Correlation Pattern Recognition for Face Recognition

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Introduction

- This paper discusses the use of correlation techniques for facial recognition(FR)
- Reviews some of the existing correlation filters and their advantages
- Introduces a new method called class-dependence feature analysis (CFA)

Overview of correlation filters

MF	Matched Filter
MACE	Minimum Average Correlation Energy Filter
SDF	Synthetic Discriminant Function Filter
OTF	Optimal Tradeoff Filter

Application of correlation filters in FR

- It uses the illumination subset of the CMU pose, illuminations, and expressions (PIE) face database.
- It shows that MACE filters produce sharp correlation peaks for authentic images and no peaks for impostor images under different illumination conditions.
- It also demonstrates the benefits of shift-invariance and graceful degradation of correlation filters in handling image translations and occlusions.

Difficulty of applying correlation filters

Requires matching face images captured in controlled condition with those captured in uncontrolled indoor and outdoor conditions

Conventional correlation filter methods are too computationally demanding for this experiment and do not take advantage of the generic training set provided by FRGC

Solution

CFA

- Method that uses one filter per class in the generic training set to project any input image into a feature vector
- The similarity between two images is then computed as the similarity between their feature vectors

extends

CFA to KCFA

- Uses nonlinear kernel functions to map the input images into higher dimensional feature spaces

Results

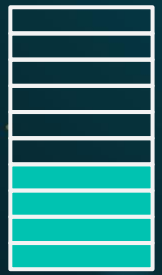
- Numerical results of applying CFA and KCFA to FRGC Experiment 4 data
- Comparison of CFA and KCFA with PCA, LDA, and variants
- Different distance metrics and SVM training

KCFA performance

- Outperforms other methods
- Verification rate: ~87.5% at 0.1% false acceptance rate
- It also compares its results with some publicly available results from other FR methods

KCFA performance

Verification rate



~87.5% at 0.1% false acceptance rate

Conclusion

The paper concludes by highlighting the advantages of using correlation techniques for FR and suggesting some future research directions.

Thank You!