Predicting HRV Accuracy to Measure Drowsy Status for Smart Traffic

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Abstract - *Driver drowsiness detection is a key technology that can prevent fatal road accidents caused by drowsy driving. The present work proposes a driver drowsiness detection algorithm based on heart rate variability (HRV) analysis and validates the proposed method by comparing with electroencephalography (EEG)-based sleep scoring. Changes in sleep condition affect the autonomic nervous system and then HRV, which is defined as an RR Interval (RRI) fluctuation on an electrocardiogram trace. Eight HRV features are monitored for detecting changes in HRV by using multivariate statistical process control, which is a well known anomaly detection method.*

Existing System are restricted in its properties of implementation such as highly controlled laboratory environment, the limited number of participants. Accordingly, more studies are required to confirm our results by using well-matched groups of participants in a real driving environment.

The proposed system forecast the drowsy condition in the driver based on the blood pressure, blood proteins. Datasets are compared with the algorithms SIFT, K-Mean, Apriori, ECLAT to analyze the drowsiness and result will be shown as pictorial representation with the percentage of drowsy status for processing with individual algorithms like SIFT(70%), K-Mean(60%), Apriori(85%), ECLAT(92%) . Thus the system will avoid the chances of fatal road accidents.

***Key Words*: BP Data, Drowsy Driving, Blood Proteins, Data mining, SIFT, K-Mean, Apriori, ECLAT.**

1 INTRODUCTION

The most frequently occurred circumstances during drowsy driving are driving from long duration or insufficient sleep or person having sleeping disorder. It is mainly notable and possible danger in traffic. Many traffic road accidents are caused by drowsiness which may lead the way to people harmed and fatal car accidents and also people death occurred in every year. Investigation on driving drowsy detection is becoming a major issuance all over the world.

Drowsy detection driving can be mainly predicted based on blood pressure, blood proteins, heart beat variability, and biological data of the driver like variation in the blood pressure during generic postures of driver and estimating the blood pressure variations during drowsy driving.

In our project, biological data of the driver can be extracted from the datasets that include a parameters as name, gender, age, globulin and albumin blood protein counts and heart beats of the driver. Comparison has to be done with the SIFT, K-Mean, Apriori, ECLAT algorithms to analyze the drowsiness. The outcome will be a pictorial representation form with overall comparative status of the drowsiness.

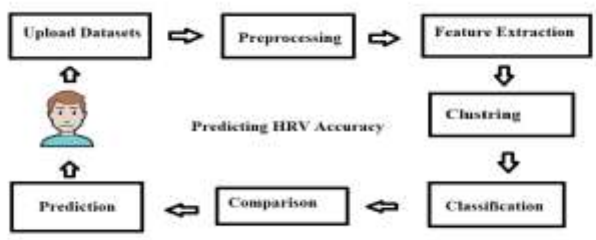

Fig-1:System Architecture

The above figure fig -1 project architecture represents a overall view of the proposed system. Admin can upload the datasets and data can be encoded using the algorithms SIFT, K-Mean, Apriori, ECLAT. By taking these algorithms as base clusters, tested datasets are compared to build a classification model and comparison has to be done with those algorithms to predict a drowsy status of the driver.

This application created by methods for an Iterative model for the explanation that the application was not entirely firm up until the time the task began. The prerequisites measured by user were being changed once in a while.

The proposed system is used based on the Heart Rate Variability (HRV) to predict the drowsiness by identifying the blood pressure and variations. Above architecture explain the whole design of project. Recorded information and transferred dataset assume a significant job in this framework, based on these data SIFT, K-Mean, Apriori, ECLAT Algorithms are classified and predicted as a result of three dimensional graph with result table.

Admin Module-Admin can manage the entire data like uploading dataset, clear dataset, and admin can edit the data. He can create registration so that user can login easily and use the application.

User Module-User can load the recorded data that have to compare with the SIFT, K-Mean, Apriori, ECLAT Algorithms.

Based on the details added in recorded data user can check status.

2 LITERATURE SURVEY

[1] We examined about estimation of the pulse during the various postures like generic normal type of exercise and high intensity exercises, there is a increased blood pressure level , from that we collect a data and estimate the all generic postures like with or without exercises using Continuous Wave Radar(CWR) and also using a photoplethysmogram(PPG) for identifying disorder in brain function.

[2] We dissect the information from Systolic Blood Pressure during the withdrawal of the heart muscle and diastolic pulse when heart muscle is in the middle of the thumps. And also find BP variations so that we can predict drowsy status in the patients having sleeping sickness.

[3] In this paper, assessing systolic and diastolic BP dependent on a PPG signal where as PPG signal is used for identifying blood variations but data from the PPG is used as wearable device. Here we using dataset in machine learning using neural network. An Artificial Neural Network (ANN) is utilized for blood estimation. This methodology gives a superior precision than recently utilize.

3 PROPOSED WORK

The proposed machine is designed to predict the drowsiness of the driver in smart traffic based on the heart rate variability on sleep scoring compared with the algorithms SIFT, K-Mean, Apriori, ECLAT. With the tested data from the datasets are compared with those algorithms and result will be preview as pictorial representation with percentage of drowsy status with comparative table. Avoid the chances of fatal road accidents during driving and saves life.

4. METHODOLOGY

The proposed system is designed for users, admin and different user data flow designs to perform the functionalities of system and roles of that functionalities like choose the datasets and upload and edit the datasets. And also analyze the various techniques with machine learning algorithms.

