Patient Monitoring Using Ai In Viral And Infectious Cases

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Abstract

The main agenda of this work is to monitor a patient in viral and infectious cases, since our world faced a nightmare of Covid 19 where it became a high risk and Challenging Situation for Doctors and Caretakers to monitor a patient . So this health thesis problem statement can be resolved by this work, like this work introduces Artificial Intelligence in order to monitor a patient. Since, Preliminary this work is designed for monitoring of Cardiac and Paralyzed Patients by the source of Emotional Intelligence and Vigorous body movement Detection.

Keywords: Image Processing, Deep Learning, Keras, Face detection, Java , Android Studio and API's

1. Introduction

The Entry of an Artificial Intelligence in Medical field is rapidly increased in every category namely Radiology, Diagnosis etc., The Digital Equipments like measuring Blood Pressure,Sugar Levels and percentage of Hemoglobin through digital Handsets are welcomed into the market , Although the technology day by day reaching heights with good accurate products .The world Nightmare COVID 19 (NOVEL CORONAVIRUS) had shaken the whole world. No technology stood in front of that Viral and Infectious Disease. This Health Thesis Problem mainly impacted on the monitoring of an Patients , Due to heavy fast spreaded virus the monitoring of an Patient became an very high Challenging Task to the Doctors and Caretakers

Since taking the above Problem Statement of Monitoring a Patient as backend Inspiration introduced this work .This work focuses on mainly two preliminary categorical patients namely :

 (i). CARDIAC PATIENTS

 (ii). PARALYZED PATIENTS

As this work followed the literature survey as foundation, As in every hospital knows that maintains the high end definition Cameras was placed at everywhere to see and in ICU also the CC- Cameras will be placed, The same methodology this work is Interfacing with Artificial Intelligence to monitor a Patient in Viral and Infectious cases.

The monitoring term means observing from time to time. Generally it was done in only Intensive care units (ICU) at Hospitals…But among these the monitoring of Cardiac patients by the source of emotional Intelligence will play a major role because the heart is the powerhouse of emotions and feelings in everybody are generated from the heart . If at all it suffers negative emotions and suppressed feelings during Cardiac Problem it burdens the life of a heart Patient .According to literature Survey the hormones [2] like cristol releases when heart carries heavy emotions which leads to the start of clotting of blood. So monitoring of Cardiac Patients by the source of Emotional Intelligence is introduced by this work

For mainly these monitoring should be done for coronary heart disease patients. The emotion intelligence should be performed in front of them Because the coronae of the heart is responsible for the generation of emotion . So here the experiment is going to predict the emotions of cardiac patients

After Finding Out the Prediction of Emotions the push Notifications can be sent to the Doctors as well as Caretakers with extension to alarm Indication, Similarly the monitoring of Paralyzed Patients can be done by the source of Vigorous Body Movement Detection

2. Relation between Cardiology and emotions

As science says that the bad emotions like anger, anxiety and grief cause a heavy impact on the heart. The psychological impacts like stress and depression causes heavy impact sometimes it will may lead to cardiac arrest which results in the death of human being

The factors like stress and jobless disorders made the symptoms of cardiac stress. The exact scenario is that bad emotions like depression and frustration release the hormones in our body like cortisol and adrenaline and foremost thing is that it narrows the blood vessels and the heart beat will increase rapidly all the blood is pushed into the centre of the body[2]. Emotions play a vital role in the cardiac part of our body. According to Radiologists, there will be a difference in ECG (Electric cardio graphs) in accordance with the Emotions. Let us see the what variations Occurred

Similarly the Paralyzed patients can't move. The monitoring is important too for their basic needs,if at all they are faced with "FITS " the body parts start moving vigorously since by tracking vigorous body movement Detection this work helps in Viral and Infectious cases.
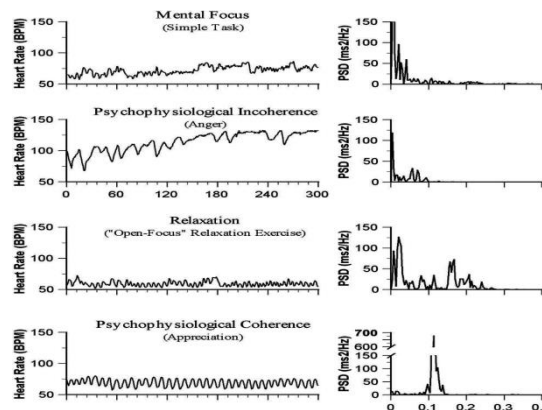
Fig(1). ECG Graphs at Different Emotions

