Task 2 – Computer Vision

Drowsiness detection is extremely important as the number of road accidents and deaths from drowsiness has increased rapidly overtime.

To detect drowsiness from given image data set we need to first detect and localize the face in the given image and then draw face boundaries after that we need to use facial detection for detecting facial regions like mouth, eyebrows, nose and jaw so that it becomes easier for us to classify between different facial features and use only those features which are required. Facial detection can be done using Dlib library or MTCNN or other face detection methods. After this we need to use only facial landmarks of eyes as we need to check only the position of the eyes of the driver while driving the car to see if the driver is drowsy or not.

Using landmarks for the eyes we can find out the vertical and horizontal distance between the landmarks and use EAR (Eye Aspect Ratio) to find ratio of length of the eyes by averaging the vertical and horizontal distance of the eye. Then we can use PUC (Pupil Circularity) to measure the perimeter, diameter and the area of the pupil using the landmarks of the eye, PUC is similar to EAR but has more focus over the pupil than the eye.

Now we will train the model and will make it calculate the average and minimum EAR and PUC values of being drowsy. After this from the given dataset we will first analyze all the images of a particular driver and calculate the EAR value and PUC value for each image and also count the number of times the eyes of the driver were close. Now we will calculate average of all the EAR and PUC values and will compare it with the average calculated using the training data, also we will compare it with the minimum values. We will also consider if the percentage of driver's eyes being closed is less than percentage of driver's eyes being open. If percentage of driver's eyes being

closed is more than percentage of driver's eyes being open, EAR and PUC values average is less than that of the average calculated from training data and is also less than the minimum value of EAR and PUC then we would conclude that the driver is drowsy. Using the data obtained while evaluation of different drivers the model would be able to update and train itself increasing its chances of giving the right answer.

This method is better than already existing methods as it would update the EAR value and PUC value for the drivers which would prevent alerts and give the drivers best experience depending on the way they always drive. Also, this model is much more sensitive compared to other models as it also uses PUC value. By monitoring the PUC value, model can better understand if the driver is drowsy or not and can alert the driver at the right time avoiding any accidents.