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IOT based Human Physical Fitness Test for Public Services using Machine Learning and Cloud Computing

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Abstract: Internet of Things (IoT) is a technology that makes use of control systems such as computer to control the physical devices, industries, vehicles, buildings over the internet. The readings from Iot devices can be combined with machine learning to get a intelligent paradigm which can accomplish almost anything without human interaction. We are using different sensors to collect the data from candidate of a physical fitness test then data is analyzed and the fit and unfit candidate id decided by the machine. The data is then stored on the cloud database for further use. The status of the physical fitness examination is sent to the respective candidates. The system is human independent and intelligent enough to find out the right candidate for the public services. To achieve this the SVM of machine Learning algorithm will be used for classification. Cloud is used to store the status of candidate fitness test which will use for future use.

Keywords— Internet of Thing, machine learning(SVM),Cloud computing.

I. LITERATURE REVIEW

A. Internet of Things for Smart Healthcare: Technologies, Challenges, and Opportunities

In 2017 STEPHANIE B. BAKER , WEI XIANG and IAN ATKINSONa published this paper which explains the idea as Internet of Things (IoT) technology has attracted much attention in recent years for its potential to alleviate the strain on healthcare systems caused by an growing population and a rise in illness. Standardization in this is issue limiting progress in this area, and thus this research proposes a standard model for application in IoT healthcare systems. This survey paper then presents the states of research related to usablitiy of model, evaluating their strengths, weaknesses, and overall suitability for wearable IoT healthcare system.

B. A survey of Internet-of-Things: Future Vision, Architecture, Challenges and Services

In 2014 Dhananjay Singh , Gaurav Tripathi and Antonio J. Jara published this paper which explains Internet-of-Things (IoT) is the convergence of Internet with RFID, Sensor and smart objects. This paper presents a discussion on Internet oriented applications, services, visual aspect and challenges for Iot applications.

C. IoT based Healthcare Kiosk

In 2018 Mayuri P. Bankar and others published a work which mainly studies: A lot of research has been carried out in the field of healthcare monitoring. The proposed system framework integrated web services with multiple sensors controlled by Arduino Uno. We proposed a model which monitors various health parameters like heart rate (BPM) , body Temperature , blood pressure (mmHg) , height and weight of an individual. The doctor can then prescribed the medication based on the data results shown by system. The designed system will reduce the efforts of the patients to visit the doctor every time for monitoring of these health parameters..

II. METHODOLOGY

The proposed work is a combination of IOT, Machine Learning, cloud computing and desktop computing together.

A. IOT

The system can be used to collect sensor data and pass it to the server using Arduino and ESP8266.The mathematical model is as:

Set (I) = {I0, I1, I2, I3}

I0 € I = Initialize Sensors

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I1 €I = Fetch sensor data to Arduino

I2 € I =Initialize Wi-Fi

I3 € I =send data to desktop server via Wi-Fi

B. Machine Learning

The System can be used to analyze sensor data in two classes fit and unfit using SVM and training dataset that is generated manually by us. The mathematical model is as:

Set (M) = {I2, M0, M1, M2, M3, M4}

I2 € M = Initialize Wi-Fi

M0 € M = Receive data via Wi-Fi

M1 = Generate Training and Testing data

M2 = Apply SVM

M3 = Get Fitness Information

M4 = Upload Fitness Information

C. Cloud Computing

The System can be used to send fitness status to concerned authority and candidate and keep log of the readings for future use.

III. OUTCOME

A smart physical fitness test for public services system using IOT.

Help to detect a physically fit client for public services.

To analyze the data without human interaction.

To send physical fitness test results to concerned authority and candidate.

IV. APPLICATIONS

Healthcare, Smart Home, Smart Agriculture, Smart Cities, etc.

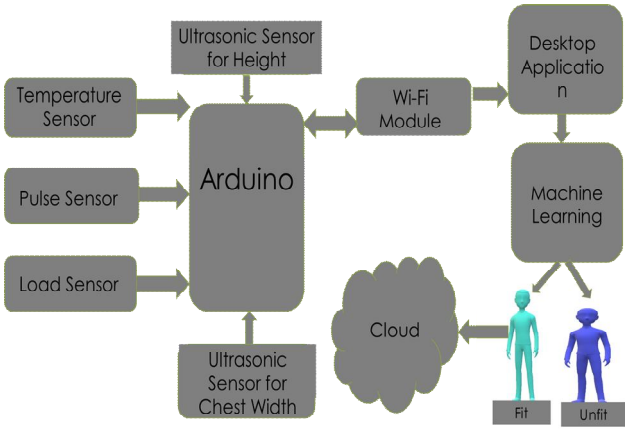
A. Dataset

1) Training Dataset: The data collected using various sensors is saved in datasheet. The datasheet contains Height measures, Weight measures, BMI measures.

