Facial Landmark Detection - OpenCV

TASK Eye Blink Detection using Facial Landmark

- Landmark detection + landmark visualization (e.g. OpenCV or Dlib or MediaPipe), use real testing data of driver inside the car (1b)
https://drive.google.com/file/d/1PjATi3Cfk6vqATnCbzErFaJ4lo19RxNb/view?usp=sharing
https://drive.google.com/file/d/1R6-ckzm9mbn9UKi5Z8yYZKDD7f0A0sxZ/view?usp=sharing

- Implementation of EAR equation (1b) http://vision.fe.uni-lj.si/cvww2016/proceedings/papers/05.pdf

- The final information about the closed eyes will depend on the values from the previous images. Combine EAR information from previous frames. For example, create the parameter that will influence the number of used frames (e.g. 3, 5, 7) (1b)

- Combination of LBP + landmarks for final prediction (1b)

- Calculate prediction score (accuracy) based on provided annotation in data archive (1b)

- Bonus: use additional landmarks (other than those around the eyes) to detect anomalies in the driver's face

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EAR

For every video frame, the eye landmarks are detected. The eye aspect ratio (EAR) between height and width of the eye is computed.

$$\text{EAR} = \frac{\|p_2 - p_6\| + \|p_3 - p_5\|}{2\|p_1 - p_4\|}, \qquad (1)$$

where $p_1, \ldots, p_6$ are the 2D landmark locations, depicted in Fig. 1.

The EAR is mostly constant when an eye is open and is getting close to zero while closing an eye.

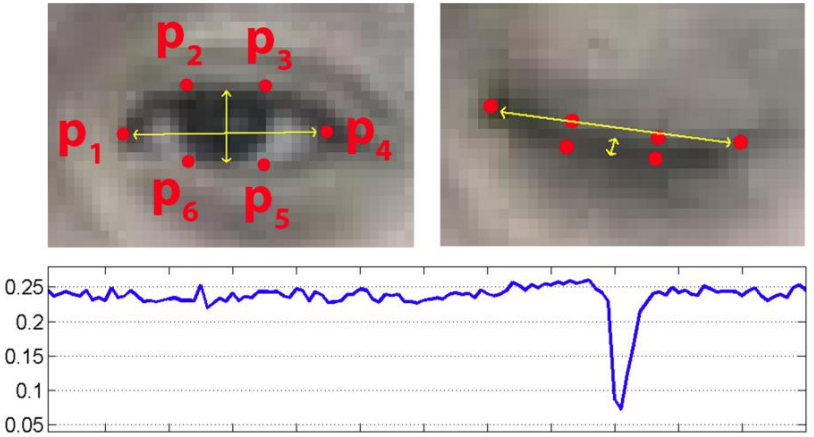

Figure 1: Open and closed eyes with landmarks p_i automatically detected by [1]. The eye aspect ratio EAR in Eq. (1) plotted for several frames of a video sequence. A single blink is present.

References:

http://vision.fe.uni-lj.si/cvww2016/proceedings/papers/05.pdf