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Correlating ECG to Rate Quality of Fatigueness in Drowsy Driving

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Abstract - *Many traffic injuries and deaths are caused by the drowsiness of drivers during driving. Existing drowsiness detection schemes are not accurate due to various reasons. To resolve this problem, accurate driver drowsiness has been developed using an electrocardiogram values. The proposed system predicts the fatigue status of driving person using ECG values. Datasets are interpreted by algorithms Naïve Bayes, K-Nearest Neighbor, Decision Tree and ECLAT. The system add test data and uploaded data both are compared and predict the result is in graphical representation with displaying percentage, where showing percentage Naïve Bayes 93.34%, K-Nearest Neigbhor 91.34%, Decision Tree 91.3%, and ECLAT 95.34%. Here showing ECLAT algorithm is more efficient than Naïve Bayes, K-Nearest Neighbor, Decision Tree algorithms. Thus, in our system we are correlating ECG to Rate the Quality of Fatigueness in Drowsy Driving to comparing pictorial representation to ensure public transport safety.*

Key Words: ECG data, Drowsy Driving, Naive Bayes, K-Nearest Neigbhor, Decision Tree, ECLAT.

1 INTRODUCTION

Driver drowsiness or fatigue is one of main factors to cause many road accidents. As a vehicle safety technology to reduce such accidents, the driver drowsiness detection problem is widely examined with various measures are obtainable. The types of measure used in existing studies for driver drowsiness detection include vehicle based measure, behavioral measures and physiological measure. Where behavioral measure means behavior of driver like yawing, eye blinking, eye. Vehicle based measure means deviations from lane position, movement of the steering wheel. Physiological measures means correlation between Physiological signals like ECG (ElectroCardioGram), EEG (ElectroEncephaloGram). In this project we made a review of finding drowsy of a person using ECG as data by applying algorithms Naïve Bayes, K-Nearest Neigbhor, Decision Tree and ECLAT. Using parameter are age, gender, ECG data, heartbeat, blood protein etc., and presented output as graph showing multiple analysis for fatigue status.

2 LITERATURE SURVEY

[1]This paper developed a method for BP estimation using only ECG (electrocardiogram) signals raw ECG are filtered and segmented. Using normal and hypertension for estimating the BP and complex analysis is done for future exaction. This paper uses the. Stack based classification and regression module to predict the systolic BP, diastolic BP and mean Arterial pressure. The distributed based calibration method is used and this paper is proposed the close result of BP. In addition to the method allows a probability distribution based calibration to adapt the models to a particular user.

[2] In this paper they are using BP, ECG signals, heart rate for estimating systolic and diastolic of BP and how BP is extracted from ECG signals using wavelet transform method for obtaining R wave and T wave to perform segmentation and applying artificial neuronal network algorithm for extract the systolic and diastolic of BP, using novel methodology first time relationship between BP and ECG signals are shown in this paper. This procedure means neural network were applied in order to have a system with systolic and diastolic blood pressure values bases on the ECG signals.

[3] In this paper hardware device used is wristband is used to collect plothysmogram (PPG) signals and for collecting electrocardiogram (ECG) hardware device is hear rate belt is used This paper made review on Hypertension is a major health risk for a person in the present busy world that influences quality of life. Hardware devices to measure pulse transit time and continuously monitoring BP which is connected to smart phone via Bluetooth, where the ECG and PPG (plothysmogram) signals are transmitted and processed in the Smartphone and result is shown.

3 PROPOSED WORK

The proposed system interpret the correlating of ECG and other parameter to rate the quality fatigueness in driving using datasets that are read from user and also from uploaded tested medical data using Naïve Bayes, K-Nearest Neighbor, Decision Tree and ECLAT machine learning algorithms. Each algorithms result is compared and analyzed with other for their efficiency and are represented pictorially.

Here ECG values and other physiological parameters are used to detect and interpret the fatigueness of person. ECG signals are converted into numeric values by applying method. After adding recorded data and uploaded data both are compared and predict the result.

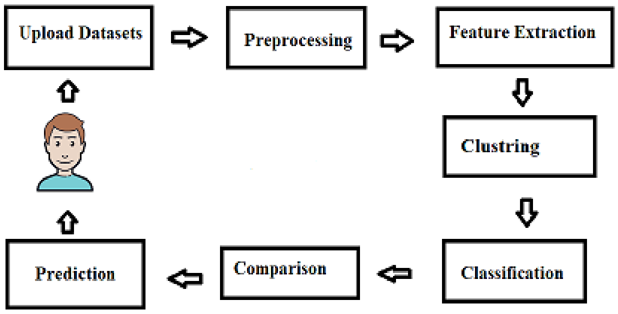

Fig -1: System Architecture Diagram

4. Methodology

4.1 Uploading Dataset

Reading / uploading dataset to our designed software allows us to read / upload interactive data values through interactive user.

	PersonNa	Age	RecordedDate	Ecg Signal	Gender	HeartBeat	Start	End	Incremen	BloodProt	Albumin	Globulin
2	Mamatha	40	03-01-2019	4.800307	Male	56	67	101	21	6	3	3
3	Raghav	33	02-02-2019	2.749616	Male	57	121	84	26	6	3	3
4	Vedhya	33	03-06-2018	1.943164	Male	62	87	98	28	8	4	4
5	chinthana	54	07-08-2018	3.540707	Female	56	95	99	25	6	3	3
6	Aakruth	48	15-02-2019	3.740399	Male	60	59	107	21	7	5	2
7	Shanthi	50	25-01-2019	4.815668	Female	56	82	72	21	8	3	5
8	Sumithra	90	26-02-2019	4.278034	Female	57	74	123	28	7	5	2
9	Prabha	49	30-01-2019	4.3702	Male	65	93	63	25	7	4	3
10	Madhu	69	28-02-2019	4.508449	Male	61	72	70	28	8	5	3
11	Prasad	65	03-03-2019	4.3702	Male	65	75	97	29	8	3	5
12	Akshith	18	05-04-2019	4.631336	Male	55	101	123	23	6	3	3
13	Amrutha	68	06-04-2019	4.385561	Female	61	119	89	24	7	5	2
14	Amulya	88	03-04-2019	4.239631	Male	56	86	92	21	8	4	4
15	Anjana	60	25-02-2019	4.285714	Female	61	56	93	27	6	4	2
16	Ankitha	26	06-03-2019	4.116744	Male	58	100	81	24	8	4	4
17	Annapurn	56	03-02-2019	5.030722	Female	56	71	104	28	6	5	1