Here in the fig.1 there is change in heartbeat at different kinds of emotions like Psychological Coherence, Relaxation and mentally focused, As seen in Psychological incoherence is causing very bad impact on cardiac role of our body the heart beat getting increased and the adrenaline and crtisol make get blood vessels very narrow and get blood direction at the centre of body which leads to the high blood pressure[3].

3. Related Case Study Work

As part of the work I gathered an ECG report. The victim's name is Suresh. He is a Business man due to some unconditional balances at the business. The income had come to a down graph and the victim is affected with some bad feelings and emotions. Because the expected output didn't care what he desires. So he suffered from high Blood Pressure.

Same situation takes place when he overt thinned about a scenario victim had experienced some bad emotions like frustration and depression due to that stress harmonies was released in his body and automatically the blood vessels become narrow and leads to high blood Pressure. When the ECG report also taken it resulted a little narrow fluctuation in heart beat which got rapid increase nearly equal to the 110 BPM which resulted in the Psychological Incoherence
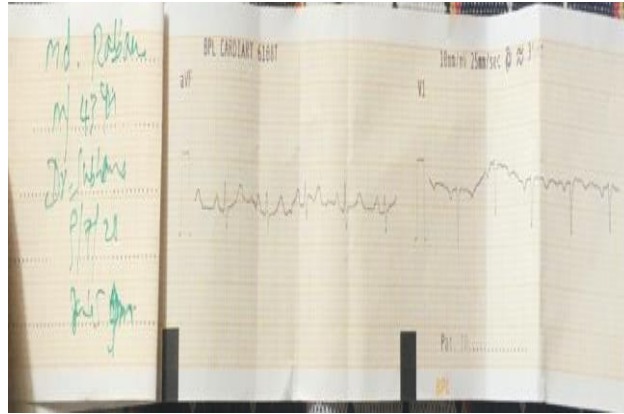
Fig (2). Live ECG report of Victim at Hospital

As in fig.5 the systolic pressure had rapidly increased gradually at for some time that period of is nothing but the imbalance of emotion i.e., Psychological incoherence.

The above case was a High blood pressure case for that type. Monitoring is very important because it is very dangerous. The root cause for this is Bad Emotions. So that monitoring of emotions rapidly in intensive care helps to prevent Dangerous Situation

From this work the above problem will easily get recognized because whenever the prediction of bad emotions is done then the high blood pressure can stop rising in the initial stage. So that there will be no effect on his systolic pressure therefore the heartbeat will be in normal range and the narrowness of blood vessels will not be affected. So we can prevent the dangerous symptoms and the effects which come after High BP , Mental distractions and Cardiology effects.
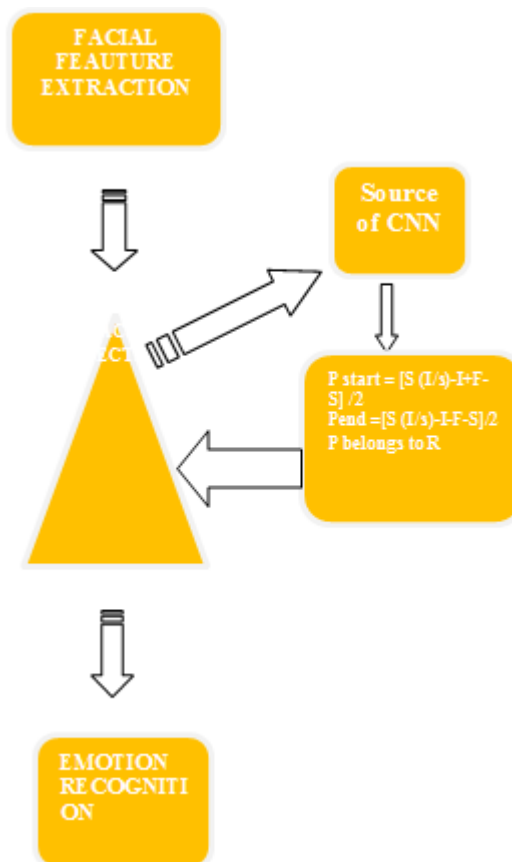
4. Block Diagram For Prediction Of Emotions

Fig.(3) Block Diagram

The formulae used for the epochs or iterations to be performing the prediction of emotion recognition.

