APPLYING ARTIFICIAL INTELLIGENCE TO WEARABLE SENSOR DATA TO DIAGNOSE & PREDICT CARDIOVASCULAR DISEASE

Project Reference No.: *47S_BE_2871*

College **:** *Basavakalyan Engineering College, Basavakalyana*
Branch **:** *Department of Computer Science and Engineering*
Guide(s) **:** *Mr. Viresha Sugoor*
Student(S) **:** *Mr. Pawan Raju*
Ms. Nikita
Ms. Kasturi
Mr. Ashish

Keywords:

Artificial Intelligence (AI), Deep Learning , Cardiovascular disease , Wearable Sensor Artificial Intelligence (AI) , Deep Learning , Cardiovascular disease , WearableSensor Devices

Introduction:

According to the World Health Organization, heart disease is the first leading cause of death in the high and second leading cause of death in low- income countries. It has remainedthe leading cause of death at the global level for the last 20 years. This project aims to analyze several data mining techniques implemented in recent years for diagnosing heart disease. At present, there areplenty of algorithms available that could detect and predict heart anomalies from clinical reports.

Objectives:

This project tackles the critical issue of heart disease, the leading cause of death globally, as reported by the World Health Organization for over two decades. The primary objective is to scrutinize and evaluate data mining techniques recently implemented for heart disease diagnosis.

Unlike traditional methods that focus on clinical reports, this project centers on Electrocardiogram (ECG or EKG) image reports. The goal is to discover and extract patterns within these ECG records, reducing the need for time-consuming manual interpretation. By digitizing ECG records, the project aims to automate and expedite diagnosis and analysis, enhancing efficiency and accuracy in detecting heart anomalies. This approach represents a significant shift toward leveraging technology for improved healthcare outcomes.

Methodology:

The methodology for this research involves a multi-faceted approach tocomprehensively analyze and implement data mining techniques for diagnosingheart disease, as outlined in the introduction. The first step is an extensive review and selection of relevant data mining techniques, encompassing Machine learning algorithms such as decision tree, support vector machines, neural networks, and Ensemble methods. This review will consider the strengths and limitations of reach technique in the Context of heart disease diagnosis. Given the project's unique emphasis on

Electrocardiogram (ECG or EKG) image reports, the subsequent phase involves the development of a robustframework for the extraction and analysis of patterns within these reports.

ML Model: We tested various algorithms and then utilized the enable techniqueto stack algorithms to enhance performance because it was a classificationproblem. Algorithms tested:

1. k-nearest neighbors (KNN)
2. Logistic Regression
3. Support Vector Machine (SVM)
4. Xgboost 5. GridSearchCV

The proposed system introduces a paradigm shift by prioritizing the analysis of Electrocardiogram (ECG or EKG) image reports over conventional algorithms usedin clinical reports for heart disease detection. Emphasizing digitization of ECG records aims to eliminate the time-consuming manual interpretation, facilitating quicker automation of diagnosis and analysis. This innovative approach

seeks to enhance the efficiency of healthcare processes in addressing the persistent global challenge ofheart disease.

