A PROJECT REPORT

on

"STRESS DETECTION SYSTEM"

Submitted to

KIIT Deemed to be University

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN
INFORMATION TECHNOLOGY
BY

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UNDER THE GUIDANCE OF

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SCHOOL OF COMPUTER ENGINEERING

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY

BHUBANESWAR, ODISHA - 751024

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KIIT Deemed to be University School
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CERTIFICATE

This is certify that the project entitled

"STRESS DETECTION SYSTEM"

submitted by

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is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science & Engineering) at KIIT Deemed to be university, Bhubaneswar. This work is done during year 2019-2020, under our guidance.

Date: 03 / 07/ 2019

Prof. NAMITA PANDA
(Project guide).

School of Computer Science and Engineering

Acknowledgement

We would like to extend our gratitude towards Prof. NAMITA PANDA for taking profound interest in our idea and providing his expert guidance that have led to it's implementation.His never ending encouragement paved our way to successful completion.

……..

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ABSTRACT

Stress is a integral part of one's life. It can be of any type like worry, pain, pressure, anxiety, etc. Sometime we can avoid but sometimes unavoidable which can be solved/managed in a proper way. It purely depends on the situation of one's life how he/she is dealing with it.

This is a small case study which includes dealing with stress management and we emphasize mainly on the work related on stress of human beings. Besides this it also highlights symptoms, prevention and cure, and management of stress.

Keywords: Stress, Work related stress, Symptoms, Types of stress

Contents

Chapter 1

Introduction

Stress is a big problem of today's generation. 20% of people or more die due to stress. It is of three types

1) Acute stress- is the most common form of stress among humans worldwide. It deals with the pressures of some past situations or future.

2) Episodic stress- it is caused due to some long term situations which have occurred in past.

3) Chronic stress- is the response to emotional pressure suffered for a prolonged period of time in which an individual perceives they have little or no control.

Our system basically monitor acute stress which measures HRV and calculate RR interval for the same.

A stress monitoring device is a device which is used to measure stress of a person using different sensors and transmit signals through it as physiological signals. Generally people use this word stress as a negative experience of one's life. It involves a set of emotions, physical and mental depression, etc. Stress management is a way long technique and psychotherapies aimed for controlling a person's level of stress, especially chronic stress (but here we will discuss about acute stress). It produces numerous physical and mental symptoms which vary according to human situations which

may lead to a decline in physical health and make a person depressed.

1.1 Defining stress-

Stress is the way human beings react physically and mentally to the changes that occur in their lives in the form of certain events, situations, incidents or experiences.

The way the individual formulates his mindset, in that kind of manner he views stress, if he see a situation in a negative way then he feel stressed, overwhelmed and out of control. On contrary if he see in a positive way, then it is called eustress, which is also known as good stress. A stressful person degrades his/her personality which leads to low confidence and mind power.

1.2 Sources of stress-

It can be from 4 basic sources -

1) Environment- what is the environment/surrounding near a person and how can he/she will deal with it?
   -The environment around can inundate a person with strong, severe and competing demands to adjust with. Examples- crime, pollution, traffic, noise, etc.
2) Social Stressors- A person experiences stress due some social roles such as parent, wife, employee, etc.
3) Physiological- Situations and circumstances affecting one's body physically as well as mentally which can be described as physiological stress.
4) Thoughts- A person overcome with many situations in life that are stress provoking, but it is the thoughts of an individual how he perceives it. It's our brain that perceives a situation to be stressful, difficult, painful or pleasant.

1.3 Types of Stress-

1) Acute stress- It is the most common type of stress. It's our body immediate reaction

to a new challenge and it triggers our fight or flight response. Its isn't always negative. In fact, they might actually be healthy for you, as these stressful situations give our body and brain a practice in developing the best response to future stressful conditions.

2) Episodic acute stress- When acute stress happens frequently, its called episodic

Acute stress. People who are worry or pessimistic or who tend to see negative sides of everything tends to have episodic stress. They are often short tempered, irritable and anxious.

3) Chronic Stress- If acute stress is not resolved and begins to increase for long period of time, it becomes chronic stress. It is considered to our health which may lead to serious diseases such as:

Heart disease, cancer, accidents, etc.

1.4 Symptoms –

Physical: headache, muscle tension, increase in heart rate, sweaty palms

Behaviors: Aggressiveness, irritation, anger, sadness, misery

Moods: Anxious, nervous, and irritable

Thoughts: Delusions, depressive and upsetting thoughts, negative thinking, catastrophic thoughts.

1.5 Management of stress:

- Stress can be effectively managed and prevented by an individual. There are some steps that one should be aware of managing stress in a proper manner.

1) Setting priorities- An individual should set up a schedule for all the tasks and decide what things are more important to do with proper time management.

2) Facial stressful movements- It is vital to think for a stressful situations and practice how to deal with it.

3) Live a healthy life style – Getting plenty of exercise, healthy eating, relaxation techniques such as yoga, meditation, prayer and breathing exercise.

4) Creating a social network- Loneliness is an extreme and distressful state of mind and it can cause stress amongst individuals. In order to get out with this loneliness, it is essential to create a social network and communicate with the people around

Chapter 2

Literature Survey

2.1 Similar Research

2.1.1 Project on Machine Learning in Stanford University

This project was conducted as a final year project by David Liu & Mark Ulrich in their Machine Learning Course.For this project,they used the dataset from Physionet uploaded in DRIVE database,and followed the ECG(ElectroCardiogram) workflow and the heart rate variability features from the database and used Linear SVM approach to get a F1 coefficient of 0.7855 but they do not clearly enough state how data and parameter tuning is handled to recreate the results.

2.1.2 Cardiogram App

Cardiogram is a mobile application associated with the Research study mRthym where a team of Medical Researchers Of the University Of California applied Deep Learning on data collected from the Apple Watch to identify abnormal heart rhythms.Their aim is to detect various heart problems focussing on Strokes,for which abnormal rhythms are a early sign.This design worked with Accuracy of 98%.

2.2 Physiological Measures Of Stress

Stress is a emotion during which stress hormones Adrenaline & Cortisol are secreted leading to increase in strength & alertness of the body leading to muscle constriction,and changes in heart rate and heart rate variability

2.2.1 ECG PATTERN OF THE HEART

Measure of Cardiac Contraction is the way electricity flows through the heart muscles.Muscle Contraction occurs only when electric current is produced by pacemaker cells & specialized conduction tissue causing Depolarization and Repolarization.This cycle of Depolarization & Repolarization is called is called ECG(Electrocardiogram),represented as a time-voltage chart of heart beat.It consists of 5 phases:P phase, QRS wave,ST ,T & U Wave.

2.2.2 RR INTERVAL & HEART RATE VARIABILITY

RR Interval is defined as the interval between two QRS peaks in ECG. It is measured using NN intervals of the interval between two QRS Peaks.Heart Rate Variability is defined as the interval between two normal heartbeats.RR intervals serve as a basis for Heart Rate Variability measurement.HRV depends upon 2 factors:1.Age 2.Aerobic Fitness Level.

