UNIVERSITÄT BIELEFELD

Project Proposal

Using Data Augmentation for Heart Rate Estimation

Background:

Remote photoplethysmography (rPPG) methods have recently gained prominence for their ability to extract heart rate from videos of the face. However, these methods often lack robustness in real-life scenarios due to motion and varying illumination. Recent work by Paruchuri et al. [1] has demonstrated that employing motion transfer as a data augmentation technique improves state-of-the-art results by 79%. This project aims to validate these implementations and apply the model to a dataset collected using the Digital Stress Test (DST) paradigm [2], which induces stress in participants.

Tasks:

- Validate the results obtained by Paruchuri et al. [1].
- Train a deep learning model and evaluate its performance on the DST dataset.

Required skills:

- Basics of neural networks and machine learning.
- Proficiency in Python.
- Familiarity with PyTorch.

Incentives:

- Engage with state-of-the-art methods for rPPG estimation.
- Gain expertise in handling video datasets
- Receive weekly supervision.

Supervisor(s):

- Bhargav Acharya, <bacharya@techfak.uni-bielefeld.de> (primary contact)
- Prof. Dr. Hanna Drimalla, <drimalla@techfak.uni-bielefeld.de>

References:

[1] Paruchuri, A., Liu, X., Pan, Y., Patel, S., McDuff, D., & Sengupta, S. (2024). Motion Matters: Neural Motion Transfer for Better Camera Physiological Measurement. In Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (pp. 5933-5942).

[2] Norden, M., Hofmann, A. G., Meier, M., Balzer, F., Wolf, O. T., Böttinger, E., & Drimalla, H. (2022). Inducing and Recording Acute Stress Responses on a Large Scale With the Digital Stress Test (DST): Development and Evaluation Study. Journal of medical Internet research, 24(7), e32280.