A fast classification scheme and its application to face recognition

快速分类机制及其在人脸识别中的应用

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- To overcome the high computational complexity in real-time classifier design, a new measure called ‘reconstruction proportion’ is proposed and exploited to reflect the discriminant information.

- A novel space called the ‘reconstruction space’ is constructed according to the reconstruction proportions. This is used to search for an optimal mapping from the conventional sample space to the reconstruction space.

- A new sample after mapping to the new discriminant space would be classified quickly based on the reconstruction proportions in the reconstruction space.

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Best average recognition accuracy on the CMU PIE face database using different feature extraction algorithms							
Method	**Recognition accuracy (%)**						
	PCA	**LPP**	**NPE**	**S-LPP**	**S-NPE**	**MMC**	**SPP**
NN	89.4±0.76	90.2±0.51	89.6±0.17	93.1±0.58	74.8±0.77	94.9±0.29	90.3±0.58
INN	94.0±0.18	93.3±0.13	94.1±0.11	94.2±0.99	94.1±0.20	97.1±0.16	94.3±0.11
KNN	85.1±0.84	89.7±0.25	89.6±0.52	93.2±0.78	69.3±0.44	94.8±0.26	89.8±0.17
IKNN	94.3±0.50	93.5±0.03	94.0±0.40	94.1±1.71	94.0±0.19	96.8±0.12	93.4±0.14
NS	97.2±0.29	94.7±0.12	96.3±0.05	94.9±0.66	97.3±0.17	70.4±2.29	94.8±0.11
INS	97.8±0.14	94.8±0.18	97.1±0.06	95.6±0.36	97.3±0.21	94.1±0.14	94.9±0.13
SRC	97.6±0.27	98.3±0.35	97.4±0.30	97.4±0.23	97.4±0.11	96.2±0.06	96.7±0.31
ISRC	98.1±0.12	98.3±0.44	97.5±0.40	97.5±0.23	97.5±0.14	97.7±0.08	97.2±0.38

NN: nearest neighbor; KNN: *K*-nearest neighbor; NS: nearest subspace; SRC: sparse representation based classification. INN, IKNN, INS, and ISRC are the improved NN, KNN, NS, and SRC, respectively. PCA: principal component analysis; LPP: locality preserving projections; NPE: neighborhood preserving embedding; S-LPP: supervised LPP; S-NPE: supervised NPE; MMC: maximum margin criterion, SPP: sparsity preserving projections

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