Project Summary Report

Drowsiness Detection

Group-43

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Abstract:

Each year hundreds of people lose their lives due to traffic accidents around the world. A main cause of fatigue is sleeplessness or insomnia. It is especially important in driving where time is a critical factor in driver's decision. On the other hand, another method to check the driver fatigue is monitoring the physical condition and facial expressions of the drivers.

Project statement:

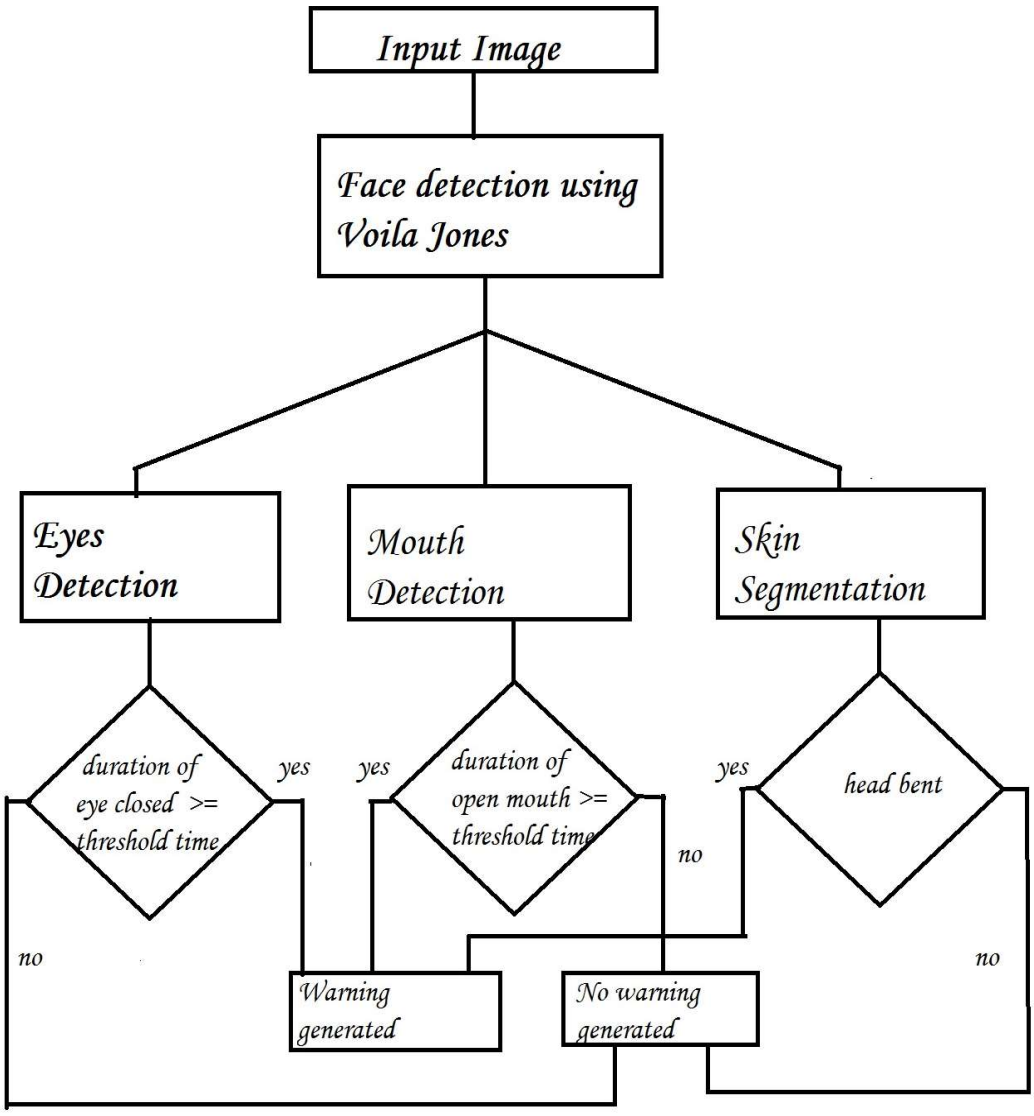
Making real time driver monitoring system to alert the driver when is drowsy. Using webcam input we need to take the driver video input. Decide whether he is drowsy, If so alert him by playing an alarm.