2) Testing Dataset: The data accessed from the datasheet is the given to the SVM algorithm to analyze the training points and to generate the testing dataset. System Architecture

B. Proposed System

System architecrure is:



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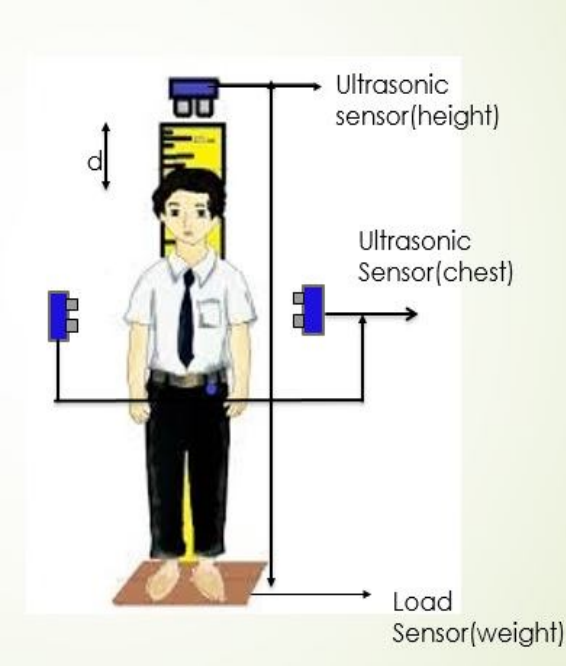


The data is captured by the sensors and send to Arduino for further computing. It will capture weight, height, chest width, pulse by various sensors. Here height is measured by the method as :
Height = (predefined height)- d……in cm

$$BMI = \frac{(weight)}{(height)^2}$$

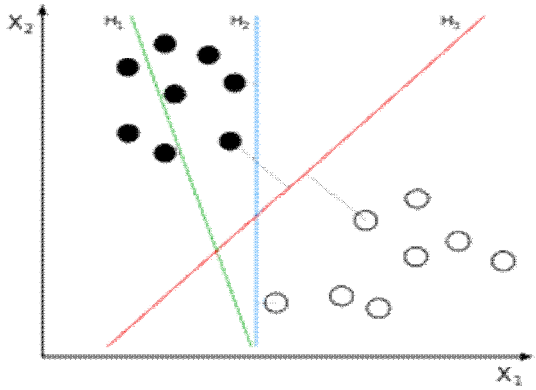
The Arduino communicate with desktop via wi-fi module. Here the SVM algorithm of machine learning is applied on datasets. The analyzed result then stored on cloud and result is acknowledged to the candidate through message.
e. g: height should be 155 cm for men,150 for women, chest width should be 84 cm for men and 79 for women so as to predict the candidate as fit.

C. Algorithum

1) SVM (Support Vector Machine): It is supervised machine learning model with associated learning algorithm that analyze data for classification and clustering.

2) Working of SVM: A support vector machine constructs a decision boundarys i.e set of hyperplanes in a high or infinite-dimensional space, which can be used for classify the data, regression, or other tasks like outlier's detection. Intuitively, a good separation is achieved by the hyperplane that has the largest distance to the nearest support vectors of any class (that is called functional margin), In general ,greater the marginal distance lead to lower the generalization error of the classifier

Selecting correct hyperplane in Linear separable dataset



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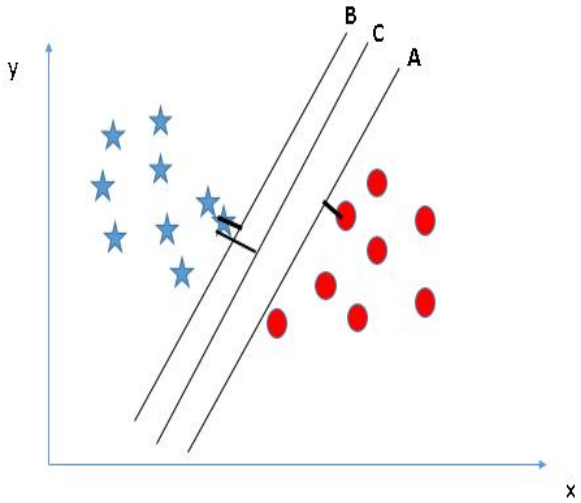
Selecting correct hyperplane among parallel hyperplanes:



V. RESULTS AND DISCUSSION

Highly efficient use of IoT, cloud computing and desktop together to build a whole new system which is secured and reliable for candidate recruitment for public services. It is more intelligent in recognizing a fit and unfit candidate for public services.

