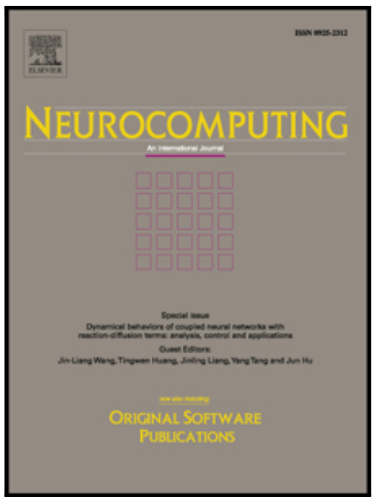

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Abstract

In this paper a particle filter based algorithm for color-guided object tracking is proposed to solve problems such as object drifting and lost in complex environment. Firstly, strong object and weak object are differentiated based on color feature relevance between object and background. Secondly, a self-adaptive object model is constructed by object status with tailored features that include CNN feature produced by defined network structure with fixed kernel functions describing object's general property, HOG feature describing object's specific property and color feature. Then the searching strategy of spatial consistency under the guidance of color feature is applied to approach tracking result. In the end, the bounding box of object is optimized by use of the mapping size of mathematical space. The proposed algorithm reduces background noise and improves tracking accuracy of objects with changing appearance. And the effectiveness of the proposed algorithm is validated by final result of the experiment.

Keywords

Object tracking; Color feature guidance; Particle filter; CNN feature; Spatial consistency search

1. Introduction

Object tracking is a key component and hard issue to be solved in intelligent video surveillance. Although there have been some successful trackers for human bodies [1] and rigid objects [2], tracking bounding box shift and object lost often occurred due to factors such as occlusion, pose variation, illumination change and background noise. The root causes of these issues are mainly attributed to: 1) object features are too much similar to background; 2) the ideal matching feature is hard to obtain due to occlusion; 3) object appearance changed greatly by pose, illumination, etc.

A lot of trackers that focus on object appearance model and motion model have been explored in recent years. Designing object appearance model with robustness is a crucial step for improving the tracking performance [3-5]. In general, there are two major approaches based on appearance model to handle object tracking which are generative-method and discriminative-method [6]. The former method extracts the most similar result from comparing object model with tracking templates and set it as target object. For example, object appearance model can be built by color histogram [1], corrected background-weighted histogram [7], sparse representation [8], etc. But trackers may fail when use such simple object model if object appearance changes. So upgraded tracking algorithms based on appearance model are proposed. e.g., Ross et al. [5] used incremental subspace model that acquired through machine learning to adapt appearance changes of object. Yao et al. [9] added sparse structure to

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