

## **Band-Reweighed Gabor Kernel Embedding for Face Image Representation and Recognition**

### **Abstract:**

Face recognition with illumination or pose variation is a challenging problem in **image processing** and pattern recognition. A novel algorithm using band-reweighed Gabor kernel embedding to deal with the problem is proposed in this paper. For a given **image**, it is first transformed by a group of Gabor filters, which output Gabor features using different orientation and scale parameters. Fisher scoring function is used to measure the importance of features in each band, and then, the features with the largest scores are preserved for saving memory requirements. The reduced bands are combined by a vector, which is determined by a weighted kernel discriminant criterion and solved by a constrained quadratic programming method, and then, the weighted sum of these nonlinear bands is defined as the similarity between two **images**. Compared with existing concatenation-based Gabor feature representation and the uniformly weighted similarity calculation approaches, our method provides a new way to use Gabor features for face recognition and presents a reasonable interpretation for highlighting discriminant orientations and scales. The minimum Mahalanobis distance considering the spatial correlations within the data is exploited for feature matching, and the graphical lasso is used therein for directly estimating the sparse inverse covariance matrix. Experiments using benchmark databases show that our new algorithm improves the recognition results and obtains competitive performance.