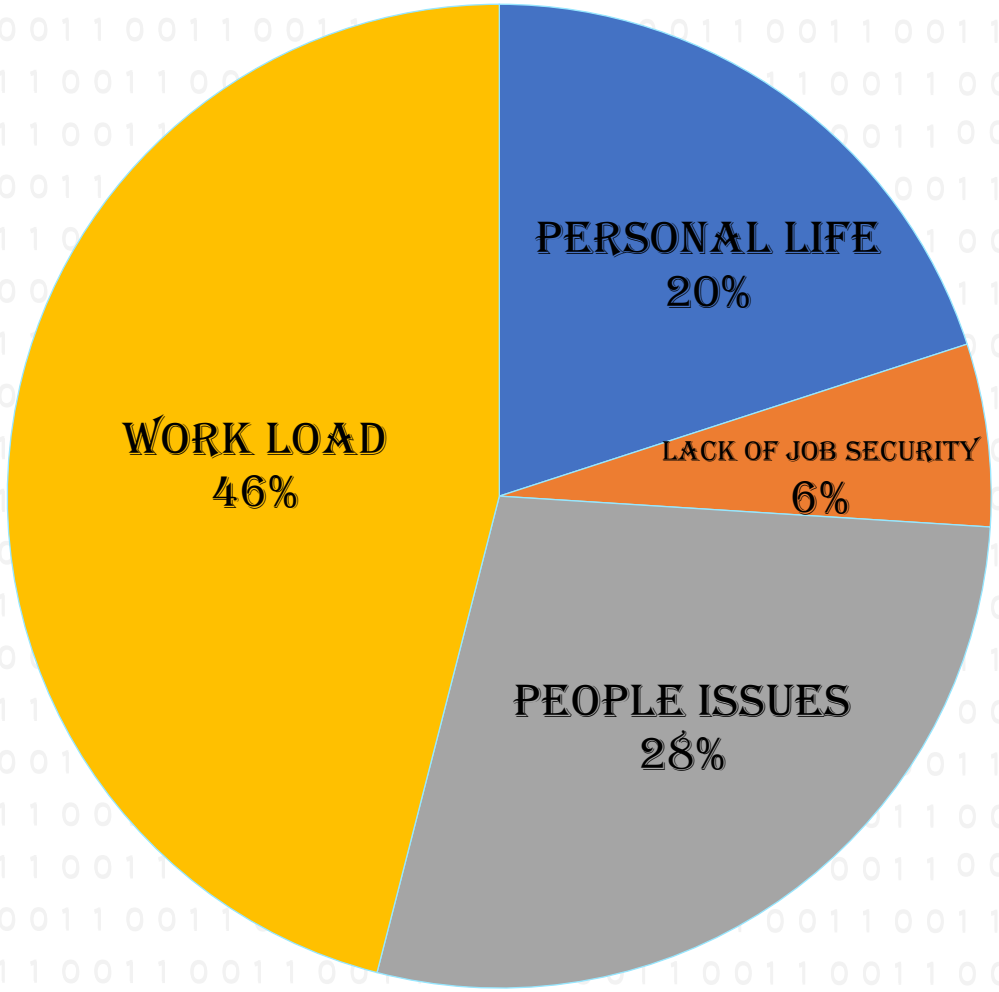

SRI RAMACHANDRA
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
MENTAL STRESS DETECTION
USING MACHINE LEARNING TECHNIQUES
SUPERVISOR: PROF.ANAMIKA KUMARI
NAME:DIVYA DILEEP
UNIQUE ID: E7321010
SRI RAMACHANDRA MEDICAL CENTRE

Introduction

Stress is an escalated psycho-physiological state of the human body emerging in response to a challenging event or a demanding condition.

Environmental factors that trigger stress are called *stressors*.



Causes of Stress

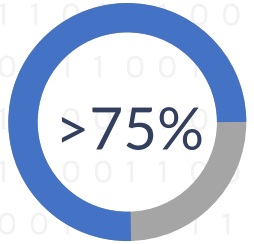
This exposure to high-risk environments while performing their jobs, leads to various mental and health problems due to constant physical and psychological stress.

Hence some researchers have used wearable devices to monitor and detect stress to improve the health and work safety of such personnel.