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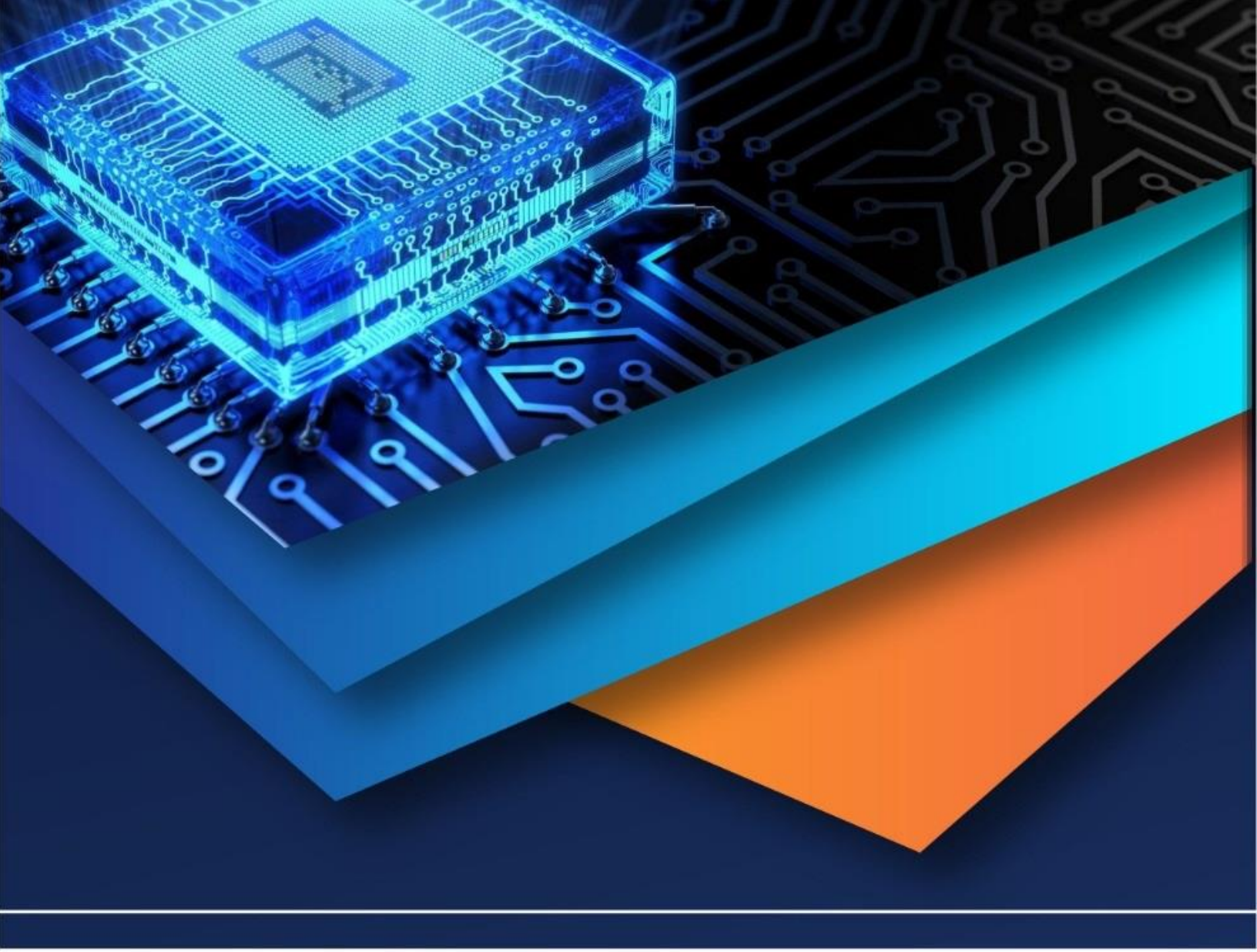

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