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Non-Invasive Based Myocardial Infarction Detector

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Abstract: ***Cardiac arrest is one of the main causes of human death worldwide. Every year, about 610,000 people die of heart attack that is one in every four deaths but there are well understood early symptoms of heart attack that could be used to greatly help in saving many lives and reducing damages bydetecting and sending alerts at an early stage. According to survey, every year, about 2.35 million people meet with accident from road accidents. Surprisingly, many of these fatal accidents happen due to the heart attack of drivers that leads to the loss of control of the vehicle. Accidents are imminent as long as there are drivers with medical conditions resulting in a lot of unfortunate crashes. We have designed a system which captures the facial image of the person and analyses the Heart attack symptoms. Immediately if any of the symptoms matches with the image of the face captured, the system would check other parameters. other parameters including Heart rate and oxygen level. When these parameters also match with abnormal conditions, then our designed system would give an output saying that the person is going through a Heart attack and sending alert messages to nearby hospitals.***
Keywords: Predicting Heart attack; Deep Learning; Convolutional Neural Networks (CNN), Machine Learning, Raspberry Pi 3, Heart Beat Sensor, MAX30100 Sensor, Facial Recognition, Keras and Tenserflow can be used;

I. INTRODUCTION

Heart attack is one of the main cause of human death worldwide. Every year, about 610,000 people die of heart attack that is one in every four death but there are well understood early symptoms of heart attack that could be usedto significantly help in saving many lives and reduce damagesby detecting and reporting at an early stage. Hence there is lack of information in individuals about the initial stage of heart attack.

While a person meeting with a heart attack, a plaque willrupture and spill cholesterol and other substances in thebloodstream. A clot is formed at the site of the rupture. If theclot is huge, it will block blood flowing through the coronaryartery, starving the heart of oxygen and nutrients (ischemia).

The current work proposes the development of a systemfor real-time detection and warning of heart attacks in drivers, which could be enormously helpful in reducing roadaccidents. The system consists of a web camera that monitors the driver's facial expressions. When facial expressions are observed, the data send to sensors which record the other parameters such as heart rate and oxygen level conditions.

Emergency call is sent to a nearby hospital and the speed of the Based on this the system detects whether the person has the heart attack or not. If the heart attack is detected an vehicle is reduced. The designed system can therefore help in decreasing the loss of lives from the increasing number of road accidents all over the world..

This project can be installed in a car where our designed system can say whether driver would meet with Heart attack or not, then we can slow down the speed of car .So this avoids the road accidents and also inform the nearby hospitals about the situation. By this we can save many lives.

It can be used to monitor the old people at home who have a greater chances of getting Heart attack. It can also be used in hospitals to monitor patient admitted with heart related issues because Doctors can't monitor the patients 24*7 ,so this can alert the Doctor if a patient is going to meet with Heart attack.

II. RELATED WORKS.

A. Xiaodong Zhuang and others (2019) proposed a "Face Analysis for Coronary Heart Disease Diagnosis". In

In this paper, they conducted an automatic analysis of the texture features extracted from eight ROIs (Regions of Interests)of the face images. Depending on the texture features, random forest and decision tree are used to detect whether the it has a CHD, or not. The experimental results on a set of 1528 face images collected from 309 subjects suggest that, our approach achieved a promising, i.e. 72.73%, prediction accuracy.First of all, the 68 facial landmark points and ears are detected.

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B. Shen Lin1, Zhigang Li, Bowen Fu (2020) proposeda "Feasibility of using deep learning to check coronary artery disease based on facial ".

In the paper it has conducted a multicentre cross-sectionalstudy of patients undergoing coronary angiography or computed tomography angiography at nine Chinese sites to train and validate a deep convolutional neural network for the detection of CAD (at least one >_50% stenosis) from patient facial photos. Amid July 2017 and March 2019, 5796 patients from eight sites were consecutively registered and randomly separated into training (90%, n= 5216).

C. Gabriel Rojas-Albarracín and others (2019) proposed a " Heart Attack Detection in Colour Images Using Convolutional Neural Networks".

This article represents a novel proposal to identify people with an apparent heart attack in colour images by detecting characteristic postures of heart attack. This system of identifying infarcts makes use of convolutional neural networks. The system have been trained with a specially organized images that contain people simulating a heart attack.