Problem solution:

- First, we take a camera input
- Then, divide the video into the frames
- Then ,we will detect faces in the given image(frame) using viola jones algorithm
- Later, we detect the eyes and mouth region in the face image(ROI)
- Detect the state of eye. If the eye is closed for some certain amount of consecutive time .we classify the person as drowsy.

- Yawn detection: If a person yawns we decide that the person is drowsy
- Head lowering: If person slowly lowers this head ,we can say that he is drowsy
- If one of the above three conditions is true, then we state that driver is drowsy.
- Then generates warning if a person is found drowsy.

Approach:



Two Approaches(to detect state of eyes & mouth):

- Deciding the state of eye by calculating the difference between the amounts of white pixels present in the eye region. For deciding the state of mouth, we calculate the amount of red component present in mouth region. If this amount exceeds the threshold value, then we state that mouth is open.
- Second approach is achieved by using facial landmarking. First we detect the face. Then we use 68-point facial landmarking, & mark 68 points around the face. In this left-eye, right-eye, mouth are represented by points 37-42, 43-48, 49-60 respectively. We use these points to calculate the aspect ratios of eyes & mouth. Then use this aspect ratio and a threshold value to decide the state of eyes and mouth (open/close).

Main findings:

We have tested our approach to given dataset. This dataset includes images of people drowsy and not drowsy, then videos of people drowsy (includes all the cases like people with & without spectacles and male/female).We have tested all functionalities (eyes, mouth & head lowering) individual, also together.

FOR EYES :

EXPECTED OUTPUT :DROWSY

Video name	Eyes
E1	Drowsy
E2	Drowsy
E3	Drowsy
E4	Drowsy
E5	Drowsy

E6	Drowsy

FOR MOUTH :

EXPECTED OUTPUT :DROWSY

VIDEO NAME	MOUTH
M1	Drowsy
M2	Drowsy
M3	Drowsy
M4	Not Drowsy
M5	Drowsy
M6	Drowsy

FOR NO-ERROR:

EXPECTED OUTPUT :NOT DROWSY

VIDEO NAME	No error
M	Not Drowsy
N1	Not Drowsy
N2	Not Drowsy

FOR Head-Lowering :

EXPECTED OUTPUT : DROWSY

VIDEO NAME	SLANT
S1	Drowsy
S2	Not Drowsy
S3	Drowsy

FOR SPECS :

EXPECTED OUTPUT : DROWSY

VIDEO NAME	SPECS
S1	Drowsy
S2	Drowsy
S3	Drowsy
S4	Not Drowsy
S5	Not Drowsy
S6	Drowsy

At last we tested for a video in which a person driving a car is actually drowsy. In this videos driver pretends to be drowsy 12 times, in which our system detected for 10 times.

Analysis of result:

Accuracy for approach (using aspect ratios)

- For images:87.5%
- For videos:83.5%

We have calculated above percentages using the results we obtained for our dataset.

Our system is more accurate in cases of people without spectacles. Our system doesn't work in pitch dark conditions because computer vision was not able to detect the face in the video.

Challenges and difficulties :

Converting the given system into a real-time system .Finding the dataset and increasing the accuracy are the main difficulties of our project. Face symmetry calculations are not same for

everyone. The calculations considered are true for most of the people.

Resolved:

We increased the accuracy by changing our approach to calculating aspect ratio method. We have made the system work for live video (from webcam) and video inputs. To make it real time we have used some external python libraries. (Like playsound, opencv).

Unresolved:

Head lowering can give abrupt results in case of bald person. The algorithm doesn't work for the people sleeping with eyes open.