2.2.3 MEASURING THE ACTIVITY OF HEART

1. **Use Of ECG & PPG**:ECG sensors are the sensors which measure the variations in Electric Signals produced by the heart directly and hence is considered a golden standard whereas as

   PPG Sensors measure the electric signal variations produced by the reflection of light due to changes in blood flow.ECG sensors are more accurate compared to to PPG sensors.

   HRV is related to the stress,which is proved by Talman-et-Al who brings forward that effect of stress on Autonomous Nervous System leading to changes In Heart Rate & Heart Rate Variability.

2.2.3.1 STRESS MEASUREMENT USING GSR (GALVANIC SKIN RESPONSE)

GSR measure resistance of the skin,which decreases on sweating.More the person is stressed,more sweating takes place and the skin resistance decreases.Research by Villarejo Et.Al brought forward that the accuracy of this approach is 91%.But,the distinction between Stress & normal sweating is not taken into consideration thus the approach fails in this scenario.

2.2.3.2 WEARABLE DEVICES

Companies like Apple & Fitbit produce highly accurate heart rate Sensors,which provides a measure of heart rate in beats/minute unit.These devices do not measure RR Intervals,which causes loss of valuable information like HRV(Heart Rate Variability),which enables us to understand the health conditions of the individuals. Nowadays,more advanced & sophisticated devices which measure the RR intervals accurately,thus also accurate measurement of Heart Rate Variability. Example:Microsoft's Band 2 Device

2.3 AUTOMATIC MACHINE LEARNING

Machine Learning is an approach in which machines are trained to recognize patterns in data to come up with problem solving approaches and help in analysis of data by acting as a data analysis tool.

Automated Machine Learning is approach,where a tool automatically takes into

consideration a lot of parameters and checks them and come up with the best solution of a problem.It is based on hyper parameter tuning such as
Grid Search & Randomized Search.Grid Search follows Brute Force Approach to find the best solution whereas Randomized Search considers a random combination of Parameters.Tuning of hyper parameters lead to the
increase in performance of the model,giving rise to Evolutionary Algorithms which select the best model fit for the data by increasing the accuracy of classification.At Each Iteration of the algorithms , each model undergoes testing and only the best performing models are selected & passed to the next iteration & thus the model keeps on evolving with each step leading to higher efficiency & performance of the model.

Chapter 3

Software Requirement Specification(SRS)

3.1 OVERALL DESCRIPTION

User stress is predicted by sending user data like Heart Rate, skin resistance and Heart rate variability to cloud where autoML is running and stress is predicted in real time and message is sent if the user is in continuous stress.

3.2 EXTERNAL INTERFACE REQUIREMENT

3.2.1 User Interface

The user interface is developed using android studio development toolkit.

3.2.2 Hardware Interface

Sensor : Pulse Sensor, ECG, GSR.

Board : Arduino UNO.

3.2.3 Software Interface

The model has been developed using Jupyter Notebook which is an IDE for python development which is open source and comes pre-installed with Anaconda suite.

3.3 FUNCTIONAL REQUIREMENTS

These requirements are categorized by use cases. For any use case, these specific requirements are required.

3.3.1 Calculating Heart Rate :

Input : The User whose stress is to be predicted.

Output : Heart Rate is calculated using pulse sensor and displayed.

Pre-condition : Pulse sensor is configured and working.

Post-condition : Data is sent for predicting stress.

The calculated Heart Rate is passed to cloud for prediction.

3.3.2 Calculating Galvanic Skin Response :

Input : The User whose stress is to be predicted.

Output : Skin resistance is calculated using GSR sensor and displayed.

Pre-condition : GSR sensor is configured and working.

Post-condition : Data is sent for predicting stress.

The calculated GSR is passed to cloud for prediction.

3.3.3 Calculating Heart Rate Variability :

Input : The User whose stress is to be predicted.

Output : Heart Rate Variability is calculated using ECG sensor

Pre-condition : ECG sensor is configured and working.

Post-condition : Data is sent for predicting stress.

The calculated HRV is passed to cloud for prediction.

3.3.4 Predicting Stress :

Input : The User whose stress is to be predicted.

Output : User state of stress is displayed and if its above a certain threshold of continuous time , a message is sent to the registered parent's number.

Pre-condition : WIFI connectivity is strong. All sensors are working

Post-condition : Stress is predicted and the given values are updated in the new dataset.

The calculated GSR, HR and RR is passed to cloud for prediction. autoML finds the best possible classifier by looping several generations and the stress is predicted according to the classifier generated by autoML.

3.4 NON FUNCTIONAL REQUIREMENT

3.4.1 Usability

The system should be convenient and user friendly .Sign up and predicting stress must be fast and hassle free.

The model must also provide access to past records so that doctor can get a rough idea about the user situation.

3.4.2 Performance

Predicting stress must be done as quickly as possible and message should be sent immediately as it a prime feature of the project.

3.4.3 Maintenance

The maintenance engineers must have basic understanding of Python, IOT, Cloud and machine learning algorithms to solve any Problems getting raised on the Back end.