Results

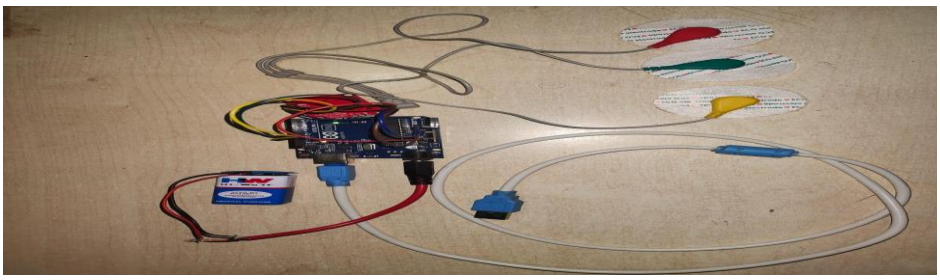


FIG.8.1 IOT MODEL

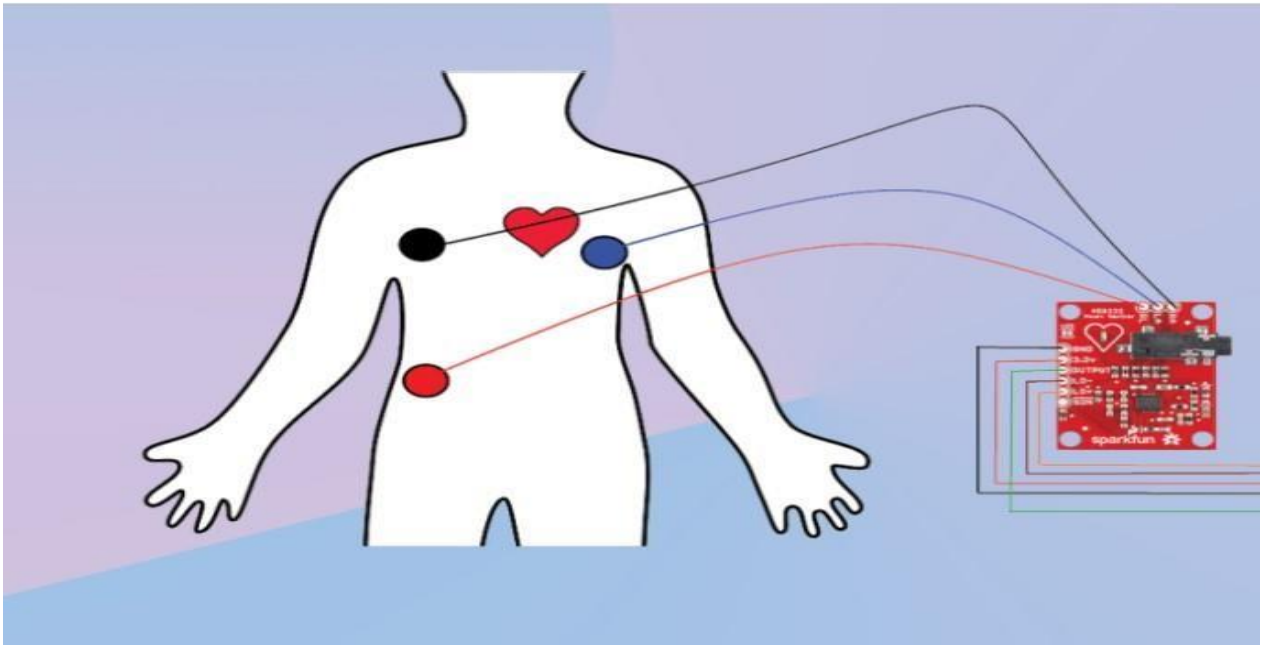


FIG.8.2 CONNECTING ELECTRODS TO PARTICULAR BOY POINTS

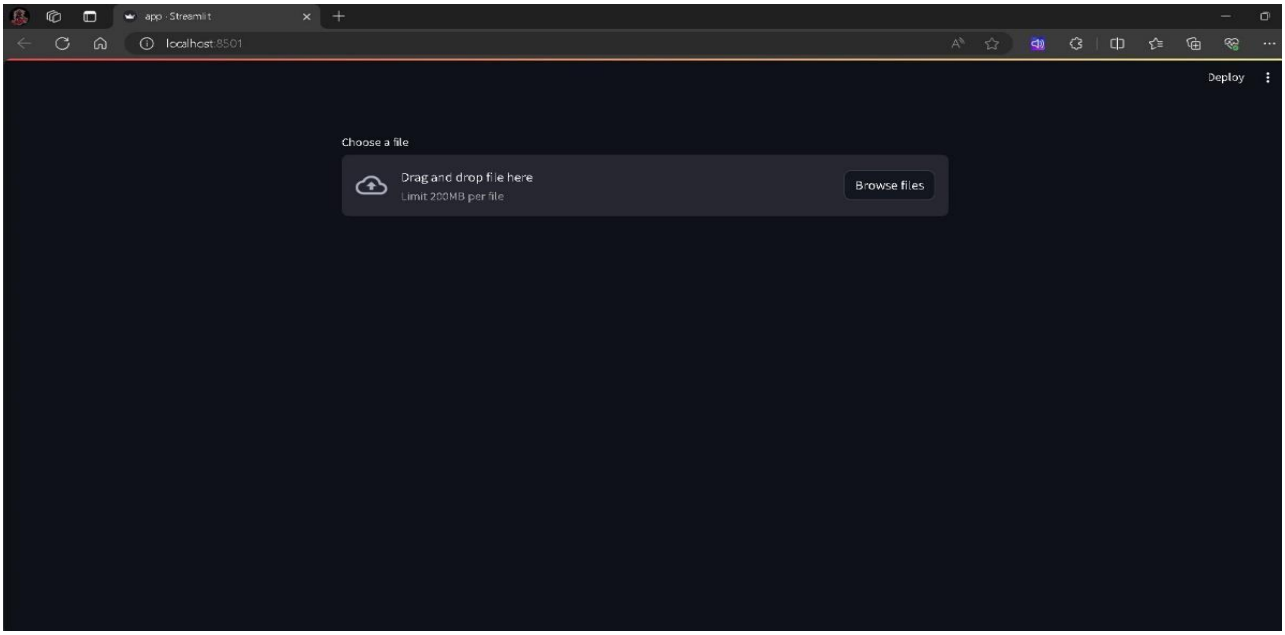


FIG.8.3 INTERFACE FOR UPLOADING IMAGE

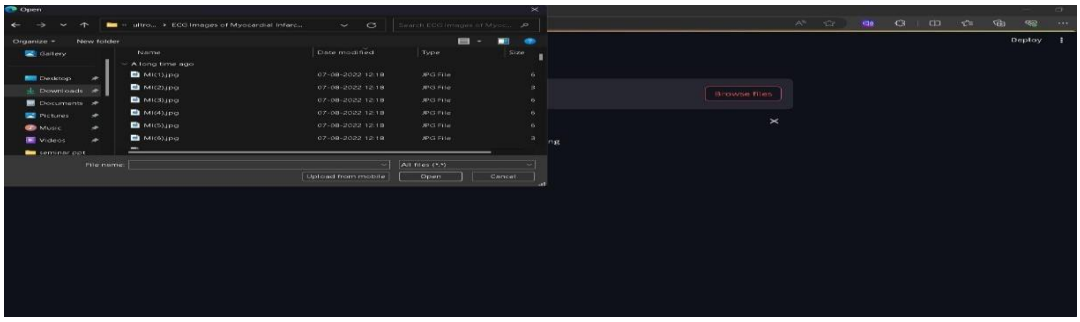


FIG.8.4 UPLOADING 3 LEAD ECG IMAGE

FIG.8.5 3 LEAD ECG IMAGE PROCESSING

FIG.8.6 CONVERTING 3 LEAD IMAGE TO 1 LEAD SIGNAL

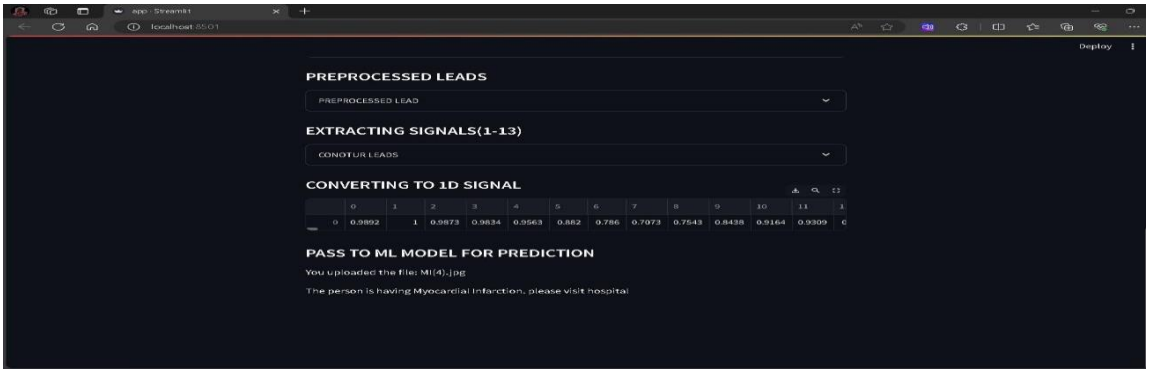


FIG.8.7 PREDICTION FOR 3 LEAD ECG IMAG

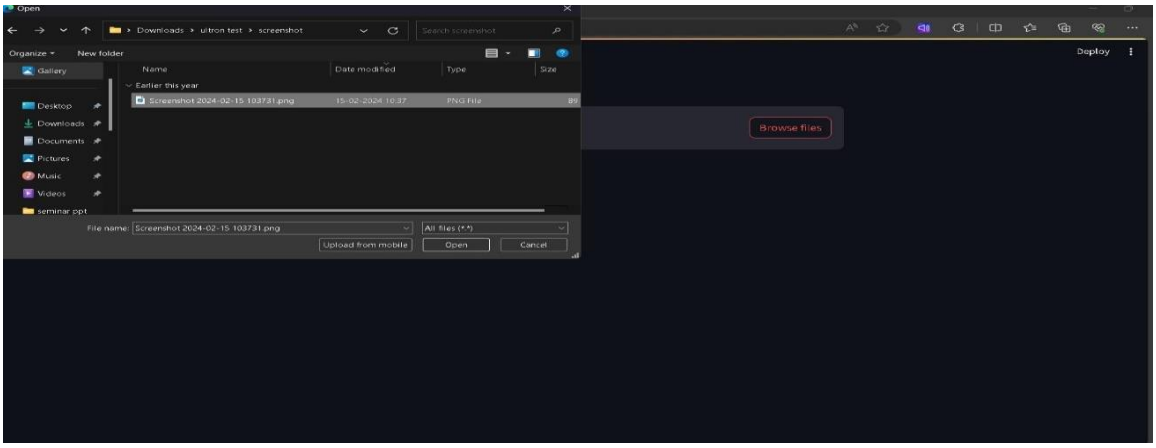
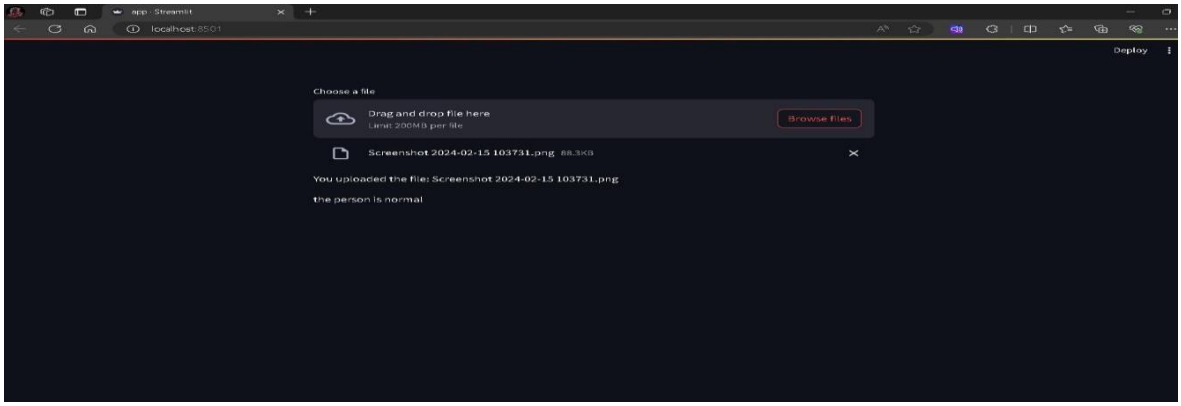


FIG.8.8 UPLOADING 1 LEAD ECG IMAGE

FIG.8.9 PREDICTION FOR 1 LEAD ECG IMAGE



Conclusion

In conclusion, this project addresses the critical global health concern ofheart disease, reaffirming its sustained status as the leading cause of death worldwide. The analysis of various data mining techniques underscores the potential for advancements in heart disease diagnosis.

By concentrating on digitizing Electrocardiogram (ECG or EKG) imagereports, the project advocates for a transformative approach, eliminating the need for labor-intensive manual intervention and accelerating the automation ofdiagnosis. This shift towards