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Jia Yan[a], Xi Chen[b,*], Dexiang Deng[a], Qiuping Zhu[a]

[a] *Department of Electrical Engineering, School of Electronic Information, Wuhan University, Wuhan 430072, Hubei, PR China*

[b] *School of International Software, Wuhan University, Wuhan 430072, Hubei, PR China*

[*] Corresponding author. Tel.: +86 27 68778696 E-mail address: robertchenxi2011@gmail.com (X. Chen)

Abstract:
Sparse representation has been attracting much more attention in visual tracking. However most sparse representation based trackers only focus on how to model the target appearance and do not consider the learning of sparse representation when the training samples are imprecise, and hence may drift or fail in the challenging scene. In this paper, we present a novel online tracking algorithm. The tracker integrates the online multiple instance learning into the recent sparse representation scheme. For tracking, the integrated sparse representation combining texture, intensity and local spatial information is proposed to model the target. This representation takes both occlusion and appearance change into account. Then, an efficient online learning approach is proposed to select the most distinguishable features to separate the target from the background samples. In addition, the sparse representation is dynamically updated online with respect to the current context. Both qualitative and quantitative evaluations on challenging benchmark video sequences demonstrate that the proposed tracking algorithm performs favorably against several state-of-the-art methods.

Keywords: Visual tracking, Multiple instance learning, Integrated sparse representation, Tracking by detection，Random projection

1. Introduction

Visual tracking is essential for applications like activity analysis, man-machine interaction and visual surveillance. However, for many real-world problems, the ambiguities inherent to the visual data makes it difficult to develop accurate trackers, such as intrinsic (e.g., pose change and shape deformation) and extrinsic factors (e.g., varying illumination, motion blur and occlusions).

In the literature, a number of tracking algorithms have been proposed, and detailed reviews can be found in [1, 2, 3]. A tracking method typically consists of three components: object appearance model, motion model and search strategy. In this paper, we study the problem of designing a robust online appearance model that considers the effects of occlusion and pose variation. Hence, we only discuss key issues related to appearance models. Appearance modeling is adopted to represent the tracked target using information extracted from the target region. In general, the recently proposed appearance models can be categorized into two classes:

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