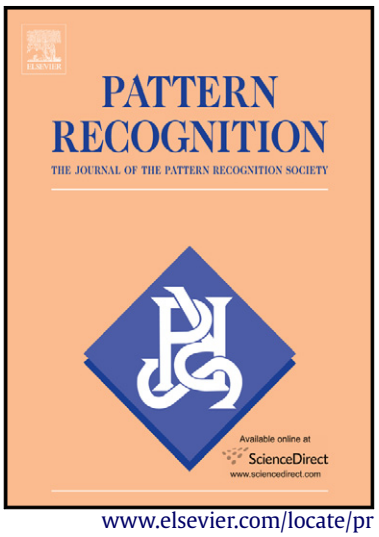

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Si Wu, Robert Laganière, Pierre Payeur

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Improving Pedestrian Detection with Selective Gradient Self-Similarity Feature

Si Wu*, Robert Laganière, Pierre Payeur

VIVA Research Lab
School of Electrical Engineering and Computer Science
University of Ottawa, 800 King Edward, Ottawa, ON K1N 6N5, Canada

Abstract

Gradient features play important roles for the problem of pedestrian detection, especially the Histogram of Oriented Gradients (HOG) feature. To improve detection accuracy in terms of feature extraction, HOG has been combined with multiple kinds of low-level features. However, it is still possible to exploit further discriminative information from the classical HOG feature. Inspired by the symmetrical characteristic of pedestrian appearance, we present a novel feature of Gradient Self-Similarity (GSS) in this work. GSS is computed from HOG, and is applied to capturing the patterns of pairwise similarities of local gradient patches. Furthermore, a supervised feature selection approach is employed to remove the non-informative pairs. As a result, the Selective GSS feature (SGSS) is built on a concise subset of pair comparisons. The experimental results demonstrate that significant improvement is achieved by incorporating HOG with GSS/SGSS. In addition, considering that HOG is a prerequisite for GSS/SGSS, it is intuitional to develop a two-level cascade of classifiers for obtaining improved detection performance. Specifically, the first level is a linear SVM with the multiscale HOG features to efficiently remove easy negatives. At the second stage, the already computed HOG features are reused to produce the corresponding GSS/SGSS features, and then the combined features are used to discriminate true positives from candidate image regions. Although simple,

*Corresponding author
Email address: ez.wusi@gmail.com (Si Wu)