Computer Vision for Human-Computer Interaction
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Thermal-Visible Face matching for Covert night time Surveillance

Face recognition has been an active area of research for the past two decades due its wide range of applications in law enforcement and verification/authentication systems. The focus of face recognition has primarily been on visible (located in the 0.35µm to 0.74µm wavelength range) imagery. More recently, some efforts have been devoted to face recognition using illumination invariant modalities such as infrared sensors. The infrared spectrum consists of four main regions: near infrared (NIR; 0.74-1µm), shortwave infrared (SWIR; 1-3µm), mid-wave infrared (MWIR; 3-5µm), and long-wave infrared (LWIR; 8-14µm). While NIR and SWIR are also referred to as reflected infrared, MWIR and LWIR are naturally emitted by the human body and commonly referred to as thermal IR. Due to the proximity of the NIR spectrum to the visible spectrum, NIR face images preserve much of the information as in visible face images. However, the natural emission of thermal IR from the human body makes it an ideal modality for nighttime surveillance tasks, but the large disparateness between the thermal IR and visible spectrums results in a wide modality gap that makes thermal-to-visible face recognition a significantly more challenging problem than the visible-to-visible or NIR-to-visible face recognition problems.

This thesis will look into methods to overcome and bridge this modality gap between thermal and visible face images. . The specific direction will be to study and implement the learning framework in an attempt to find the latent space where projections from these two modalities are closer. This could be done, for example, by using a deep neural network to directly learn the similarity function by using different hand crafted face representations.

The research will also include collecting data using specialized thermal sensors with the collaboration of Fraunhofer IOSB, Ettlingen.

For more information and details please contact:

The thesis will be jointly supervised at Fraunhofer IOSB and KIT. Please contact Dr. Saquib Sarfraz (saquib.sarfraz@kit.edu).
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