. A. (2019). Big Data Analytics in Healthcare Systems. International Journal of Mathematical, Engineering and Management Sciences, 4(1), 17–26. https://doi.org/10.33889/ijmems.2019.4.1-002

[2] Antony Basco, J., & Senthilkumar, N. C. (2017). Real-time analysis of healthcare using Big Data Analytics. IOP Conference Series: Materials Science and Engineering, 263, 042056. https://doi.org/10.1088/1757-899x/263/4/042056

[3] Khan, S., Khan, H. U., & Nazir, S. (2022). Systematic analysis of healthcare big data analytics for efficient care and disease diagnosing. Scientific Reports, 12(1). https://doi.org/10.1038/s41598-022-26090-5

Acknowledgements

We would like to sincerely thank Professor Weider Yu for his guidance and support during our group Master's research. Their knowledge, invaluable suggestions, and consistent assistance have been essential to the project's successful completion.