

Master Thesis

Facial Recognition on Tablet Computers

Description

The Chair of Digital Signal Processing and Circuit Technology focuses on the development of AAL (Ambient Assisted Living) systems. Enabling our system to properly support the user means making sure it recognizes them. An elegant way of doing this is to perform facial recognition on images captured from devices already present as part of the AAL system: tablet computers. To perform facial recognition, the use of convolutional neural networks (CNNs) is common and can achieve state-of-the-art-results. However, CNNs require a lot of computational power and memory, which tablet computers often lack. Approaches to solving this problem might be to employ networks specifically designed for mobile devices or use classical image processing methods instead.

The goal of this Master Thesis is to reliably recognize the user of our AAL system via facial recognition. Because of privacy concerns, cloud solutions are not possible and all processing must be performed on the tablet computers. The suitability of existing apps needs to be investigated and evaluated. It is important that the algorithms not only detect faces, but also are able to identify whether it is a specific person. The most promising approaches should be compared by testing their performance on a small, custom dataset. Lastly, the functionality of the best algorithm has to be verified on our tablet computers.

For additional information, please refer to the attached literature. Further details will be discussed via video conference.

Recommended experience

- understanding of computer vision (classical approaches and deep learning)
- good knowledge in Java/C++ and frameworks like OpenCV and TensorFlow
- experience with Android app development is a bonus

Literature

- I. Masi, Y. Wu, T. Hassner and P. Natarajan, "Deep Face Recognition: A Survey", 2018 31st SIBGRAPI Conference on Graphics, Patterns and Images (SIBGRAPI), Parana, 2018, pp. 471-478, doi: 10.1109/SIBGRAPI.2018.00067
- W. Zhao, R. Chellappa, P. J. Phillips, and A. Rosenfeld. 2003. Face recognition: A literature survey. ACM Comput. Surv. 35, 4 (December 2003), 399–458. <https://doi.org/10.1145/954339.954342>
- Bazarevsky, Valentin, et al. "Blazeface: Sub-millisecond neural face detection on mobile gpus." arXiv preprint arXiv:1907.05047 (2019).
- Kristian Lauszus, Jonathan Wang, "Face Recognition Android App", 2016, <https://github.com/Lauszus/FaceRecognitionApp>.