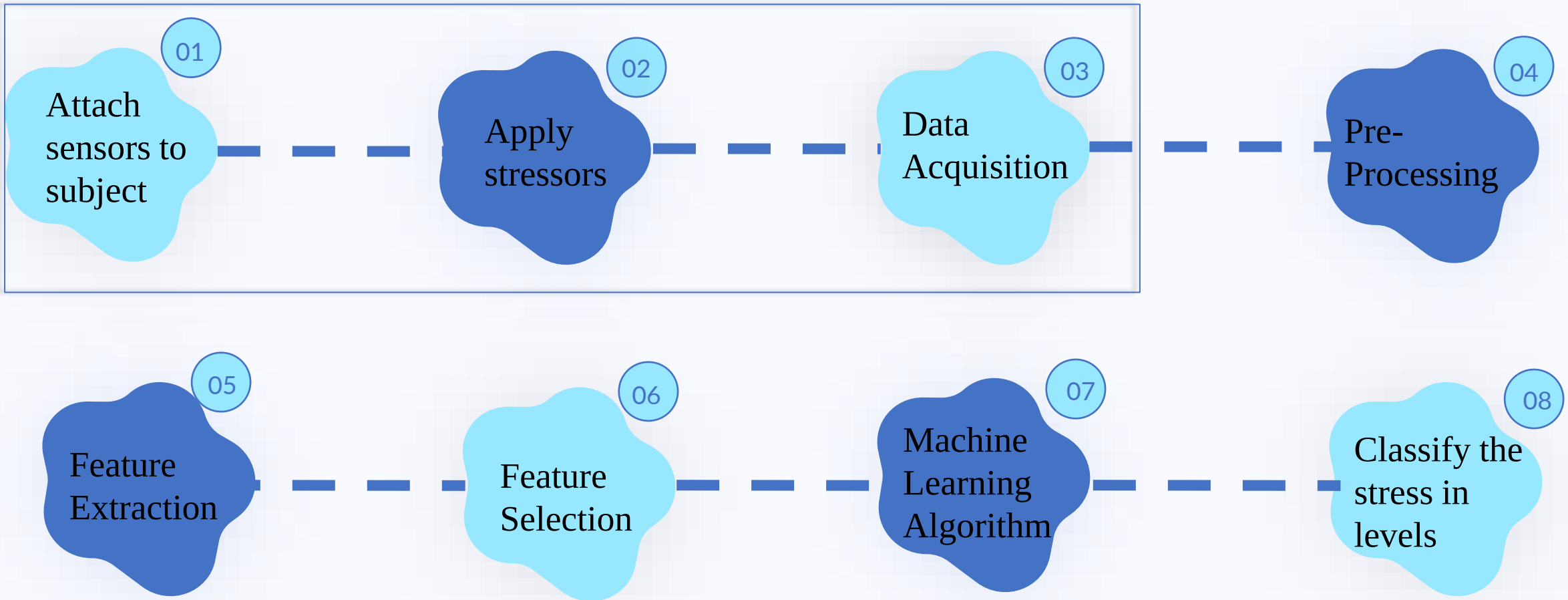
OBJECTIVE

The aim of the project is to predict whether the patient have stress or not by applying several machine Learning algorithms such as Logistic regression, SVM, Random forest and so on.

The main objective is to built a Stress prediction Model with improved and enhanced Accuracy



