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Health monitoring using IOT

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ABSTRACT:

In today's society, substantial difficulties in healthcare and medicine are caused by a lack of effective treatment and timely monitoring. There are several through electronic-based technology and IoT-based devices We can monitor the patient's health over the internet. The Indian experts took advantage of these smart devices and The use of technology to monitor a patient's health status. The application of machine learning in the field of medical diagnosis is increasing gradually. This can be contributed primarily to the improvement in the classification and recognition systems used in disease diagnosis which is able to provide data that aids medical experts in early detection of fatal diseases and therefore, increase the survival rate of patients significantly. In this paper, we apply different classification algorithms, each with its own advantage on three separate databases of disease (Heart, Breast cancer, Diabetes) available in UCI repository for disease prediction. The feature selection for each dataset was accomplished by backward modeling using the p-value test. The results of the study strengthen the idea of the application of machine learning in early detection of diseases.

KEYWORDS: Pulse Rate Sensor, Buzzer, SP02, Contactless Temperature Sensor, OLED Display

INTRODUCTION

IOT devices are a collection of connected smart devices that communicate with one another and share data online. These methods were utilized to construct a system that would allow for the detection and prediction of numerous diseases while also detecting other healthcare issues. The goal of such a system is to quickly forecast the disease from the patient's physiological data, such as blood pressure, body temperature, and heart rate. Blood pressure, body temperature, and heartbeat monitors to gather patient data. Using the Internet of Things (IOT), it continues to capture the patient's data and send out an emergency warning if necessary. This permits the patient's data to be stored in the cloud. Consequently, the patient's medical history records will be useful to doctors. Therefore, prompt action ensures the patient's success. Data mining is essential to healthcare for predicting sickness. N number of patient health tests are necessary to diagnose an illness. Alternately, the use of data mining technique can reduce the number of tests. The process of choosing, realizing, and displaying a vast amount of data to search for useful hidden patterns is known as data mining.prediction of several disease types utilizing A variety of soft computing techniques, including machine learning, data visualization, and multidimensional databases, are frequently used to handle data mining difficulties. The Internet of Things (IOT) illness predictive system focuses on predicting the disease from various technologies and processes utilize for early disease prediction

DESIGN AND COMPONENTS

This section details the design and components required for constructing a health monitoring using IOT . It discusses: Hardware components: Pulse rate Sensors , ultrasonic buzzer, contactless temperature sensor, raspberry pi and SP02. Software components: Arduino programming environment (Arduino IDE), control algorithms for tracking the sun's position.

I. *CNN ALGORITHM*

A Convolutional Neural Network (CNN) is a type of deep learning algorithm specifically designed for image processing and recognition tasks. Compared to alternative classification models, CNNs require less preprocessing as they can automatically learn hierarchical feature representations from raw input images. A convolutional neural network (CNN or ConvNet) is a network architecture for deep learning that learns directly from data. CNNs are particularly useful for finding patterns in images to recognize objects, classes, and categories. They can also be quite effective for classifying audio, time-series, and signal data.

1. Convolutional Layers: These layers apply convolutional operations to input images, using filters (also known as kernels) to

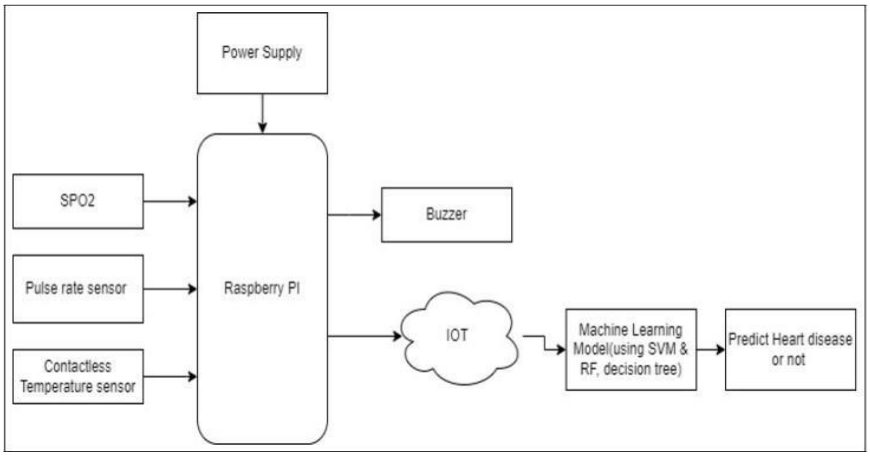
detect features such as edges, textures, and more complex patterns. Convolutional operations help preserve the spatial relationships between pixels.

2. Pooling Layers: Pooling layers downsample the spatial dimensions of the input, reducing the computational complexity and the number of parameters in the network. Max pooling is a common pooling operation, selecting the maximum value from a group of neighboring pixels.

3. Activation Functions: Non-linear activation functions, such as Rectified Linear Unit (ReLU), introduce non-linearity to the model, allowing it to learn more complex relationships in the data.

