I. INTRODUCTION

Drowsiness is basically characterized as “a condition of close rest because of weariness”. It is actually unmistakable from weakness, which has been characterized as an "unwillingness to keep playing out the job that needs to be done". The impacts of languor and weariness are almost the same. Exhaustion influences mental readiness, diminishing a person's capacity to work a vehicle securely and expanding the danger of human blunder that could prompt fatalities and wounds. Languor moderates response time, diminishes mindfulness, and weakens judgment. Exhaustion and lack of sleep affect all transportation administrators (for instance: carrier pilots, truck drivers, and railroad engineers). In the two conditions, driver can't concentrate on essential errand of driving which may improve the probability of crash event. With the consistently developing movement conditions, this issue will additionally break down. Therefore, it is important to create driver readiness framework for mishap counteractive action [1]. In [2] image processing method is utilized for drowsiness recognition. The framework ought to distinguish the condition of the driver as ahead of schedule as could be allowed and the false identification rate ought to be diminished. The framework utilizes Gabor ordinal measures so as to identify the face. A nonintrusive drowsiness recognition method is used eye-tracking and image processing[3]. Open CV’s library is used to accept each frame and store it in an image structure that can easily be used for further processing [4]. Eye movements of 14 drivers is observed using electrooculography (EOG) at the moving-base driving simulator of Mercedes Benz to assess driver drowsiness[5]. A module for automatic driver drowsiness detection based on visual information and Artificial Intelligence is used to locate, track and analyze both the driver's face and eyes to compute a drowsiness index to prevent accidents[6]. Both face and eye detection is performed by Haar-like features and AdaBoost classifiers[7].

II. LITERATURE SURVEY

Cheng et al. [8] exhibit a nonintrusive laziness acknowledgment technique utilizing eye-following and picture handling. A hearty eye identification calculation is acquainted with address the issues caused by changes in light and driver act. Six measures are figured with level of eyelid conclusion, greatest conclusion length, and squint recurrence, normal opening level of the eyes, opening speed of the eyes, and shutting speed of the eyes.

Emam et al. [9] proposed integration between image mining technique and the developed real time drowsy eye detection architecture. They present Intelligent Drowsy Eye Detection using Image Mining (IDEDIM) system architecture.

G. Kong et. al. [10] presents visual examination of eye state and head posture (HP) for ceaseless checking of sharpness of a vehicle driver. Most existing ways to deal with visual discovery of non-ready driving examples depend either on eye conclusion or head gesturing points to decide the driver tiredness or diversion level.

Loonis et al. [11] propose a novel wise reconnaissance framework to gauge driver sleepiness in light of the Observer Rating of Drowsiness (ORD) show incorporated into prove hypothesis through combination of path and eye

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Weber’s law signifies the relationship between incremental threshold (Δ F) and surrounding intensity (F). It states that the ratio Δ F/F is always constant and denoted by Weber fraction [20] where F is initial intensity in the signal/image and F is the smallest change which is noticeable. For example, in signal processing context, in a crowded room, one has to speak loud in order to get heard, whereas a whispering sound is sufficient in a quiet place to get noticed. Such a phenomenon in the context of human vision is known as ‘Just Noticeable Difference’ (JND). Chen et al. [20] proposed the JND based Weber local descriptor (WLD) which became popular feature extraction technique for texture classification, face detection and face recognition. In particular, it leads to a representation close to biological human vision. The WLD histogram is constructed after mapping of differential excitation and orientation components. Further, it is projected onto 1-D space for classification efficiency.

**IV. RESULT AND DISCUSSION**

The receiver operating characteristic is a metric used to check the quality of classifiers. For each class of a
classifier, ROC applies threshold values across the interval [0, 1] to outputs. For each threshold, two values are calculated, the True Positive Ratio (TPR) and the False Positive Ratio (FPR). For a particular class i, TPR is the number of outputs whose actual and predicted class is class i, divided by the number of outputs whose predicted class is class i. FPR is the number of outputs whose actual class is not class i, but predicted class is class i, divided by the number of outputs whose predicted class is not class i.

Figure 2: Receiver Operating Characteristics using SVM

Figure 3: Receiver Operating Characteristics using Decision tree classifier

Figure 4: Receiver Operating Characteristics using KNN

Figure 5: Receiver Operating Characteristics using ANN

The results for the actual pixel location using ground truth images and that of resulted outputs has been described with above parameters.

Table 1: Results in tabular form using different features and classifiers

| Classifier used | Features used | LBP    | DWT    | Statistics | Contourlet-WLD and LBP |
|-----------------|---------------|--------|--------|------------|------------------------|
| SVM             | LBP           | 96.4143| 96.5139| 97.0120    | 97.4104                |
| Decision tree   | DWT           | 89.2430| 79.4821| 84.9602    | 93.5259                |
| KNN             | Statistics    | 98.0080| 94.9203| 82.8685    | 98.8048                |
| ANN             | Contourlet-WLD| 96.1155| 93.6255| 95.0199    | 96.0159                |
As shown in above table and graphs, there is not much difference in classification parameters when video has been compressed to 50%. However if we increase the compression ratio, results can be degraded due to small size of the patches.

### V. CONCLUSION

Driver drowsiness was perceived as a vital reason in the vehicle mishaps. It is demonstrated that driving performance reduces with increase in drowsiness. Advanced innovation offers some would like to maintain a strategic distance from these sorts of mischances up to some degree. As video camera facility is easily available, a computer vision oriented mechanism can gives real time results in alerting the driver when he/she feels sleepy based on the status of the eyes. Similar research has been explored in this work in which different types of features has been used on eye region. At first face has been detected from whole frame and later left and right eye patches has been extracted so that better features can be obtained only from eye region. Later a set of features has been evaluated in which LBP, statistics and DWT features has been used from existing literature and a new feature based on contourlet transform and web local descriptors has been introduced. Different classifiers i.e. ANN, SVM, decision tree etc. has been trained and tested using the extracted features from both closed and open eye datasets. Experimental results show high accuracy in drowsiness detection when new feature has been considered as compared to existed feature sets.

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