P (Start) = [S (I/s)-I+F-S] / 2

P (end) =[S (I/s)-I-F-S] / 2

Since, Here 'P' indicates the Principle of epoch

5.   process of prediction emotions

Facial feature extraction

The facial feature defines the dimensions of a face in which the face components like nose, mouth, ears all these things are marked and identified .It is an initialization step for face detection. After land marking of components of face it will start performing libraries of comp vision
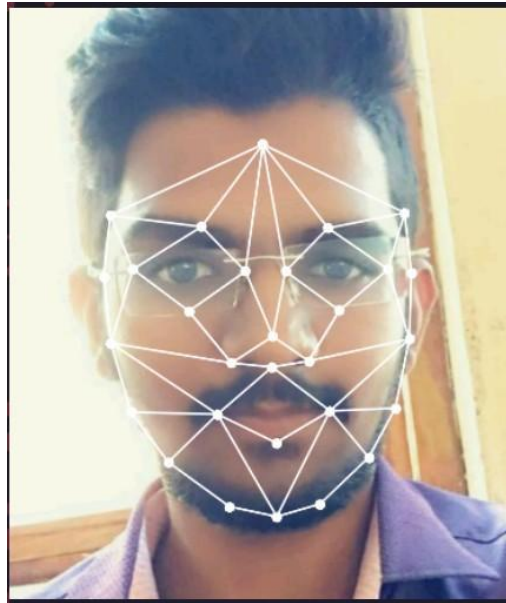

fig.(4)

By open CV technology the pictures will be taken and it will be converted into RGB2BGR hence the visual is black and white we will use binary classifier. Then by that approach the pictures or videos will be easily understood by the computer by giving labels to each and every image .By that every image has a particular metric value for that metric calculations will be done.
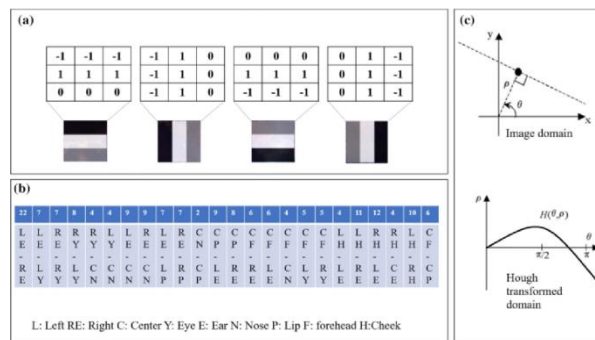

Fig.(5) GraphicalAlgorithmic Values

It will start calculating the   facial dimensions in accordance with left right ear , nose etc., After immediately the dimensions of components of face will helps in detection of face by excluding some independencies like beard, hair, ears, caps ,turbans etc., $s(t) = \Sigma \alpha_i \times s_i(t)$

$i=1$

	Predicted Positive	Predicted Negative
Actual Positive	TP (True Positive)	FN (False Negative)
Actual Negative	FP (False Positive)	TN (True Negative)

B. Face Detection

Secondly the process is going to start with face detection. Before starting the model the unsupervised learning takes place with the model which means the data of several emotions are trained as a dataset in the database of the model [5]. Whenever the model is in working module then it captures the human and after the model is goanna detect the faces and remarking the faces with a square dimension box by excluding some of the interdependencies like cap, turbans, beard etc,.[4] And the detected face will be calculated by using computer vision in the form of Binary classification

fig.(6) Face Detection

As in the above picture the person is exposed to webcam and after the model had excluded some of his dependencies like hair, beard all and at the end of pipe line it detected only the faces of humans. Here there are some visual geometry applications in the role of detection of faces. The VGG face model involves detection of faces [3]. By these we can detect the face. The after immediate approach is emotion detection

