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# Age Invariant Face Recognition and Retrieval by Coupled Auto-encoder Networks

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## Abstract

Recently many promising results have been shown on face recognition related problems. However, age-invariant face recognition and retrieval remains a challenge. Inspired by the observation that age variation is a nonlinear but smooth transform and the ability of auto-encoder network to learn latent representations from inputs, in this paper, we propose a new neural network model called coupled auto-encoder networks (CAN) to handle age-invariant face recognition and retrieval problem. CAN is a couple of two auto-encoders which bridged by two shallow neural networks used to fit complex nonlinear aging and de-aging process. We further propose a nonlinear factor analysis method to nonlinearly decompose one given face image into three components which are identity feature, age feature and noise, where identity feature is age-invariant and can be used for face recognition and retrieval. Experiments on three public available face aging datasets: FGNET, CACD and CACD-VS show the effectiveness of the proposed approach.

*Keywords:* Face recognition, Age invariant, Auto-encoder

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## 1. Introduction

Age-invariant face recognition and retrieval is a challenging problem on face recognition research because one person can exhibit substantially different ap-

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