Scheme for analysis of mental stress



IMPORTING NECESSARY PACKAGES

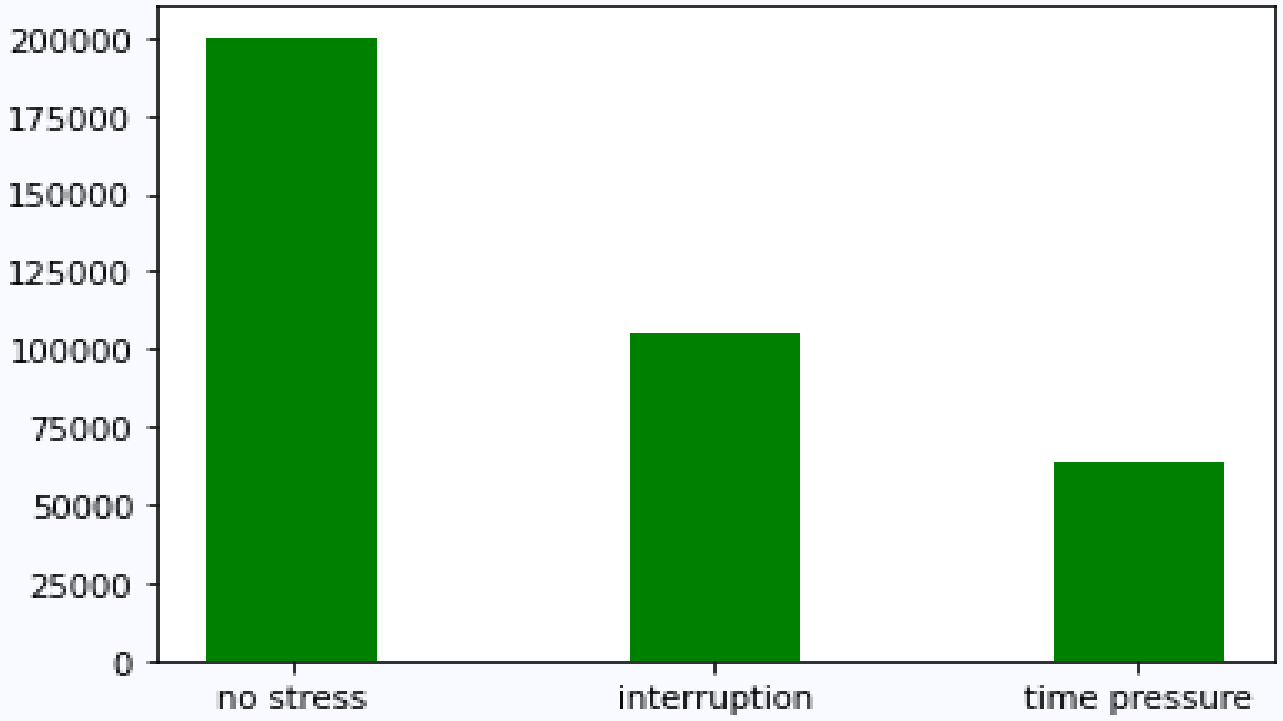
```
import pandas as pd
import numpy as np
import pandas_profiling as pp
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn import preprocessing
from sklearn.metrics import classification_report
from sklearn.metrics import accuracy_score
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import confusion_matrix, accuracy_score
from sklearn.svm import SVC
from sklearn.preprocessing import StandardScaler
from sklearn.decomposition import PCA
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import classification_report
from sklearn.model_selection import train_test_split
```

IMPORTING DATASET

```
#Importing Dataset
train = pd.read_csv("/content/hrv dataset/hrv dataset/data/final/train.csv")
test = pd.read_csv("/content/hrv dataset/hrv dataset/data/final/test.csv")
```

PLOTTING

```
conditions = dict(train['condition'].value_counts())
labels = list(conditions.keys())
counts = list(conditions.values())
plt.bar(labels,counts, color ='green',
        width = 0.4)
```

