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Learning deep compact similarity metric for kinship verification from face images

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Highlights

- A new DNN is proposed to facilitate fusion of deep embeddings for parent-child data.
- A deep metric learning algorithm is derived to learn a compact kin similarity metric.
- Evaluations show the efficacy of our kinship metric with high verification accuracy.

Abstract

Recent advances in kinship verification have shown that learning an appropriate kinship similarity metric on human faces plays a critical role in this problem. However, most of existing distance metric learning (DML) based solutions rely on linearity assumption of the kinship metric model, and the domain knowledge of large cross-generation discrepancy (*e.g.*, large age span and gender difference between parent and child images) has not been considered in metric learning, leading to degraded performance for genetic similarity measure on human faces. To address these limitations, we propose in this work a new kinship metric learning (KML) method with a coupled deep neural network (DNN) model. KML explicitly models the cross-generation discrepancy inherent on parent-child pairs, and learns a coupled deep similarity metric such that the image pairs with kinship relation are pulled close, while those without kinship relation (but with high appearance similarity) are pushed as far away as possible. Moreover, by imposing the intra-connection diversity and inter-connection consistency over the coupled DNN, we introduce the property of hierarchical compactness into the coupled network to facilitate deep metric learning with limited amount of kinship training data. Empirically, we evaluate our algorithm on several kinship benchmarks against the state-of-the-art DML alternatives, and the results demonstrate the superiority of our method.

Previous Next

Keywords

Face recognition; Kinship verification; Metric learning; Deep neural network; Hierarchical compactness

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