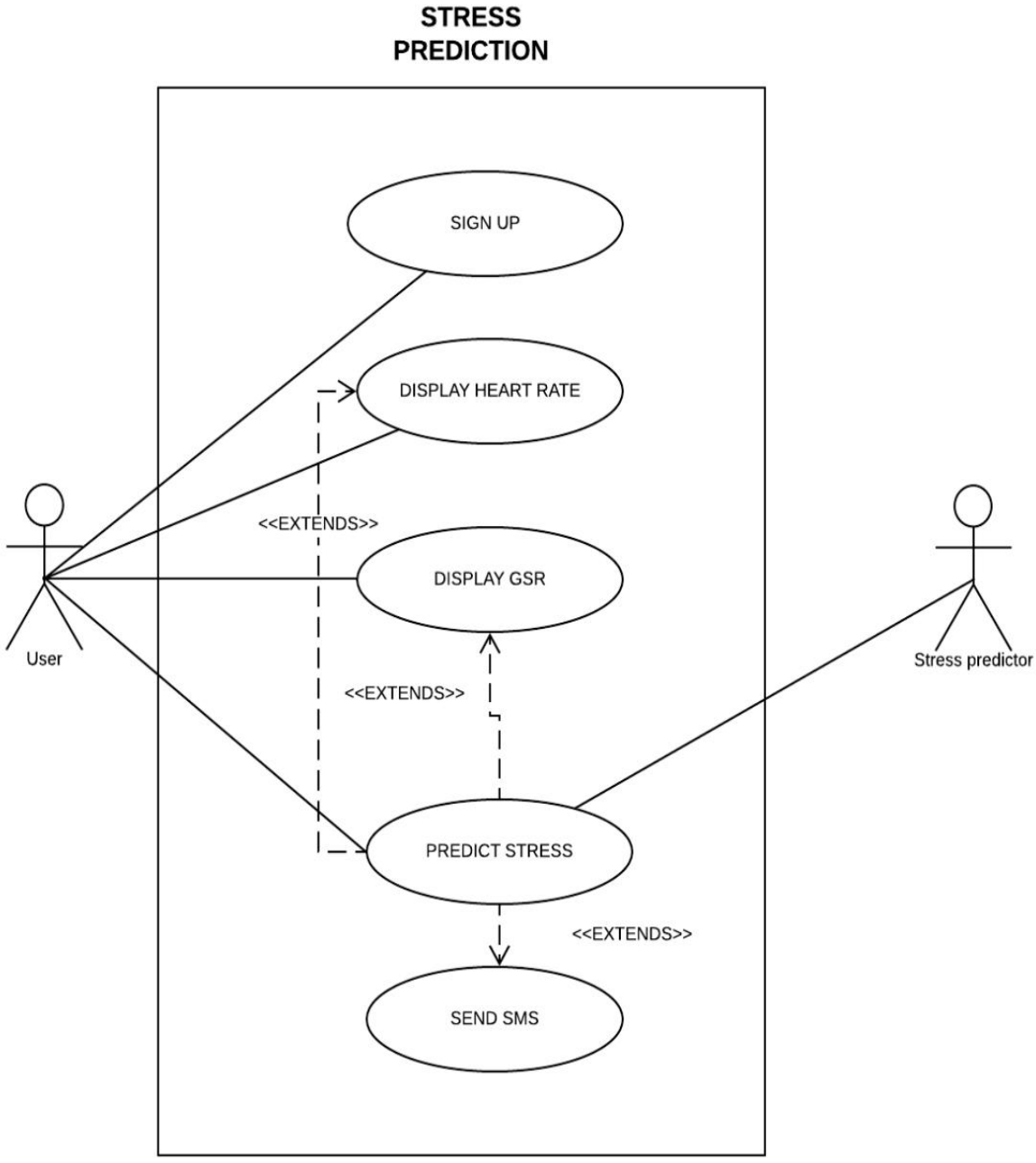
3.4.4 Reliability

This software will be developed with machine learning, IOT, Cloud technology and embedded system. So, there is no certain reliable percentage.