C. Emotion Recognition

Here is the final step of the model which detects the emotion of the human face which was detected in the first two steps. As in this work the data set of 4 basic emotions was given namely Neutral, sad, anger, Happy. Here the model is trained in the way such that it is given a sample of 860 images in 4 basic emotions after that it starts the calculation metrics and pixel equalization and all other characteristics of an image. After that the machine will start comparing the calculated data with the labeled data which comes under supervised learning[4]. The unsupervised learning means that input based outcome. Here also the whole output is based on the dataset which was given

fig.(7) Prediction of

As in above figure (3) the picture is detected as Neutral emotion with no fluctuation in heart rate or any other hormones. These were the exact scenarios behind the scenes of Emotion prediction.
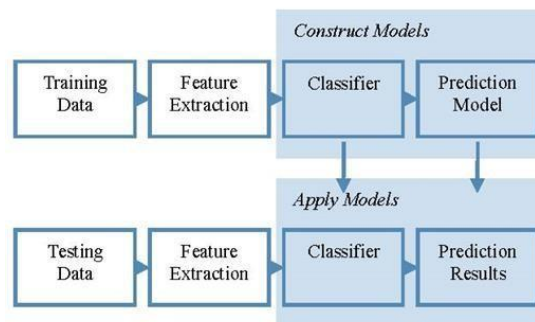

Fig.(8) Block Diagram of Machine Learning model Architecture

6.   How Our Model Works

In this work the main focused thing is emotion recognition. The main agenda to monitor the cardiac patients at critical centers especially in Viral and Infectious cases and if they face any bad emotions then automatically it alerts to the Caretakers

Fig.(9) Sample Process of Monitoring

As shown in the above figure The CC will monitor the cardiac patients in critical care with a high resolution of night vision cameras. it is interlinked with cloud the predicted emotion will be sent through to caretaker by the form of message
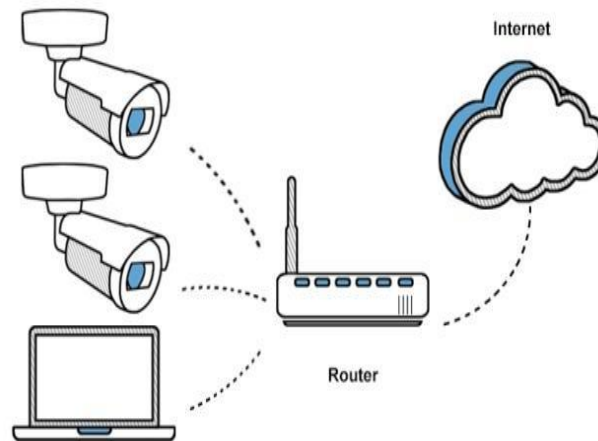

Fig.(10) Cloud Architecture

As in the above figure the data will be captured through cc and the information passes through server and saves into the cloud and moreover by p2p server we will send the predicted sms to the caretakers monitoring laptops or mobile phones. By these methods here the monitoring of cardiac patients will be done.

Sending push notifications to the care takers in case of android and ios:

The Machine Learning Algorithm will be interfaced with CC Cameras and API Cloud Base SQL Server, The API's are interconnected with above structural Cloud architecture as shown in above fig.8 the Firebase Connected for the sake of Android handset and APNS for the sake of IOS , The Block approach was shown below in order to follow for sending an Predicted result via Push Notification via Online
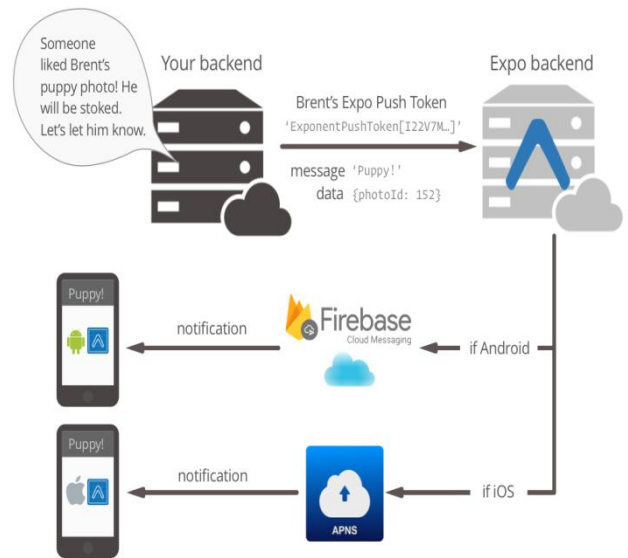
Fig.(11) Step Process of Push Notifications

To detect faces in an image, create a FirebaseVisionImage object from either a Bitmap, media.Image, ByteBuffer, byte array, or a file on the device. Then, pass the FirebaseVisionImage object to the FirebaseVisionFaceDetector's detectInImage method.