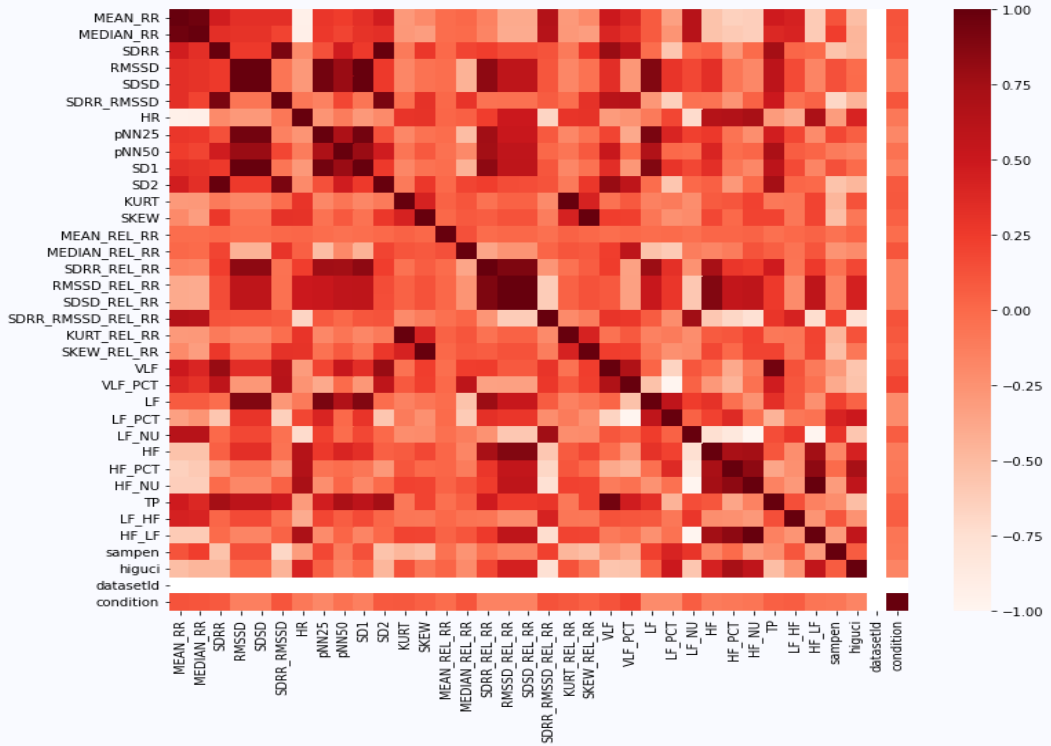


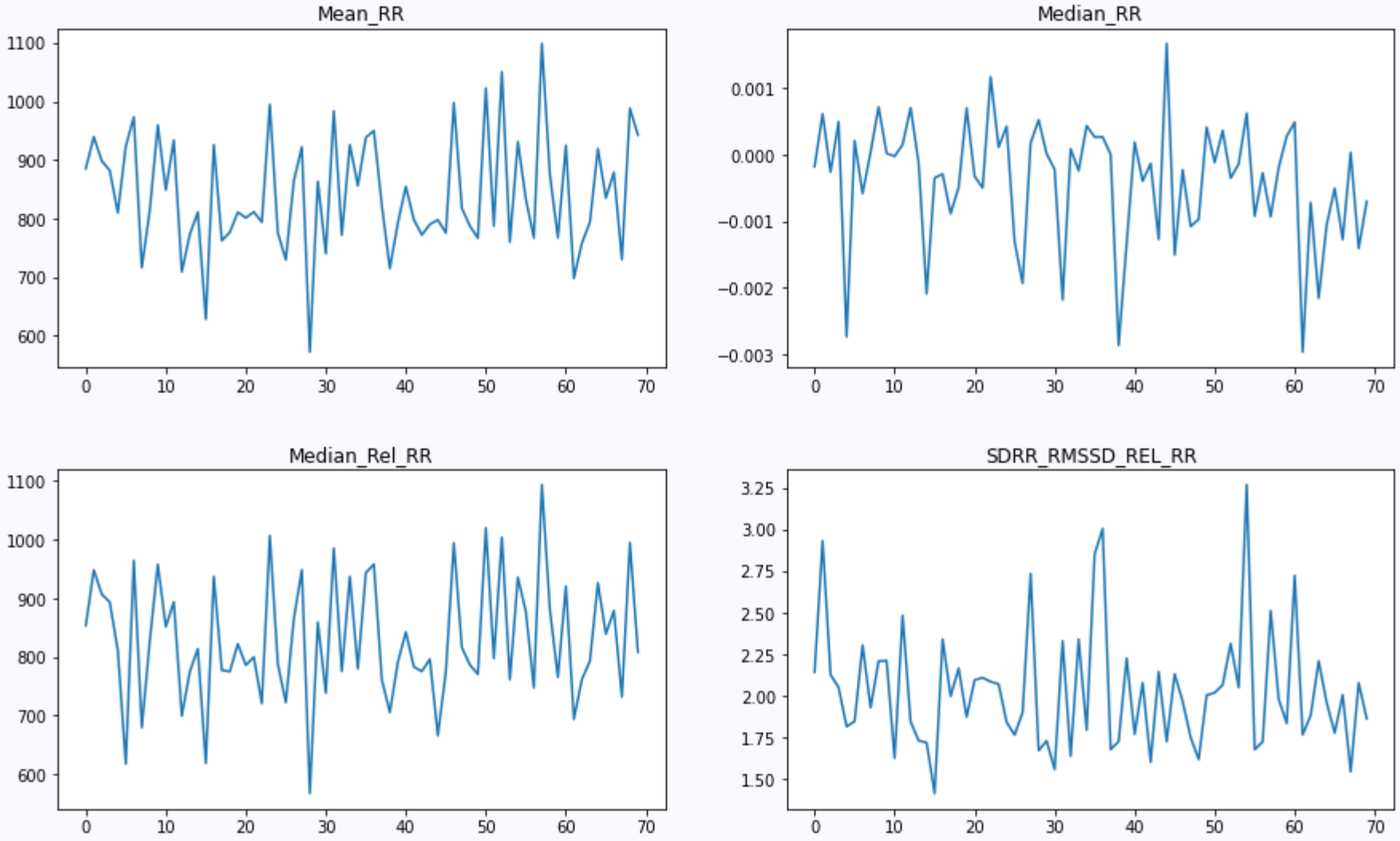
ENCODING

```
le = preprocessing.LabelEncoder()
le.fit(train['condition'])
train['condition'] = le.transform(train['condition'])
test['condition'] = le.transform(test['condition'])
```