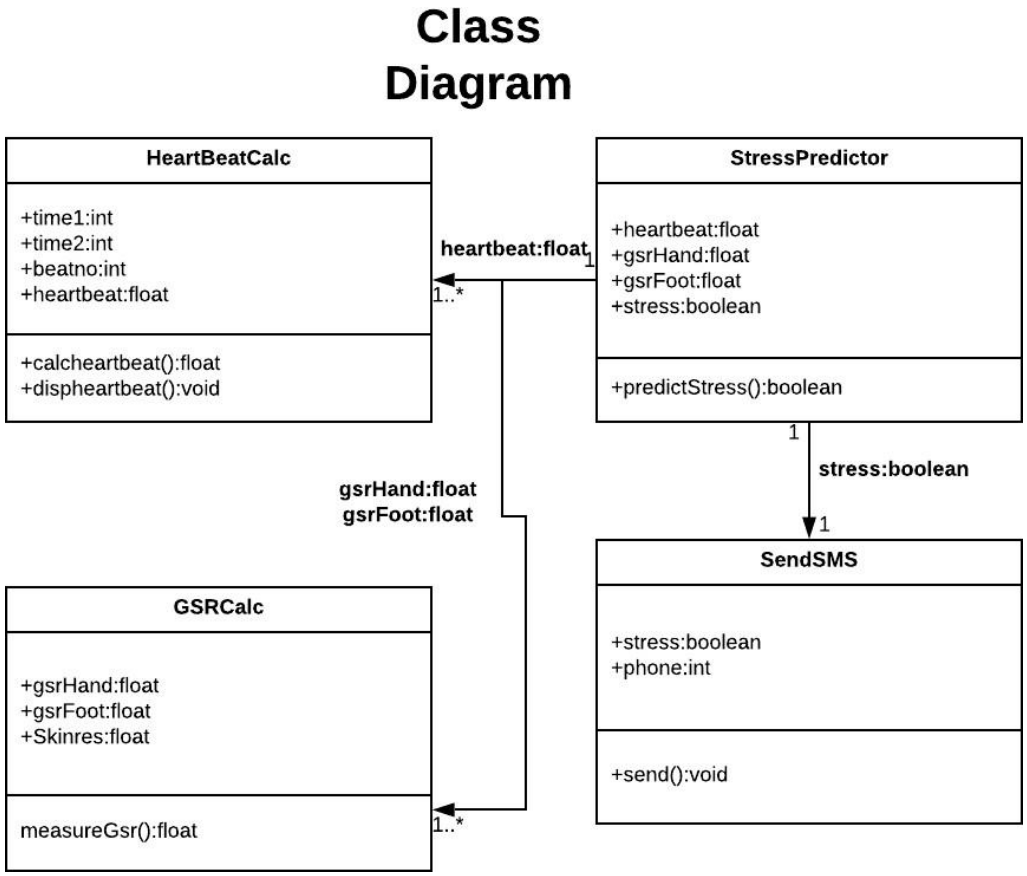
Chapter 4

System Design

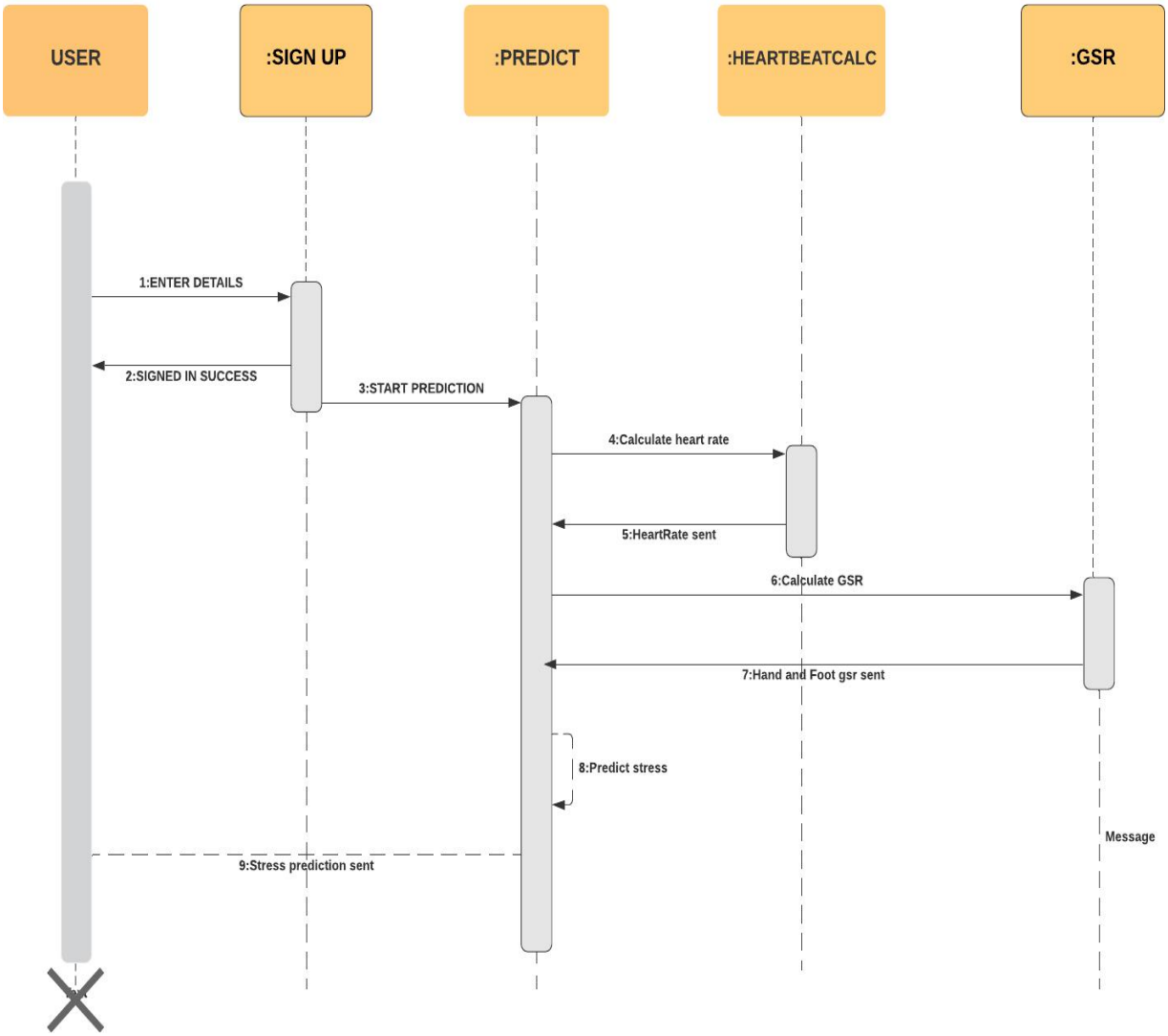
4.1 Use case diagram



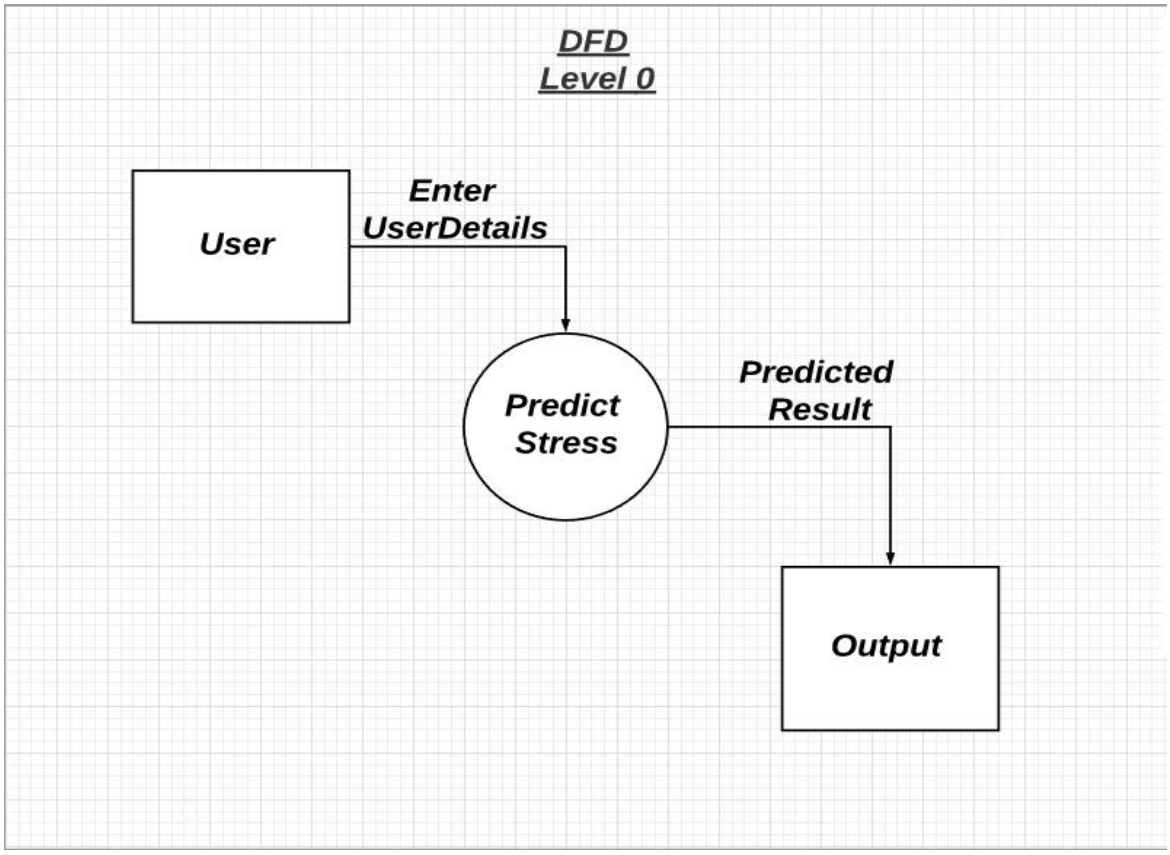
4.2 Class diagram



4.3 Sequence diagram



4.4 Level 0 DFD



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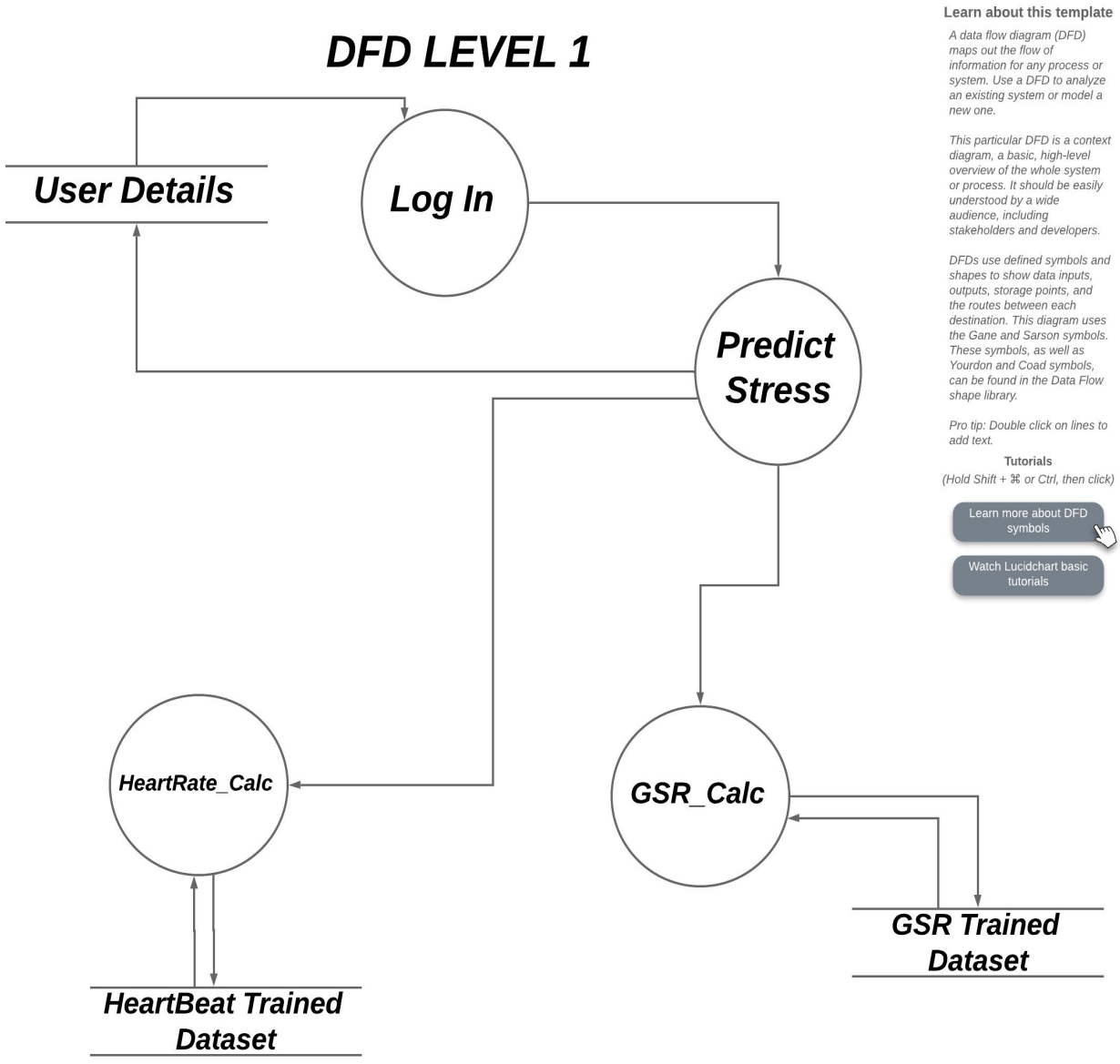


Chapter 5

SYSTEM TESTING

5.1 Test Cases and Test Results

TestID	Test Case Title	Test Case Procedure	System Behaviour	Expected Result
1	Calculate Heart Rate	User heart rate is calculated by pulse sensor	Heart rate is being displayed as 85 bpm.	Heart rate will be displayed in beats per minute(60-100 bpm). **POSITIVE.**
2	Calculate ECG	User ECG is calculate by ECG sensor	ECG is displayed in serial monitor(557)	ECG is calculated at an interval of 1 s.Range is 400-600. **POSITIVE**
3	Calculate Heart Rate	Heart Rate is calculate in beats per minute by	Heart Rate value was being displayed as	Heart Rate value is displayed in beats per

		pulse sensor	72 bpm	minute.(Range -60 to 100 bpm in normal condition in young people). **POSITIVE**
4	Calculate ECG	User ECG is calculate by ECG sensor.	Value was recorded as 500	ECG(QT intervals) lies in the range between 400-600. **POSITIVE**
5	Calculate ECG	User ECG is calculate by ECG sensor.	Value was not recorded & NA was displayed.	ECG(QT intervals) lies in the range between 400-600.
6	Calculate Heart Rate	Heart rate is calculated using Pulse Sensor	Anomalous values like 42 were coming despite having heart beat in the normal range conditions (60-100)	Heart rate should be displayed inthe range of 60- 100 bpm.
7	Calculate ECG	ECG is calculate using ECG sensor.	ECG value was recorded as zero.	ECG value should be in the range 400-600.
8	Calculate Heart Rate	Heart rate is calculated using Pulse Sensor	High heartbeat readings of 200 beats per minute were	Heart rate in the range of 60-100 beats per minute will be displayed in

			recorded in normal conditions.	normal conditions.
9	Calculate ECG	ECG is calculated from palm.	ECG value was recorded as 1000.	ECG value should be in the range of 400-600.
10	Classifying Stress	Stress was classified from Heart Rate & ECG Sensor using ML.	Subject was shown “The Exorcist” and the stress prediction module returned true.	This module will return either true or false.

Chapter 6

Requirement Analysis

Stress Detection,whether performed in the laboratory or outdoor Environments,needs to collect data which help us to gain information about reliable stress response patterns.The entire system was divided into five modules,each of them putting forward a set of questions,which forms a basis for the Requirement Analysis phase.

6.1 Population Filtering

Data is Collected on a certain majority of the population.It poses the following questions:

1. Who should participate?