4.1 Uploading Datasets

Admin will choose the datasets upload the data and he is only able to clear or load the data. User can only register and login to page and gives the details that may cause drowsy and then given details will matched with the data and result will displayed in the graphical form.

Name	Age	Date	ECG	Gender	HeartBeat	Status
Yashaswini N Prasad	23	43555	1.82587965646	Female	58	Drowsy
Yashaswini T J	22	43556	6.68238341808319	Female	55	Drowsy
Manjunath	24	43536	1.50021435692906	Male	61	Drowsy
Bhavana	24	43556	7.62966126203536	Female	57	Normal
Bhavani	33	43565	1.13159023225307	Female	63	Drowsy
Chaithra	29	43582	7.67252445220947	Female	60	Normal

Fig-2: Dataset Table

4.2 Pre-Processing

Data gets transformed, or Encoded or features of the data can now be easily interpreted by the algorithms SIFT, K-Mean, Apriori, ECLAT. Considering those algorithms as base clusters and traversed to get maximum predominant values matched to predict drowsy.

4.3 Classification

It characterize enormous informational indexes are first arranged, at that point designs are distinguished and connections are set up to perform information examination using SIFT, K-Mean, Apriori, ECLAT algorithms. Traversal has to be done in vertical methodology.

4.4 Sift Algorithm

It is a technique for detecting salient, stable feature points in an image. There are for the most part four stages associated with the SIFT calculation. We will see them individually.

1. **Scale-space peak selection:** Potential location for finding features in user data.
2. **Key point Localization:** Accurately place the feature key points obtained.
3. **Orientation Assignment:** Assigning orientation to key points.
4. **Key point descriptor:** Describing the key points as a high length vector.
5. **Key point Matching:** Identify the key points between two neighbour images.

4.5 K-Mean Algorithm

K-Means Clustering is a concept that falls underneath Unsupervised Learning. This set of rules is employs to discover agencies inner unlabeled statistics.

Step 1-Once the test data is inputted, we take this and compare with train dataset for clustering.

Step 2- Test dataset is calculated as nodes and are compared with each train dataset to obtain mean value from the dataset, once we get the highest mean values when we compare test and train, we get clusters based on the mean value.

4.6 Apriori Algorithm

In Apriori, data item is traversed once at a time and not repeated. Reading a data needs again and again in this algorithm. Apriori follows a two categories for identifying data item are, One, at each step data is generated and Two, counts each data item and support its calculations.

Stage 1: Apply least help to find all the incessant sets with k things in a database.

Stage 2: Use oneself join rule to locate the incessant sets with k+1 things with the use of successive k-item sets. Rehash this procedure from k=1 to the moment that we can't make a difference oneself join rule.

4.7 Eclat Algorithm

The ECLAT calculation represents Equivalence Class Clustering and base up Lattice Traversal. It is well-known techniques for Association Rule mining. It is a progressively productive and adaptable form of the Apriori calculation. While the Apriori calculation works from an even perspective mimicking the Breadth-First Search of a diagram, the ECLAT calculation works in a vertical way simply like the Depth-First Search of a chart. This vertical methodology of the ECLAT calculation makes it a quicker calculation than the Apriori calculation.

```
Input: D, σ, I ⊆ 𝓘
Output: F[I](D, σ)
F[I] := {}
for all i ∈ 𝓘 occurring in D do
  F[I] := F[I] ∪ {I ∪ {i}}
  // Create D^i
  D^i := {}
  for all j ∈ 𝓘 occurring in D such that j > i do
    C := cover({i}) ∩ cover({j})
    if |C| ≥ σ then
      D^i := D^i ∪ {(j, C)}
    end if
  end for
  // Depth-first recursion
  Compute F[I ∪ {i}](D^i, σ)
  F[I] := F[I] ∪ F[I ∪ {i}]
end for
```

4.8 Prediction

In this module, it will detect the user status whether he/she is normal or drowsy based on the recorded data provided by user and it will matched with the data uploaded by the admin and algorithms comparison was done to predict the percentage of drowsiness find in people during smart traffic.

From the above figure fig-3:Comparision table, data is processed with all the algorithms and predict the drowsy status in the pictorial form with the percentage as mentioned as SIFT(70%), K-Mean(60%), Apriori(85%), ECLAT(92%).

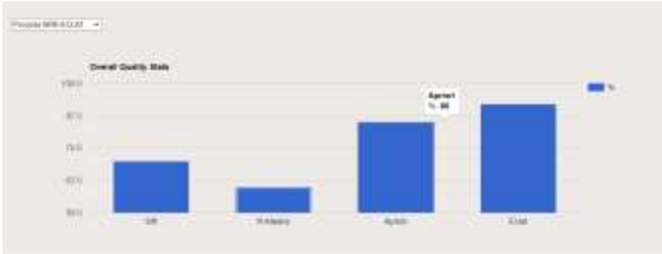

Fig-3: Comparision Table

5. CONCLUSIONS

Drowsiness detection can be utilized to prevent fatal road accidents caused by drowsy driving in the smart traffic. The Tested datasets are already uploaded are collected from the user profile. This data will be compared with the algorithms SIFT, K-Mean, Apriori, ECLAT to predict the drowsy condition of the driver based on the heart rate variability factor and blood pressure variation, heart beat count and blood protein rates.

Finally these algorithms are compared and detect the cause of drowsiness during sleep or unsleepy states. We get a result as pictorial representation with the percentage of drowsy status for each gender. This proposed system helps in avoiding the road accidents and saves the life.

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