digitization aligns with the contemporary landscape of healthcare technology, promising quicker and more efficientoutcomes in the ongoing battle against heart disease on a global scale.

In summary, this project addresses the global urgency of heart disease by analyzing modern data mining techniques. By prioritizing the digitization of Electrocardiogram (ECG) imagereports, the research streamlines and expedites heart disease diagnosis, eliminating manual intervention. This approach aligns with contemporary healthcare technology, promising swift andefficient outcomes globally

Innovation In Project

The proposed system introduces a paradigm shift by prioritizing the analysis of Electrocardiogram (ECG or EKG) image reports over conventional algorithms usedin clinical reports for heart disease detection. Emphasizing digitization of ECG records aims to eliminate the time-consuming manual interpretation, facilitating quicker automation of diagnosis and analysis. This innovative approach seeks to enhance the efficiency of healthcare processes in addressing the persistent global challenge of heart disease

Future Scope

1. Adding Bluetooth module to the IoT model for supporting wireless connection.
2. Developing the android application for signal generation.
3. Taking permission from the expert doctors for deploying ai and ml model on web.
4. Training ml model with the more image formats.
5. Training ml model for supporting more cardiovascular diseas

Reference

- **Abdul Hannan a, Sehrish, Munawar Cheema b, Ivan Miguel Pires c d** Biomedical Signal Processing and Control Volume 87, Part B, January 2024,105519
- Muhammad Shafiq,[1]Changqing Du,[1]Nasir Jamal,[2]Junaid Hussain Abro,[2]TahirKamal,[3]Salman Afsar,[4]and Md. Solaiman Mi**a Volume**
- **Solam Lee, Y. Chu, Jieng Ryu, Y. Park, Sejong Yang, S. Koh** Publishedin Yonsei medical journal 1 January 2022
- **Aruna, S. & Rajagopalan, S. A novel SVM based CSSFFS** feature selection algorithm for detecting breast cancer. Int. J. Compute. Appl. 31, 20 (2021).
- **Lakhani, P. & Sundaram, B. Deep learning at chest radiography:** Automated classification of pulmonary tuberculosis by using convolutional neural networks. Radiology 284, 574–582 (2020).
- **Yasuaki, K. & Akai, H.** Deep learning with convolutional neural network for differentiation of liver masses at dynamic contrast-enhanced CT: A preliminary study. Radiology 286, 887–896 (2019).