CORRELATION

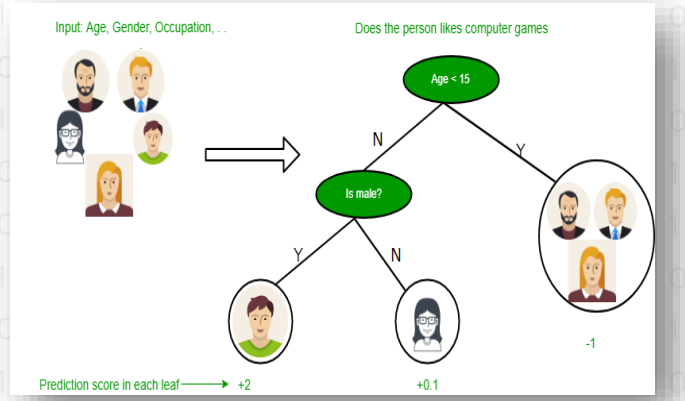
```
plt.figure(figsize=(12,10))
corr = train.corr()
sns.heatmap(corr, annot=False, cmap=plt.cm.Reds)
plt.show()
```




Mean_RR
1100
1000
900
800
700
600
0
10
20
30
40
50
60
70
Median_RR
0.001
0.000
−0.001
−0.002
−0.003
0
10
20
30
40
50
60
70
Median_Rel_RR
1100
1000
900
800
700
600
0
10
20
30
40
50
60
70
SDRR_RMSSD_REL_RR
3.25
3.00
2.75
2.50
2.25
2.00
1.75
1.50
0
10
20
30
40
50
60
70

APPLYING DECISION TREE MODEL

Decision tree algorithm falls under the category of supervised learning. They can be used to solve both **regression** and **classification problems**. Decision tree uses the tree representation to solve the problem in which each leaf node corresponds to a class label and attributes are represented on the internal node of the tree. We can represent any Boolean function on discrete attributes using the decision tree.




```
Accuracy: 0.9986352448029635
```

RESULT:

By applying different machine learning algorithms we can observe that Decision tree gives highest accuracy as 99%. So we can conclude that decision tree is the best model to predict the patient’s stress level

REFERENCES:

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Peer-review under responsibility of the scientific committee of the International Conference on Pervasive Computing Advances and Applications – PerCAA 2019

[2] S. A. Singh, P. K. Gupta, M. Rajeshwari, and T. Janumala, ``Detection of stress using biosensors," *Mater. Today*, vol. 5, no. 10, pp. 2100321010, 2018.

[3] A. Fernandes, R. Helawar, R. Lokesh, T. Tari, and A. V. Shahapurkar, ``Determination of stress using blood pressure and galvanic skin response,'' in *Proc. Int. Conf. Commun. Netw. Technol.*, Dec. 2014, pp. 165168.

CONCLUSION

- Then the raw data was pre-processed by removing noise using filters followed by extraction and selection of features.
- Various machine learning algorithms were applied to build classification models. The most common classifiers were KNN, Decision Tree, RF, and SVM.
- The ultimate objective in stress detection is to develop a high accuracy model that is effective and affordable.