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IMAGE-BASED BREATHING ANALYSIS DURING THE MEDITATION PROCESS

Walaa Othman

Supervisor–assistant professor, Dr., A. Kashevnik

(ITMO University)

In this thesis, the respiratory rate has been calculated from the video. Also, some metrics like stability and rhythmicity have been analyzed to evaluate the meditator breathing process.

Introduction. Monitoring the respiratory rate (RR) without special equipment using smartphone cameras is useful for the person's health and mental status detection (e.g., calmness and anger). For mediation, the low number of breaths per minute can refer to a focus state. Together with RR to estimate the process, the breathing profile should be created that also includes stability and the rhythmicity of the breathing.

Main part. In this project, we used OpenPose neural network to find the skeleton of the person, then using optical flow algorithms we calculated the movement of the main points. For breathing, we care about the movement of the thorax point.

For measuring the RR, the thorax data first cleaned using a zero-crossing algorithm with amplitude threshold then the RR is calculated by counting the number of peaks at each minute.

For the rhythmic property, the peak to trough amplitude is calculated for each breath. The breathing considered rhythmic if the difference between the peak to trough amplitude for all breaths and the median amplitude during the meditation process is less than a threshold determined experimentally.

For stability, we considered respiration as stable if the difference between peaks is small and the same for troughs.

Conclusion. The RR and the breathing analysis have successfully calculated for different people with different mediation skill levels.