

Cross-modal and Extended Range Face Recognition



S&T Campaign: Information Sciences
System Intelligence and Intelligent Systems

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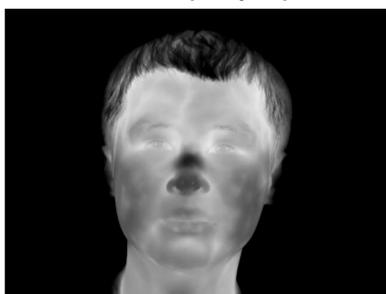
Research Objective

- Investigate and develop novel techniques for cross-modal face recognition at extended ranges

Visible (0.4-0.7 μ m)



MWIR (3-5 μ m)



LWIR (8-14 μ m)

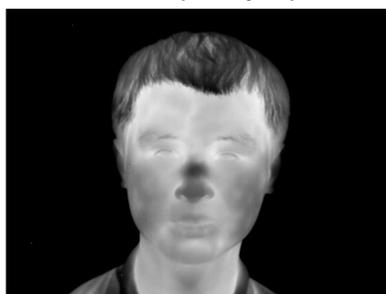


Figure 1. Face images in visible, mid-wave infrared (MWIR), and long-wave infrared (LWIR) spectra.

Challenges

- Visible and thermal facial signatures are very different due to the nature of the phenomenology (reflective in visible, emissive in thermal)
- Limited pixels or resolution at extended ranges result in significantly degraded facial feature details

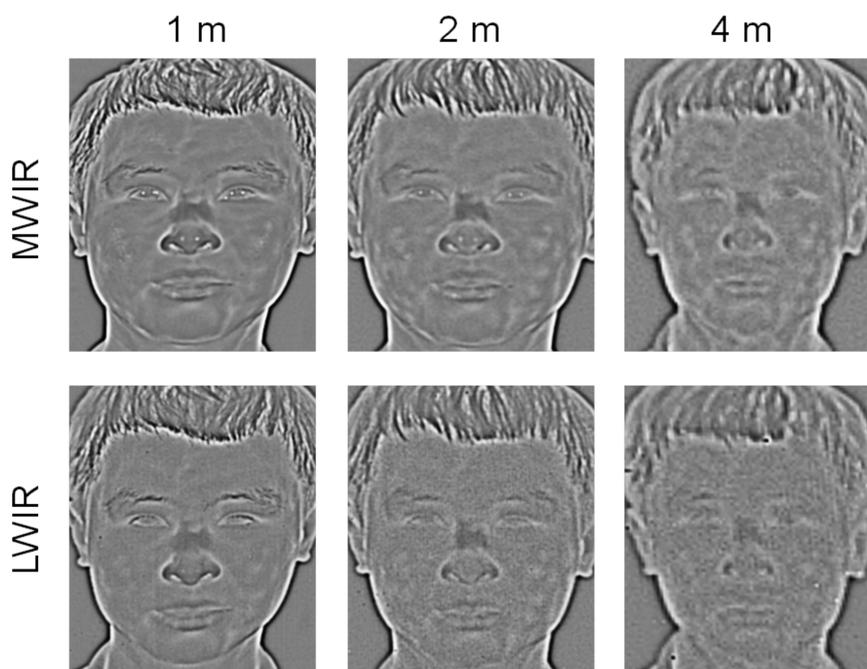


Figure 2. Preprocessed thermal face images acquired at 1, 2, and 4m, showing significant reduction in facial details as the range increases and face resolution decreases.

ARL Facilities and Capabilities Available to Support Collaborative Research

- Multimodal imaging sensors (visible, SWIR, VNIR, MWIR, LWIR, and polarimetric LWIR)
- Expertise in algorithm development (enhancement, feature extraction, classification, etc) and sensor phenomenology for face recognition research

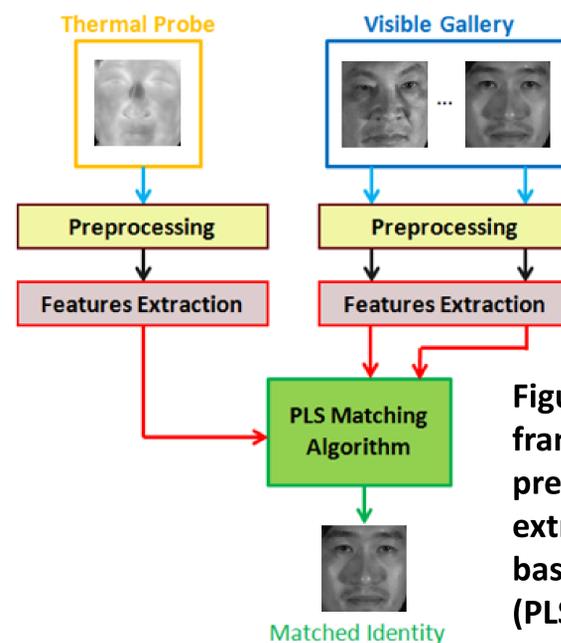


Figure 3. Face recognition framework consisting of preprocessing, feature extraction, and recognition based on partial least squares (PLS) method.

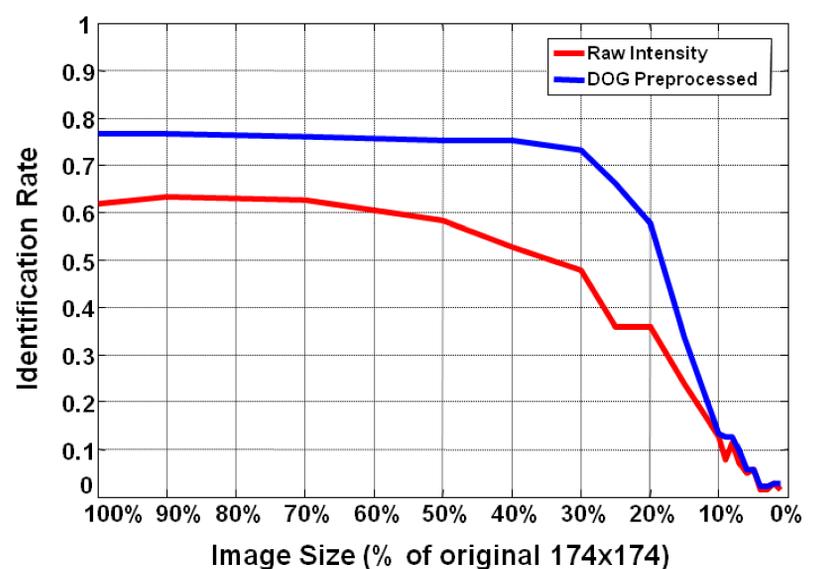


Figure 4. Cross-modal thermal-to-visible face recognition performance in terms of Rank-1 identification rate as a function of face resolution.

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Access to large subject population for extensive data collection in diverse conditions
- Expertise in multimodal biometrics, machine learning techniques, and software development
- Internship and postdoctoral fellowship opportunities