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Coupling Deep Correlation Filter and Online Discriminative Learning for Visual Object Tracking

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Abstract

Advances in mathematical models and optimization introduce powerful tools for solving the visual object tracking problem, but this fundamental problem remains unsolved due to various challenges such as illumination variation, deformation and occlusion. Recent progress in correlation based models has provided an effective and efficient tracking solution. This type of trackers exploits the property of convolution theorem to significantly speed up their computational processes. However, their scheme of training correlation filters restricts them to use only a few negative examples to train their model, consequently lowers their performance. Therefore, in this paper, we propose to combine the fast calculation advantage of correlation filter with an online discriminative learning model, which can fully exploit the negative examples in the context around the target. The proposed tracker proceeds in a coarse-to-fine scheme: the proposed tracker will first employ a correlation filter to generate a coarse estimation of the location of the target, and then employ a translating model to refine its estimation and calculate the scale variation of the target via a scaling model. Both the translating model and the scaling model are formulated in the framework of our online discriminative model. Besides, we also propose an effective offline representation learning method to generate robust image feature for our correlation filter. Extensive experiments on the online Object Tracking Benchmark against the state-of-the-art methods validate the effectiveness of the proposed tracker.

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