Towards Identifying Social Interactions with Thermal Imagery

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Abstract

Improvements in Computer Vision methods for people detection and pose estimation, combined with better cameras, has allowed computer scientists to begin exploring real-world social networks and how people interact with each other within these networks. The increased availability of modular sensors presents an opportunity to investigate social interactions using a system that could be deployed in a lightweight, unobtrusive fashion, while also protecting the anonymity of participants, something that is far more difficult to achieve using high-resolution RGB images. Thermal images can provide similar amounts of information as RGB images while also protecting the identity of participants.

This work aims to test the limits of the minimum specifications required in a thermal sensor to enable it to identify social interactions occurring between two people when combined with standard Computer Vision techniques. The interactions must also be measured with respect to time and the attention paid by each participant. To achieve this, this work proposes a system that detects, tracks and estimates the pose of a person found in a small thermal image. Two classes of detection are defined: head, when a person is close to the sensor, and body, when a person is standing a few metres away. A novel method to measure interactions is proposed: each frame a participant spends facing the other person increases their "attention score", showing which participant was more invested in an interaction.

To evaluate the system, a series of pre-recorded scenarios are played back as if it was live data. These scenarios show the best and worst of a system working at the limits of what its components can handle. Ultimately, it demonstrates that such a system could be deployed successfully. This work aims to be a proof of concept that will enable direct or tangential research in the future.