D. Maria T. Bekendam and others (2021) proposed a " Facial Expressions of Emotions During Pharmacologicaland Exercise Stress Testing: The Role of Myocardial Ischemia and Cardiac Symptoms"

Psychological factors such as depression, anxiety, and anger are frequent in patients with ischemic heart disease. These psychological factors are recognized to adversely affect clinical outcomes in cardiac patients. Depression is more common in patients with ischemia. Also, anginal (chestpain) symptoms were associated with more negative emotions digitally assessed emotion expression, and symptoms during cardiac stress testing CST in patients undergoing myocardial perfusion imaging

III. MATERIALS AND METHODS

A. Convolutional Neural Network Models

In machine learning, Convolutional neural network method is one of the well known algorithms. The classification of texts, audios and images is mainly done using this algorithm. Neural networks are "trained" to signify a system by means of existing data that includes specific matchings of the model's inputs and outputs.

In traditional artificial neural networks, CNNs are a branch that is especially used for applications with repeated patterns in various parts of the modelling space, mainly image recognition. The task of identifying plant illnesses from photographs of their leaves through AlexNet and GoogLeNet were the two basic CNN architectures examined in this study. These algorithms, as well as their training and testing procedures, were employed using the Torch71 machine learning computational framework, which uses the LuaJIT2 programming language.

B. Training and Testing Datasets

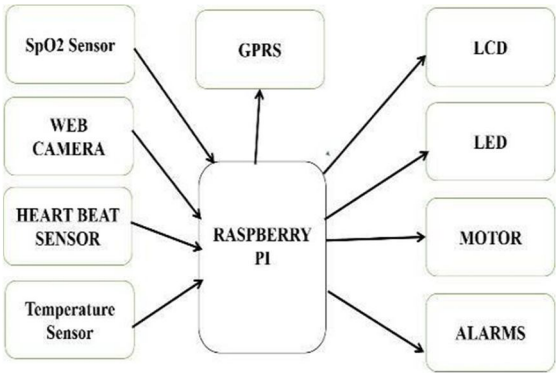
The dataset is taken from the kaggle website. The dataset contains 1680 directories. Each directory contains 2-50 images. Each picture is centered on a single face. These images are encoded in RGB. The original size of the image is 250x250. Additionally, the images of the students are goingto be taken and uploaded to the dataset.

C. Methods

The work is to develop a system that can detect the heart attack by using face recognition and other parameter like heartrate , oxygen level and temperature. It makes use of Raspberry Pi with a camera, heart rate sensor , and a spo2 sensor. The system is complemented with a screen LCD which presents the detected classes to the user. Immediately if any of the symptoms matches with the image of the face captured , the system would check other parameters. Other parameters includes Heart rate and respiratory rate . When these parameters also matches with Heart attack parameters, then our designed system would give an output saying that the person can meet with Heart attack within some time.

Step for Detecting Heart Attack:

- Taking input images of the person sitting infront ofthe camera.
- From the input image, detected facial expressionwill be recognized.
- Next step will be face recognition by usingCNNalgorithms.
- Then checking for other two parameters(Heartbeatandoxygen) to be sure about the heart attack.
- Once all three parameters are matched itdisplaysheartattack.



This project can be installed in a car where our designed system can say whether driver would meet with Heart attack or not, then we can slow down the speed of car. So this avoids the road accidents and also inform the nearby hospitals about the situation. By this we can save many lives. It can be used to monitor the old people at home who have a greater chances of getting Heart attack. It can also be used in hospitals to monitor patient admitted with heart related issues because Doctors can't monitor the patients 24*7 ,so this can alert the Doctor if a patient is goingto meet with Heart attack.

IV. RESULTS

The current work proposes the development of a system for real-time detection and warning of heart attacks in drivers, which could be enormously helpful in reducing road accidents.

The system consists of a web camera that monitors the driver's facial expressions. When facial expressions are observed, the data send to sensors which record the other parameters such as heart rate and respiratory conditions.

Based on this the system detects whether the subject has a heart attack or not. If a heart attack is detected an emergencycall is sent to a nearby hospital, the speed of the vehicle is reduced and alarm is used to alert the surrounding people.

The designed system can therefore help in saving the lives ofthe people all over the world.

