Title: Face Recognition in the Thermal Infrared Spectrum

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Abstract: We present a two-stage face recognition method based on infrared imaging and statistical modeling. In the first stage we reduce the search space by finding highly likely candidates before arriving at a singular conclusion during the second stage. Previous work has shown that Bessel forms model accurately the marginal densities of filtered components and can be used to find likely matches but not a unique solution. We present an enhancement to this approach by applying Bessel modeling on the facial region only rather than the entire image and by pipelining a classification algorithm to produce a unique solution. The detailed steps of our method are as follows: First, the faces are separated from the background using adaptive fuzzy connectedness segmentation. Second, Gabor filtering is used as a spectral analysis tool. Third, the derivative filtered images are modeled using two-parameter Bessel forms. Fourth, high probability subjects are short-listed by applying the L^2-norm on the Bessel models. Finally, the resulting set of highly likely matches is fed to a Bayesian classifier to find the exact match. We show experimentally that segmentation of the facial regions results in better hypothesis pruning and classification performance. We also present comparative experimental results with an eigenface approach to highlight the potential of our method.