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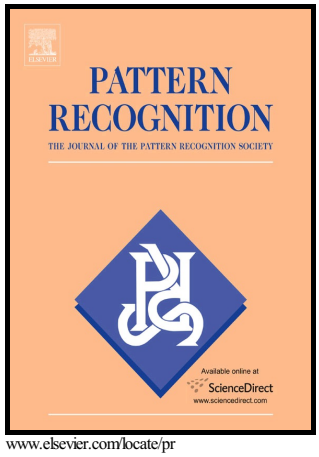

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PII: S0031-3203(16)30162-5
DOI: http://dx.doi.org/10.1016/j.patcog.2016.07.013
Reference: PR5799

To appear in: *Pattern Recognition*

Received date: 31 January 2016
Revised date: 31 May 2016
Accepted date: 7 July 2016

Cite this article as: Alexandre Franco and Luciano Oliveira, Convolutiona covariance features: Conception, integration and performance in person re identification, *Pattern Recognitior* http://dx.doi.org/10.1016/j.patcog.2016.07.013

Convolutional covariance features: Conception, integration and performance in person re-identification

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Abstract

This paper introduces a novel type of features based on covariance descriptors – the convolutional covariance features (CCF). Differently from the traditional and handcrafted way to obtain covariance descriptors, CCF is computed from adaptive and trainable features, which come from a coarse-to-fine transfer learning (CFL) strategy. CFL provides a generic-to-specific knowledge and noise-invariant information for person re-identification. After training the deep features, convolutional and flat features are extracted from, respectively, intermediate and top layers of a hybrid deep network. Intermediate layer features are then wrapped in covariance matrices, composing the so-called CCF, which are integrated to the top layer features, called here flat features. Integration of CCF and flat features demonstrated to improve the proposed person re-identification in comparison with the use of the component features alone. Our person re-identification method achieved the best top 1 performance, when compared with other 18 state-of-the-art methods over VIPeR, i-LIDS, CUHK01 and CUHK03 data sets. The compared methods are based on deep learning, covariance descriptors, or handcrafted features and similarity functions.

Keywords: Person re-identification, covariance features, deep leaning, transfer learning.

1. Introduction

Person re-identification (re-id) is formulated as a pair-similarity problem, consisting in identifying a person across a database of images, given a target image or video