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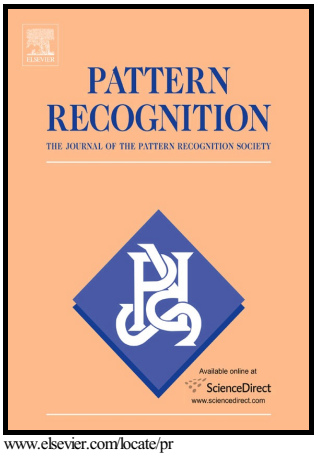

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Selective Weakly Supervised Human Detection under Arbitrary Poses

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Abstract

In this paper we study the problem of weakly supervised human detection under arbitrary poses within the framework of multi-instance learning (MIL). Our contributions are three folds: 1) we first show that in the context of weakly supervised learning, some commonly used bagging tools in MIL such as the Noisy-OR model or the ISR model, tend to suffer from the problem of gradient magnitude reduction when the initial instance-level detector is weak and/or when there exist large number of negative proposals, resulting in extremely inefficient use of training examples. We hence advocate the use of more robust and simple max-pooling rule or average rule under such circumstances; 2) we propose a new selective weakly supervised detection (SWSD) algorithm, which is shown to outperform several previous state-of-the-art weakly supervised methods; 3)finally, we identify several crucial factors that may significantly influence the performance, such as the usefulness of a small amount of supervision information, the need of relatively higher RoP (Ratio of Positive Instances), and so on - these factors are shown to benefit the MIL-based weakly supervised detector but are less studied in the previous literature. We also annotate a new large-scale data set called LSP/MPII-MPHB (Multiple Poses Human Body), on which and another popular benchmark dataset we demonstrate the superiority of the proposed method compared to several previous state-of-the-art methods.

Keywords: Weakly supervised learning, Human detection, Selective weakly supervised

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