1. Introduction

- Challenges for facial expression recognition
  - High intra-class variations and high inter-class similarities
  - Subtle facial appearance changes
  - Head pose variations
  - Illumination changes
  - Gender, race, and other person-specific attributes
- Developed two novel approaches to learn discriminative features
  - Identity-aware convolutional neural network (IACNN) to deal with identity-related variations
  - Island loss to enhance the discriminative power of the deeply learned features

2. Related Work

- 2D/3D feature extraction
  - Human crafted features: LBP, LQG, LGBP, HOG, SIFT, and their spatiotemporal extensions
  - Features learned from data: sparse coding and deep learning
- Loss function and similarity metric learning for facial expression recognition
  - Contrastive Loss: calculating from training pairs
  - Triplet Loss: calculating from training triplets
  - Center Loss: reducing the intra-class variations
  - Locality-Preserving Loss: reducing the intra-class variations

3. Identity-Aware Convolutional Neural Network

- Motivation:
  - Recognition performance usually degrades on unseen subjects
  - Features extracted may not purely related to facial expression
- Proposed framework:

4. Island Loss Convolutional Neural Network

- Motivation:
  - Reducing the intra-class variations while enlarging the inter-class differences simultaneously

5. Experimental Result

- Experimental Results on four databases, i.e. CK+, CASIA, MMF, and SFWE have demonstrated that IACNN and IL-CNN outperforms the baseline CNN models.
  - Results on the most challenging dataset, i.e. SFWE.

6. Future Plan

- Learning expression-related discriminative features
- Extending island loss to more applications
- Constructing facial expression databases

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