Fig -2: Dataset Table

4.2 Pre-Processing

In this module datasets get interpreted by our selected machine learning algorithms Naïve Bayes, K-Nearest Neigbhor, Decision Tree, ECLAT.

4.3 Dataset Classification

In the classification module, the large datasets are sorted into first, then identified the patterns and relationship are established to perform data analysis using Naïve Bayes, K-Nearest Neigbhor, Decision Tree and ECLAT Algorithms. Traversal should be done in the form of vertical methodology.

4.4 ECG (ElectroCardioGram)

The ECG is electrical action of contractile the heart beats and can be easily recorded with help of surface electrodes on the limbs or chest. The rhythm of the heart beats can be calculated per minute (bpm) by counting identifiable waves. Normal range of ECG ranges from 120-200ms (3-5 squares on ECG).

Study on ECG

The below Fig -3 shows the ECG of heartbeat in normal sinus rhythm and whose parameters are studied in detailed using

P-Waves, PR Interval, PR Segment, Q-Wave, R-Wave, QRS Complex, S-Wave, ST Segment, T-Waves.

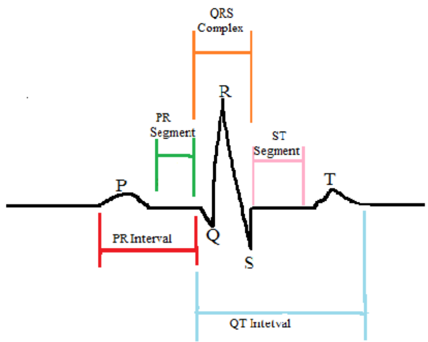

Fig -3: Normal ECG of a Person

4.5 Naïve Bayes Algorithm

Input : test dataset (age, heartbeat)

1] Once test data is inputted, we take this values and compare with train dataset for classification and prediction.

2] Test data is compared to calculate as predictor and excerptor probability, where A is drowsy may be, B is may not be.

$$Posterior\ probability,\ P(a|b) = \frac{P(b|a) * P(a)}{P(b)}$$

3] After applying above formula we get highest probability, It will be taken as solution.

4.6 K-Nearest Neigbhor Algorithm

Input: test dataset (heartbeat, age)

1] Once Training dataset is dumped, Nodes will be created

2] In this step K- specification is formed (means clustering section) where primary index is ECG values, incremental values, secondary index is blood protein etc.

3] Test data is compared with K-specification, which comparisons gives more is taken as final value.

4.7 Decision Tree Algorithm

Input: test dataset (heartbeat, age)

1] The dataset are split into left list and right list, where every dataset is compared with low, mid, high.

2] After comparing with low, mid, high values, it forms cluster which node as go through or visited most is taken as final value (fatigue).

4.8 ECLAT Algorithm

Input: test dataset (heartbeat, age)

1] These inputted values age, ECG values, globulin etc are taken as item.

2] Next, we find number of frequent occurrences of values which discovering itemset in the trained dataset based on most frequent we get related data as values.

4.9 predictions

In Interpretation module the identified algorithms as specified are applied and interpreted fatigue status of a person data.

5. RESULT

Here below graph showing ECLAT algorithm is more efficient than Naïve Bayes, K-Nearest Neigbhor, Decision algorithms with percentage.

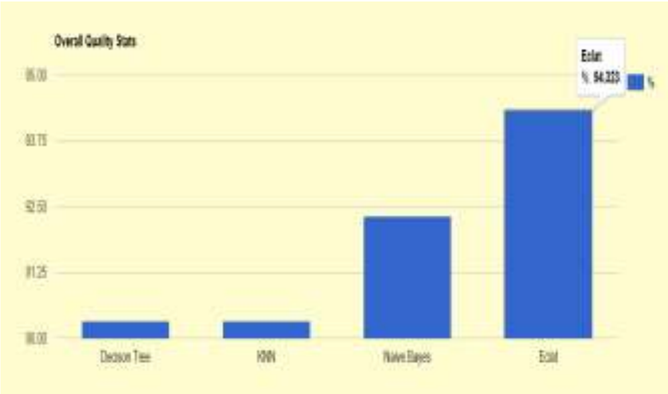

Chart -1: Comparison graph with percentage

6. CONCLUSIONS

To avoid the future accidents of the driving persons, Correlating ECG to rate the quality of fatiguness in drowsy driving this application is developed. The datasets are collected from testified sites, means which already examined report of the patient.

The system allows to apply different algorithms such as Naïve Bayes, K- Nearest Neighbor, Decision Tree and ECLAT Algorithms than it will predict the fatigueness of person.

Here using ECG value to detect the drowsiness of person, where ECG signal are converted into numeric data. The main concepts finding fatigueness of a person using ECG singles which is converted into numeric data. After adding recorded data and uploaded data both are compared and predict the result is in graphical representation with displaying percentage. Here showing ECLAT algorithm is more efficient than Naïve Bayes, K-Nearest Neighbor, Decision Tree algorithms.

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