2. How many people should participate?

   Stress depends upon factors age,and gender.The sample population on which analysis is being done should consist of equal proportions of different demographic groups.For Selection,prior information about the population's stress parameters & workload information of different individuals should be collected with the help of a Statistician and then the sample size is calculated.

6.2 Selection Of Stress Stimuli

The conclusions regarding information collected should be applicable in real life.This section poses the question,what type of stress stimulus should be taken into consideration. The basic characteristics of Stress stimulus are Unpredictability ,uncontrollable and socio-evaluative threats.The stimulus should be relevant to the day to day activities or to the scenario.

6.3 Selection Of Different Reliable Stress Modalities

Stress can be measured in many different methods like by studying the electric signals like ECG(Electrocardio gram) & PPG signals,which are collected by portable wearing devices,& by measurement of Skin Conductivity by Galvanic Skin Response(GSR).Since Stress parameters have no fixed hard & fast rules or procedures for it's measurement so different reliable modes for stress parameter measurement should be considered,which enables us to have robust conclusions for our study of stress parameters of various individuals.

6.4 Self Reporting

Self Reporting is employed to study the effects on the body after the stress stimulus(feelings after the stimulus experience) .This process is very much subjective and unreliable.However this process provides us with the insight of the physiological effects of the stimulus.The Physiological response to various stimuli may vary from person to person depending on factors like age,gender,personality type & external factors like aerobic fitness.Factors affecting Stress responses should be collected by self reporting, which can be used to bring forward differences between stress response data & analyse them.

6.5 Information About The Sensors Used for Effective Prediction

The Sensors,that are used in the measurement of the signals for Stress Detection should be configured in such a way that no negative effect on the prediction algorithm is produced by the Sensor .So we use Clinically verified Sensors.Properties of the physiological signals can be used to configure the sensors.Signals Like GSR(Galvanic Skin Response) has a latency in seconds,between the response & stimulus applied.Therefore,the sensors should be properly calibrated and time synchronisation.Also the noise characteristics of the sensors should be taken into consideration,enabling to find effective Noise elimination methods & increase the accuracy of measurement of the sensors.

