

Stress Detection from Thermal Videos

Vision Research Labs – Prof. Manjanth

Goal:

Precise measurement of physiological signals is critical for the effective monitoring of human vital signs. Recent developments in computer vision have demonstrated that signals such as pulse rate and respiration rate can be extracted from digital video of humans, increasing the possibility of contact-less monitoring. The goal of the project is to detect stress levels from thermal videos of human faces.

Design:

- A hand held device with an integrated thermal camera/IR camera to capture the face video.
- On board processing device to process the thermal videos and estimate the stress level.

Device:

- Sensor: FLIR thermal camera
- Processing devices: CPU, GPU, LOIHI or a neural network accelerated microcontroller.

Milestone:

1. Designing the experiment to induce no stress/stress conditions.
2. Collecting thermal video dataset.
3. Designing neural network architecture for binary classification of stress/no stress conditions.
4. Based on the success of no. 3, quantifying the stress levels on the scale of 0 - 100.
5. Report and presentation.

Prior works:

- StressNet: Detecting Stress in Thermal Video [1]
- DeepPhys: Video-Based Physiological Measurement Using Convolutional Attention Networks [2]
- Remote photoplethysmography signal measurement from facial videos using spatio-temporal networks [3]

References:

[1] Kumar, Satish, et al. "StressNet: detecting stress in thermal videos." *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision*. 2021.

[2] Chen, Weixuan, and Daniel McDuff. "Deepphys: Video-based physiological measurement using convolutional attention networks." *Proceedings of the european conference on computer vision (ECCV)*. 2018.

[3] Yu, Zitong, Xiaobai Li, and Guoying Zhao. "Remote photoplethysmograph signal measurement from facial videos using spatio-temporal networks." *arXiv preprint arXiv:1905.02419* (2019).