

Diploma Thesis Review

Tereza Soukupová, Eye-Blink Detection Using Facial Landmarks

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The thesis presents an algorithm to detect eye blinking of a person in front of a camera. The main idea is to leverage facial landmark detectors that localize characteristic points on the face image. The eye-aspect-ratio (EAR) was introduced as a simple statistic to measure a degree of eye openness. Two methods to detect eye blinks out of the EAR signal over time were proposed: (1) a supervised SVM method, that takes a fixed size temporal neighbourhood and performs a scanning window detection, and (2) an unsupervised HMM-based method that successively adapts to a specific blink pattern of a subject under monitoring. Excellent results achieving the state of the art on standard datasets together with astonishing results in low resolution images were reported.

Tereza proved her competence in advanced techniques of statistical modelling as e.g., Hidden Markov Models with a hybrid discrete-continuous variables. She managed to implement the special case of Baum-Welch algorithm herself, which is non-trivial and requires a deeper understanding of the matter. She was excellent in a quick implementing new ideas and conducting new experiments. She was able to detect unexpected/suspicious results and she was able to efficiently track a source of an error even outside of her own code, which is a quality that is very often missing to students, while this is essential for a successful engineer.

Tereza worked on her thesis systematically and intensively which is corroborated by the quality of achieved results. The accuracy of the method quantitatively measured on several standard datasets is comparable with the state-of-the-art and the proposed solution

outperforms much more complicated approaches found in the literature. Tereza has published a paper on a regular conference [1], and she won the *best student paper award*. I especially liked her effort to continue on the research to improve the results even after the successful conference paper.

I suggest evaluating the thesis as

A – Excellent.

Ing. Jan Čech, Ph.D.
Thesis Advisor

References

1. Tereza Soukupová and Jan Čech. Real-Time Eye Blink Detection using Facial Landmarks. In Proc. Computer Vision Winter Workshop, February 2016. Rimske Toplice, Slovenia. *Best student paper award*.