Chapter 7

Project Planning

This project has been developed using iterative waterfall model. First of all the feasibility of the project was determined through research based on research papers and general problem faced by people in their daily lives.

After gathering the required facts, the analysis of system requirement was made. The system requirements provided us with all the dependencies that were required to develop the module. After the requirement analysis the best possible approach and algorithms were listed down. Using the required Dependencies and best approaches, the module was developed and was tested against custom input to see that it meet the standards for which it is meant to be.

Chapter 8

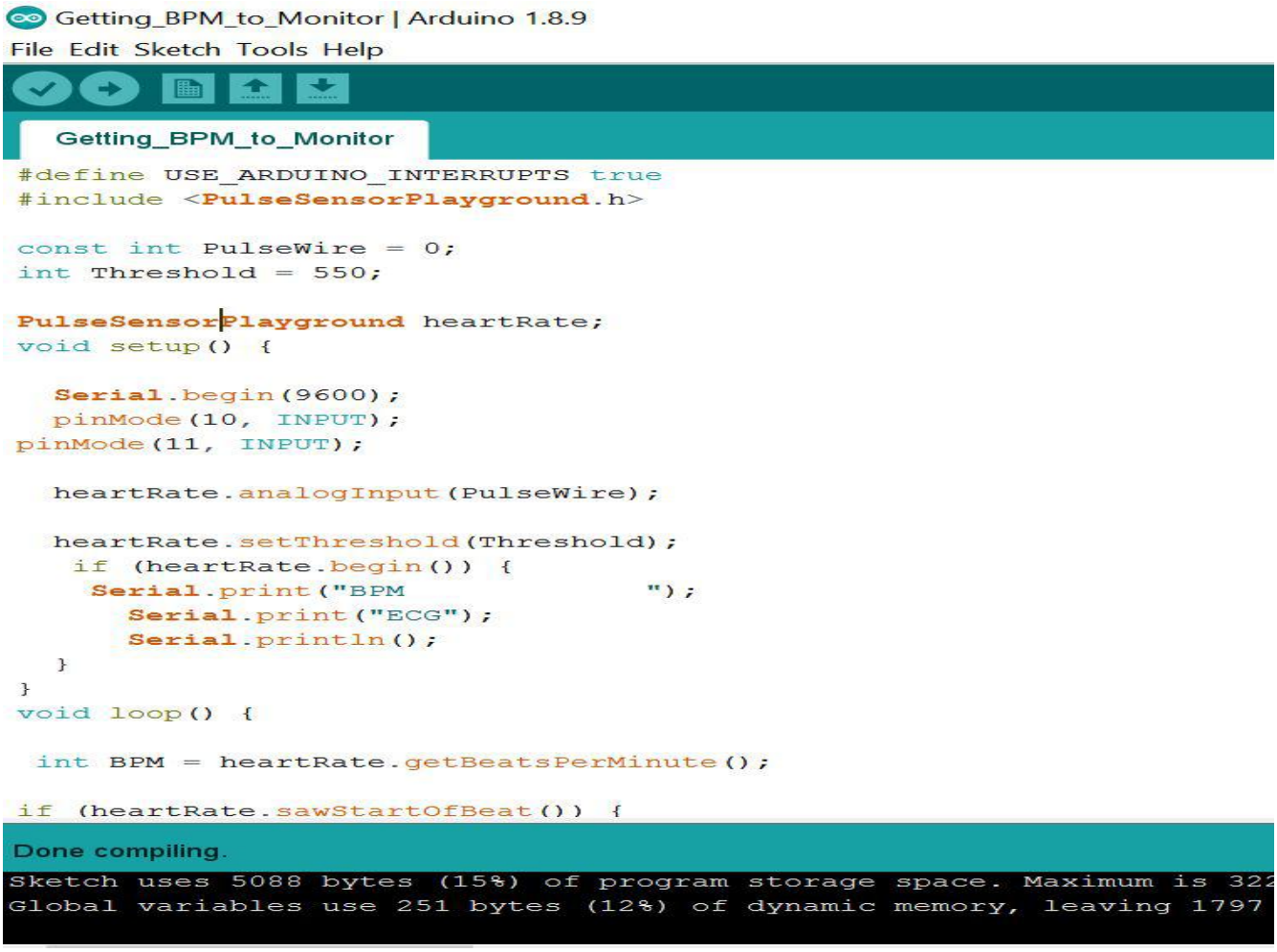
IMPLEMENTATION

The user needs to sign up by entering some details.After that,sensors get activated and heart rate ,galvanic skin response(gsr) and electrocardiogram(ecg) is calculated in real time and based upon the calculated heart rate,galvanic skin response and electrocardiogram values ,user state is predicted whether he is stressed or not.If he is in continuous stress for a time greater than threshold value, an message is sent to his registered parent`s phone number to save him.Calculated heart rate and galvanic skin response values are sent over wifi to a cloud based internet of things platform(amazon web services)and there amazon sagemaker is used for prediction and predicted values are sent over real time to the user`s mobile app. Sagemaker uses autoML which continuously updates given data set with new values and finds the best classifier according to new data set and makes prediction.In case of no connectivity,Arduino UNO3 has a saved data set (smaller than original)which comes into action.For calculating heart rate , we use pulse sensor,for measuring skin resistance galvanic skin response sensor comes into play,for measuring required rr intervals,electrocardiogram signals are taken into account.

For board purposes we go for arduino.Python is the preferred language. Cloud services are provided by amazon web services and its iot core module is used for deploying ml on cloud. Publish subscribe actions are taken care by amazon.

