



VISTA – Driver Mental State Recognition

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Problem definition

- Detect and track the face of a driver in order to get an information about driver's vigilance.
- Extract facial features that are important for retrieval of various vigilance parameters.
- Estimate parameters such as eyes openness, yawning, gaze direction, and head bending, that may indicate the driver's inattention or fatigue.
- Build an inference engine that may issue an appropriate warning or signal an alarm according to estimated parameters mentioned above.

Potential applications

- An automated personalized system that may be installed in road vehicles in order to reduce the number of accidents caused by driver's inattention or drowsiness.
- The system is built in a non-intrusive way:
 - no physical contact with the system is required except in case when an alarm is signaled
- Convenient especially for long driving periods without a rest (e.g. track drives).

Techniques

Face detection:

- Viola-Jones detector

Facial features extraction:

- implemented using a novel supervised gradient descent method

Fatigue parameters estimation:

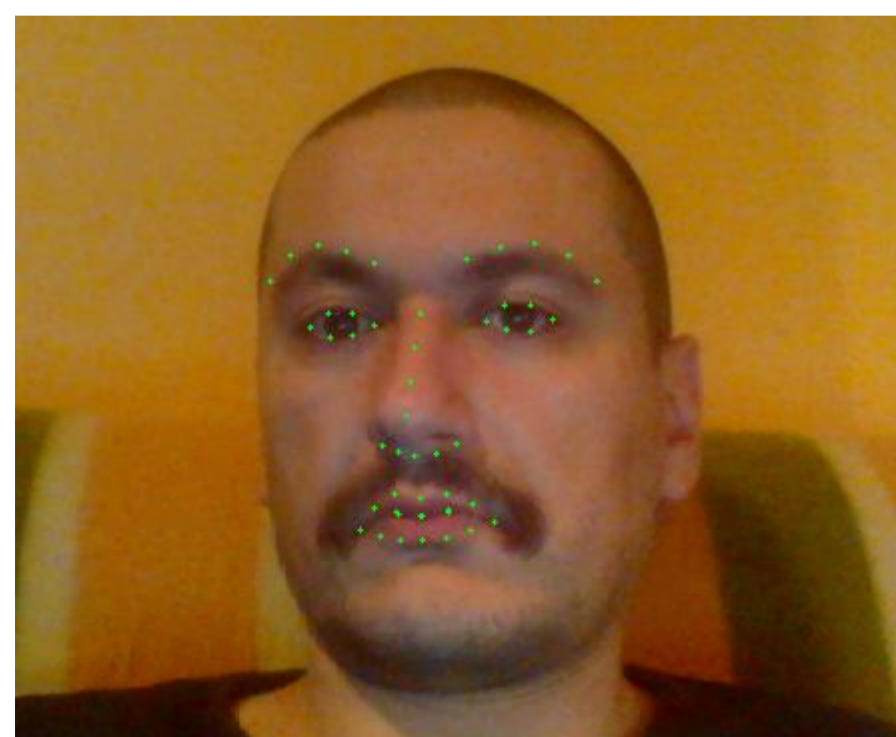
- calculation of PERCLOS and other relevant parameters

Decision making:

- based on thresholds calculated in a short calibration procedure for each individual

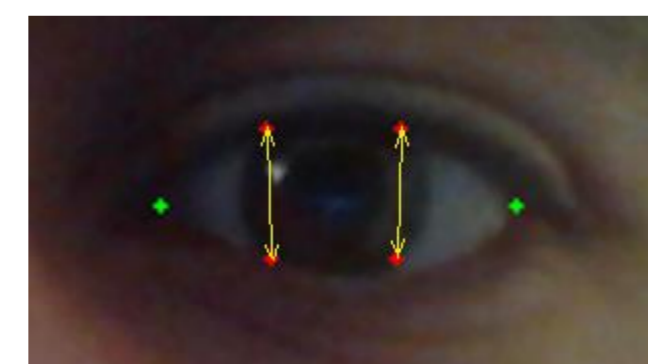
Results

Facial features detection and tracking



- example of correctly detected features around eyes, eyebrows, nose and mouth
- the implemented supervised gradient descent method is reliable enough in tracking facial features even if a person is wearing glasses or sunglasses

Detecting a fatigue



- example of warning issued by the system according to recognized yawning
- the eye openness is estimated by calculation of distance between features on eyelashes; the similar principle is applied for mouth openness estimation

Contact

VISTA

Computer Vision Innovations for Safe Traffic

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