For face recognition, you should use an image with dimensions of at least 480x360 pixels. If you are recognizing faces in real time, capturing frames at this minimum resolution can help reduce latency.

Create a FirebaseVisionImage object from your image.

To create a FirebaseVisionImage object from a media.Image object, such as when capturing an image from a device's camera, pass the media.Image object and the image's rotation to FirebaseVisionImage.fromMediaImage().

If you use the CameraX library, the OnImageCapturedListener and ImageAnalysis.Analyzer classes calculate the rotation value for you, so you just need to convert the rotation to one of ML Kit's ROTATION_ constants before calling `FirebaseVisionImage.fromMediaImage():`

* Java (Code of Conduct)

```
private class YourAnalyzer implements ImageAnalysis.Analyzer {

    private int degreesToFirebaseRotation(int degrees) {
switch (degrees) {
 case 0:
return FirebaseVisionImageMetadata.ROTATION_0;
 case 90:
return FirebaseVisionImageMetadata.ROTATION_90;
 case 180:
return FirebaseVisionImageMetadata.ROTATION_180;
 case 270:
return FirebaseVisionImageMetadata.ROTATION_270;
    default:
throw new IllegalArgumentException(
"Rotation must be 0, 90, 180, or 270.");
```

```
    }
      }
      @Override
      public void analyze(ImageProxy imageProxy, int degrees) {
    if (imageProxy == null || imageProxy.getImage() == null) {
      return;
    }
    Image mediaImage = imageProxy.getImage();
    int rotation = degreesToFirebaseRotation(degrees);
    FirebaseVisionImage image =
    FirebaseVisionImage.fromMediaImage(mediaImage, rotation);
    // Pass image to an ML Kit Vision API
    // ...
      }
    }
```
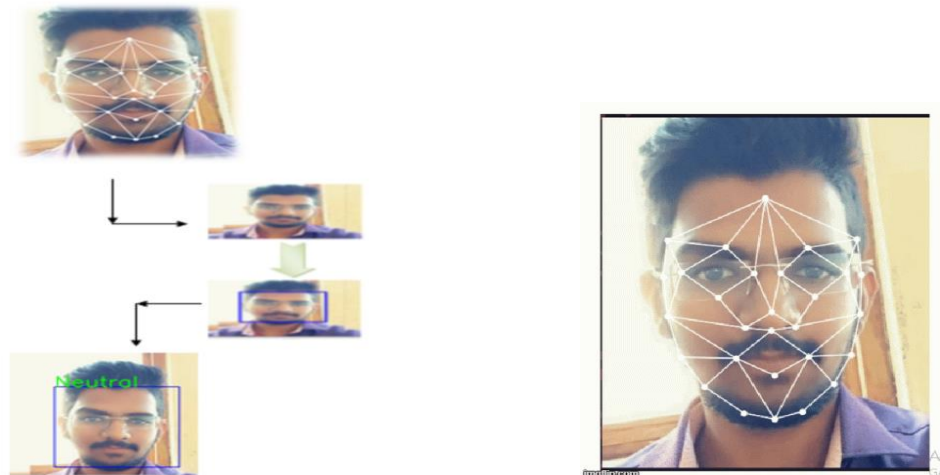
7.   pictorial procedure of model

Fig.(12) Three Step Approach Flow Chart Representation

The Gif of three step Algorithmic Approach of Machine Learning Model is shown beside.