Screenshots of the Project

9.1 Arduino Uno



Getting_BPM_to_Monitor | Arduino 1.8.9

File Edit Sketch Tools Help

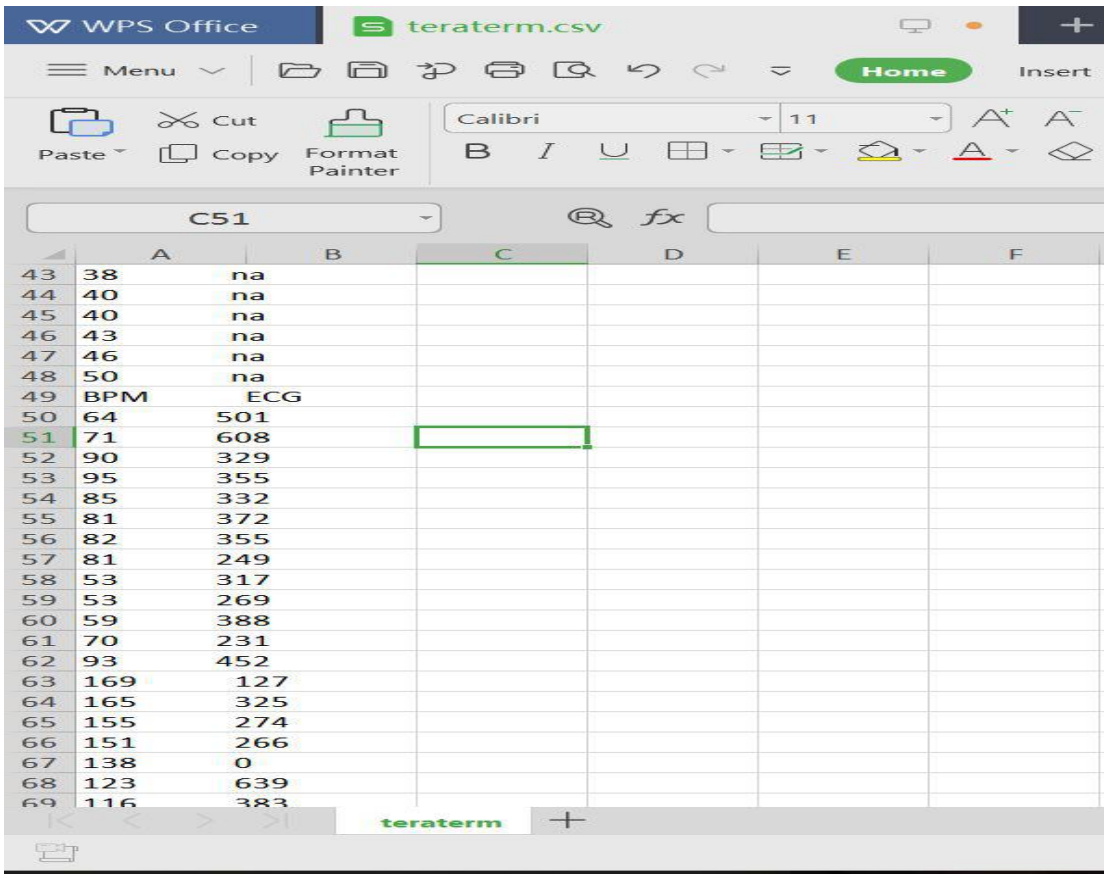
Getting_BPM_to_Monitor §

```
      Serial.print("ECG");
      Serial.println();
  }
}
void loop() {

 int BPM = heartRate.getBeatsPerMinute();

if (heartRate.sawStartOfBeat()) {

 Serial.print(BPM                );

if((digitalRead(10) == 1)||(digitalRead(11) == 1)){
Serial.println("                 na");
}
else{
// send the value of analog input 0:
Serial.print("               ");
Serial.println(analogRead(A2));
}
}

delay(1000);
}
```

Done uploading.

```
avrdude done.  Thank you.
```

27


WPS Office
teraterm.csv
Menu
Home
Insert
Paste
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Format Painter
Calibri
11
C51
A
B
C
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E
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43 38 na
44 40 na
45 40 na
46 43 na
47 46 na
48 50 na
49 BPM ECG
50 64 501
51 71 608
52 90 329
53 95 355
54 85 332
55 81 372
56 82 355
57 81 249
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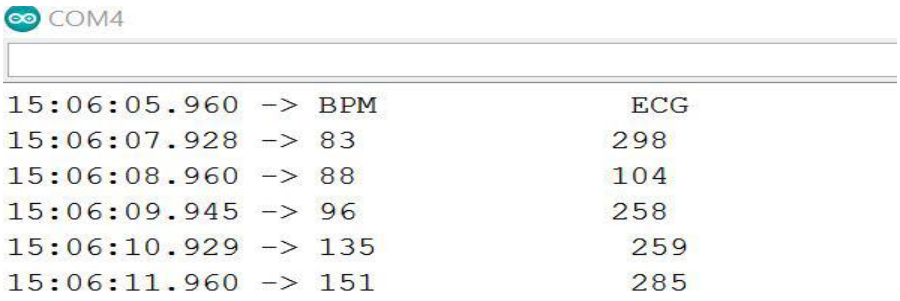
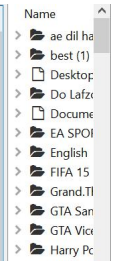
68 123 639
teraterm


COM4
15:06:05.960 -> BPM ECG
15:06:07.928 -> 83 298
15:06:08.960 -> 88 104
15:06:09.945 -> 96 258
15:06:10.929 -> 135 259
15:06:11.960 -> 151 285

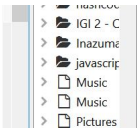
1.)Importing necessary libraries

```
from sklearn.model_selection import train_test_split
from sklearn.neural_network import MLPClassifier
from sklearn.model_selection import StratifiedKFold
from sklearn.model_selection import GridSearchCV
from tpot import TPOTClassifier
import matplotlib.pyplot as plt
from scipy import signal
import scipy.signal
import pickle
import sklearn.metrics
from sklearn.model_selection import cross_val_score
from sklearn import svm
import numpy as np
import pandas as pd
from sklearn.metrics import precision_recall_fscore_support
```



2.)Reading dataset and cleaning of data

```
dataframe_hrv = pd.read_csv("C:/Users/nEW u/Downloads/dataframe_hrv.csv")
#print(dataframe_hrv.head(5))

def fix_stress_labels(df='',label_column='stress'):
    df['stress'] = np.where(df['stress']>=0.5, 1, 0)
    print(df["stress"].unique())
    return df
```

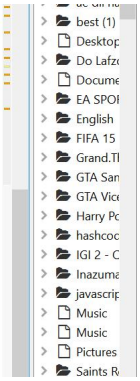


3) Converting the CSV file in dataframe

```
dataframe_hrv = fix_stress_labels(df=dataframe_hrv)
print(dataframe_hrv)
```

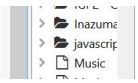
4.) Feature removal of data

```
def missing_values(df):
    #df = df.reset_index()
    df = df.replace([np.inf, -np.inf], np.nan)
    df[~np.isfinite(df)] = np.nan
    #print(dataframe_hrv)
    df.plot( y=["HR"])
    df['HR'].fillna((df['HR'].mean()), inplace=True)
    #print(dataframe_hrv)
    df['HR'] = signal.medfilt(df['HR'],13)
    #print(dataframe_hrv)
    df.plot( y=["HR"])

    df=df.fillna(df.mean())
    #print(dataframe_hrv)
    #X = df[['HR','interval in seconds','AVNN', 'RMSSD', 'pNN50', 'TP', 'ULF', 'VLF', 'LF', 'HF','LF_HF']]
    #Y = df[['stress']]
    #print(X)
   # print(Y)
    return df

dataframe_hrv = missing_values(dataframe_hrv)
#print(dataframe_hrv)
```