The efficiency of detection is high because of considering ofthree parameters that is facial recognition ,heart rate, oxygen rate. datasets. The algorithms utilized were LBP(Local binaryPattern),KNN(KNearestNeighbour),CNN(Convolutio nal Neural Network), Haar Cascade algorithm and RNN(Recurrent Neural Network). So finally after detection we are going to slow down the speed of the car .Also we areinforming the nearby hospitals about the situation. Hence byusing this system we are reducing loss of human life and we can also control the death rate caused due to heart attack.

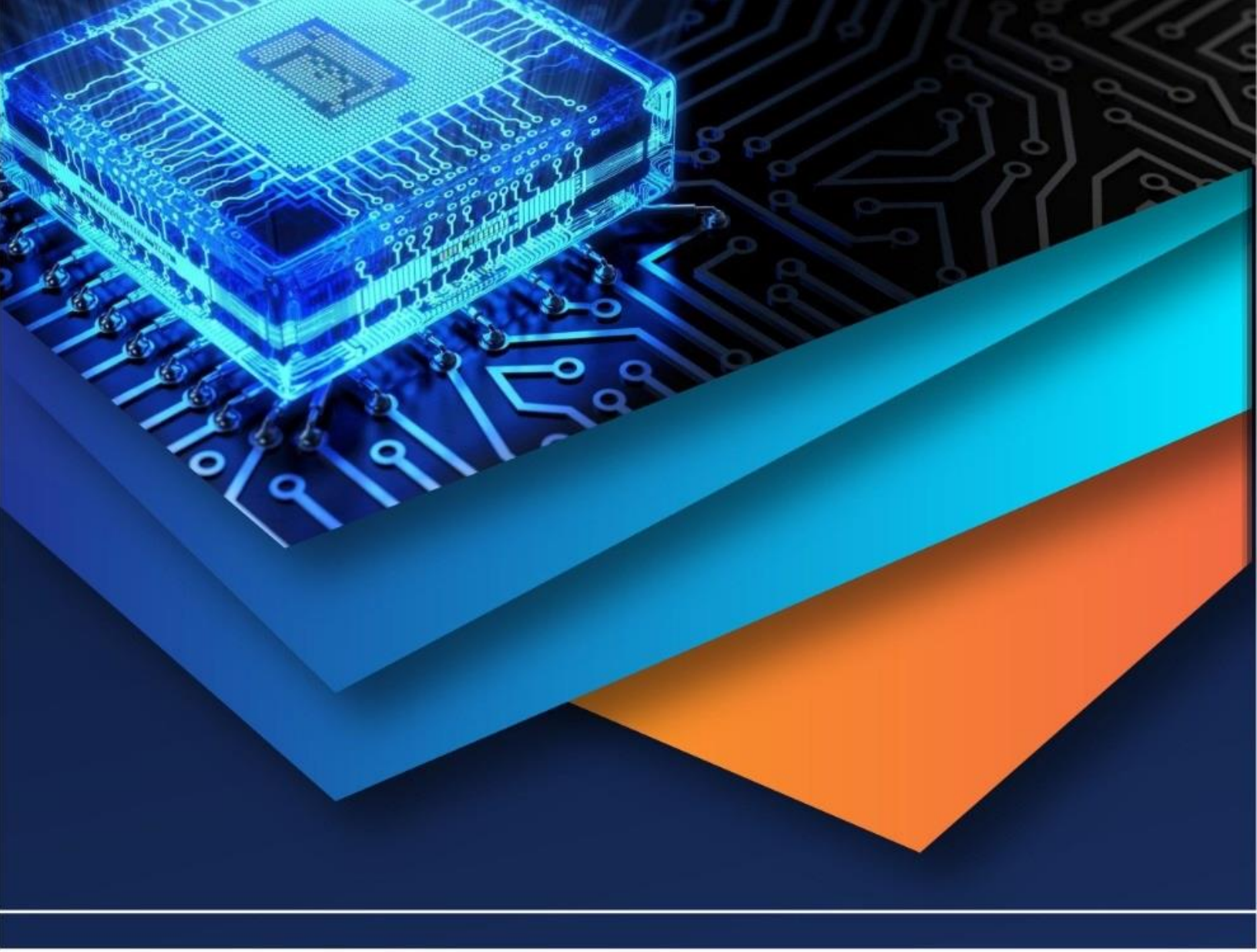
V. ACKNOWLEDGMENT

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