In order to train our machine learning model this work is involved with 5 different basic emotions namely sad,disgust,happy,neutral and fear. the beside gif is predicted the natural sample image as Neutral Emotion

8.   plots of model accuracy and model loss

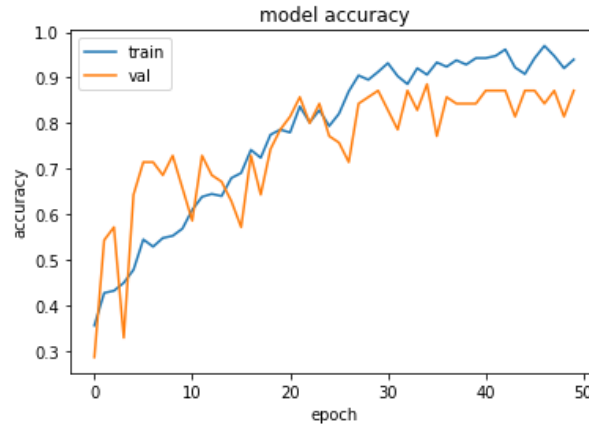The below plots are drawn based upon the precision and accuracy values which was shown in the above table

Fig.(13) Accuracy Plot

There are 50 epochs which are used to run the model. The Condition for over fitting that Validation Accuracy should

always be Greater than Normal Accuracy and the Validation Loss should always be less than Normal Loss. In the above figure the blue line indicates the validation Accuracy and the Orange line indicates the Normal Accuracy. The Intersection should not be done to get proper Accurate Output model
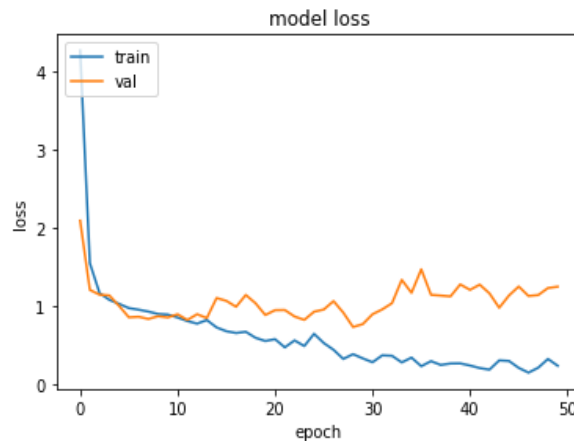

Fig.(14) Loss Plot

Here, coming to the above graph it talks about model loss. The over-fitting condition doesn't satisfy here also there is no intersection of lines taken. So we can observe here also the Validation Loss is less than that of Normal loss

9.   result

At the end of pipe line in this work the Cardiac patient monitoring is done and by the source of knowing the relation between the Emotions and Cardiology and proposed on good solution through AI- iot Technology sending the information to the mobile phones .etc..,which really helps in Viral and Infectious cases

Let us recap here the result of Facial emotion recognition in just three steps by the sources of CNN. Then we came up with some values of Tn, Fn, precision and validation accuracy values due to uniform distribution of dataset

	Precision	Recall	F1	UAR	Accuracy
Average of Keras	0.876	0.196	0.237	0.573	0.8
Average of	0.209	0.022	0.030	0.504	0.893

LSTM		1			
Fusion	0.432	0.233 4	0.359	0.602	0.910
Var of Keras	0.023	0.021	0.035	0.005	0.012
Var of LSTM	0.006	0.002	0.002	0.008	0.008
Var of Fusion	0.057	0.032	0.040	0.008	0.016

a.   Conclusion and future scope

This Work can be further modified and classified into the non cloud form that means we can make it as offline mode that is we can monitor at a time for multiple hospitals of State cardiac care centers through developing iot server networking. Hence this work is very useful and it benefits the society. Since we can say the evolution medical science is turning real life challenges very easy from complex behavior, Thus Monitoring of Patient can be done easily in especially Viral and Infectious Cases

10.   Acknowledgement

To initialize this proposal as a startup we can take help from the governing body under Atma Nirbhar Bharath which leads Scale impact of benefit in business model where both Entrepreneur and Society get benefits by this proposal. This Proposal is agreeing the theme of Atma Nirbhar Bharath where it resulting in impact of society as well as empowerment of entrepreneurship, this work is implemented in two hospitals at where we got a token of appreciation the doctor and hospital acknowledgements are attached below

Prototype and doctor acknowledgement link:

https://youtu.be/hV8UQVmxSkg

Acknowledgements :

Hospital-letterhead-1.jpg

sunrise hospital .pdf.

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AUTHORS:

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