4. Fully Connected Layers: These layers are responsible for making predictions based on the high-level features learned by the previous layers. They connect every neuron in one layer to every neuron in the next layer**.**

II. *BLOCK DIAGRAM & DESCRIPTION*



- **Hardware Setup:**

Gather the necessary hardware components, including:

1. SpO2 sensor module.
2. Heart rate sensor module.
3. Contactless temperature sensor (such as infrared temperature sensor).
4. Buzzer for alerts.
5. Microcontroller board (Raspberry Pi) to interface with the sensors and process the data.

- **Sensor Data Acquisition:**

6. Connect the sensors to the microcontroller board according to their specifications.
7. Write code to read data from each sensor.
8. Ensure proper calibration and accuracy of sensor readings.

•**Data Analysis and Preprocessing:**

1. Collect data from the sensors in real-time.
2. Preprocess the data, including noise reduction, outlier removal, and normalization if necessary.
3. Combine the data from different sensors into a unified dataset.

•**Machine Learning Model Selection:**

4. Choose appropriate machine learning algorithms for classification. For your case, SVM (Support Vector Machine), Random Forest, and Decision Tree classifiers are suitable choices.
5. Consider the characteristics of your dataset and the computational requirements of each algorithm.

•**Data Labeling:**

6. Label the data based on the person's health condition. For instance, 'normal' or 'heart disease.'
7. Ensure a balanced dataset to avoid bias in model training

•**Model Training:**

8. Split the dataset into training and testing sets.
9. Train the selected machine learning models using the training data.

10. Tune hyperparameters to optimize model performance, possibly using techniques like cross-validation.

•**Model Evaluation:**

11. Evaluate the trained models using the testing dataset.
12. Assess performance metrics such as accuracy, precision, recall, and F1-score. 3.Choose the model with the best performance for
13. deployment .

•**Real-time Monitoring and Prediction:**

14. Implement a real-time monitoring system using the microcontroller board.
15. Continuously read sensor data and preprocess it.
16. Input preprocessed data into the trained machine learning model to predict the person's health condition.
17. If the prediction indicates a potential health issue (e.g., elevated heart rate, abnormal SpO2 or temperature), trigger the buzzer for alerting the
18. person.

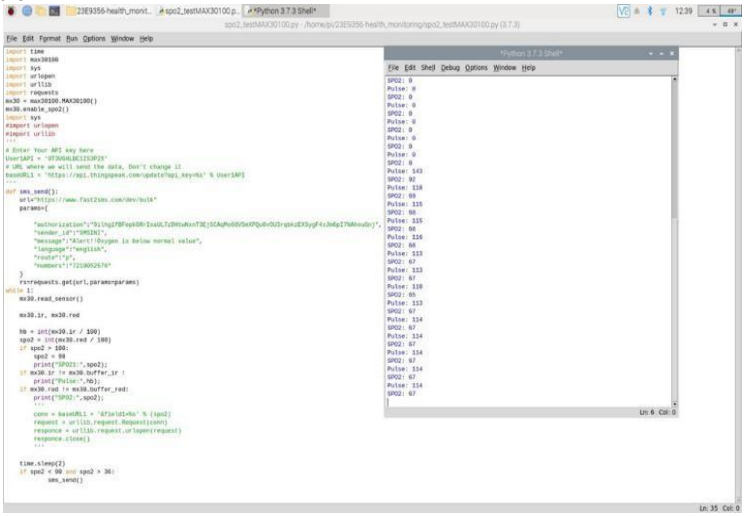
III. *SOFTWARE COMPONENT*

Operating system :

Windows 10 IDE :

Spyder

Programming language : Python



RESULT

The main objective of this paper is to make reliable communication between patient and doctor. Patient account creation, existing accounts editing, data gathering through other measuring devices, communication through Bluetooth and other wireless techniques are performed. Similarly, doctor account creation, editing, trans-receiving the data, analysis of the data and also analyze the patient condition checked through the received data. Pulse rate sensor, temperature sensor, oxygen levels through the sensor are collected and stored transmitted through the app for the doctor analysis. Minor errors are occurred in the results when compared to the standard methods but the values are valid.

REAL-WORLD APPLICATIONS AND FUTURE DIRECTIONS

As we all know, the future scope of the patient health monitoring via internet connectivity is emerging day by day because it helps in the camps also like when a disaster takes place then in the rescue camps the medical team is unable to take the big or huge or large machines so this portable kit will be helpful. The bioelectronics is making its place in the field of electronics or engineering as well as in the field of medical science.

CONCLUSION

In conclusion, the integration of IoT sensors and SVM algorithm for predicting heart disease is a promising approach for enhancing healthcare. By continuously monitoring vital signs and utilizing SVM for classification, this system can offer timely and accurate predictions. It enables early detection and intervention, ultimately improving patient outcomes and reducing healthcare costs. However, it's important to ensure the reliability and security of IoT data and fine-tune the SVM model for optimal performance. Overall, this combination of technology holds great potential for protective and effective heart disease prediction and management

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