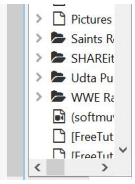
5.) Data selection

```
selected_x_columns = ['ECG','RMSSD','HR']

X = dataframe_hrv[selected_x_columns]
y = dataframe_hrv['stress']
```

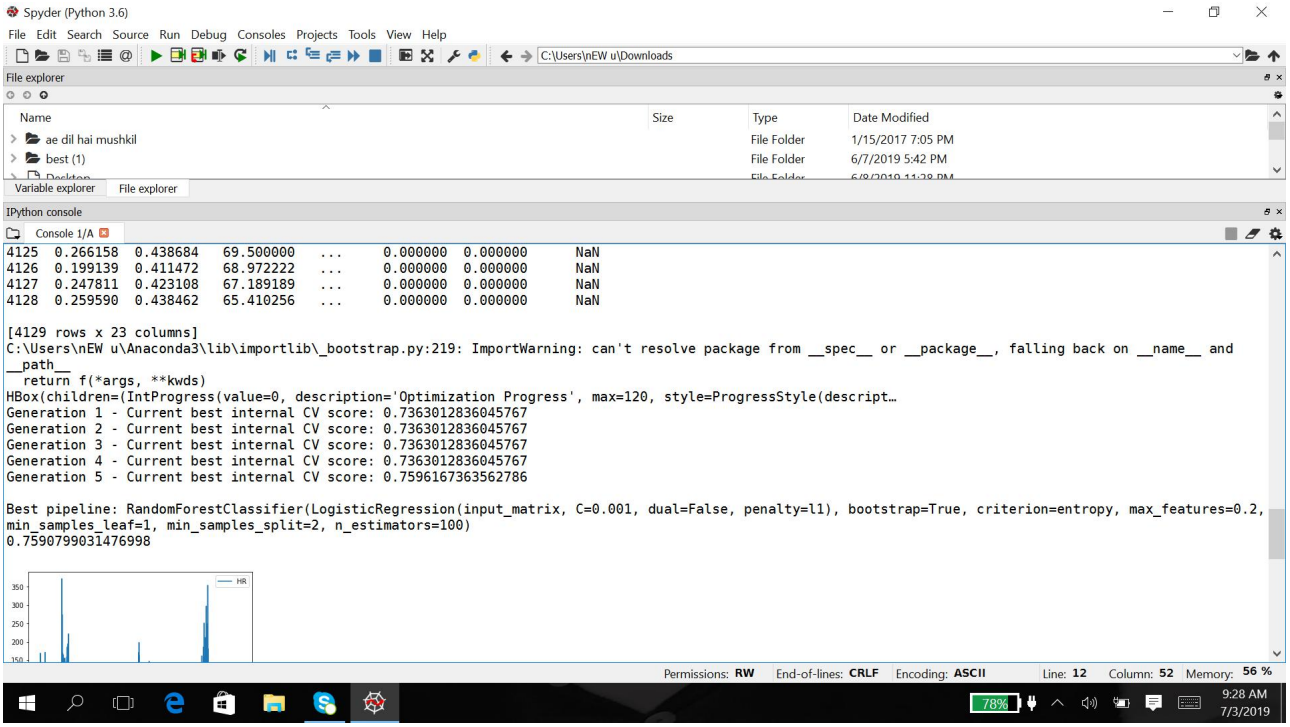


6.) Using automated machine learning tool

```
def do_tpot(generations=5, population_size=10,X='',y=''):

    X_train, X_test, y_train, y_test = train_test_split(X, y,train_size=0.80,test_size=0.20)
    tpot = TPOTClassifier(generations=generations, population_size=population_size, verbosity=2,cv=3)
    tpot.fit(X_train, y_train)
    print(tpot.score(X_test, y_test))
    tpot.export('tpot_pipeline.py')
    return tpot

tpot_classifer = do_tpot(generations=5, population_size=20,X=X,y=y)
```



7.) Output


Spyder (Python 3.6)
File Edit Search Source Run Debug Consoles Projects Tools View Help
C:\Users\nEW u\Downloads
File explorer
Name
Size
Type
Date Modified
ae dil hai mushkil
File Folder
1/15/2017 7:05 PM
best (1)
File Folder
6/7/2019 5:42 PM
Variable explorer
File explorer
IPython console
Console 1/A
4125 0.266158 0.438684 69.500000 ... 0.000000 0.000000 NaN
4126 0.199139 0.411472 68.972222 ... 0.000000 0.000000 NaN
4127 0.247811 0.423108 67.189189 ... 0.000000 0.000000 NaN
4128 0.259590 0.438462 65.410256 ... 0.000000 0.000000 NaN
[4129 rows x 23 columns]
C:\Users\nEW u\Anaconda3\lib\importlib_bootstrap.py:219: ImportWarning: can't resolve package from __spec__ or __package__, falling back on __name__ and __path__
return f(*args, **kwds)
HBox(children=(IntProgress(value=0, description='Optimization Progress', max=120, style=ProgressStyle(descript…
Generation 1 - Current best internal CV score: 0.7363012836045767
Generation 2 - Current best internal CV score: 0.7363012836045767
Generation 3 - Current best internal CV score: 0.7363012836045767
Generation 4 - Current best internal CV score: 0.7363012836045767
Generation 5 - Current best internal CV score: 0.7596167363562786
Best pipeline: RandomForestClassifier(LogisticRegression(input_matrix, C=0.001, dual=False, penalty=l1), bootstrap=True, criterion=entropy, max_features=0.2, min_samples_leaf=1, min_samples_split=2, n_estimators=100)
0.7590799031476998
HR
350
300
250
200
150
Permissions: RW
End-of-lines: CRLF
Encoding: ASCII
Line: 12
Column: 52
Memory: 56 %
78%
9:28 AM
7/3/2019

Chapter 10

Conclusion and Future Scope

10.1 CONCLUSION

In this project we have learnt about type of stress, symptoms, prevention and how to cure and manage it.

In this we have come across technologies like Auto Machine Learning and Internet of Things. By this we have learnt about different classification of stress and how to monitor it. We have also seen about the different sources of stress such as environment, social stressors, physiological and thoughts. When a person is in stress, he depicts stress in his moods, behaviors, thoughts and at times shows physical symptoms such as body ache, high blood pressure, etc. There have been certain ways stated by which a person can easily manage stress, these are setting priorities, practice facing stressful moments, examining ones social networks.

Finally, it can be stated that a person in all phases of his life, whether self-employed, service, business, professionals, minority jobs should develop capability to think positive, control their anger, stay calm and work hard within themselves.

10.2 FUTURE SCOPE

This is only a prototype with a large scope of improvement in future. We can use Deep Learning for faster prediction. We can use humidity sensor and temperature to rule out the condition of winter and non humid weather where sweat doesn't come even during stressful situation. We can inculcate all the sensor in a watch and make it portable

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5.) www.dataespresso.com