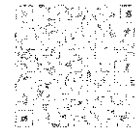


強健性多物件追蹤技術

黃雅軒^{1,*} 林啟賢²

¹中華大學資訊工程學系副教授

²中華大學資訊工程學系碩士生



摘要

本論文提出一套強健性多物件追蹤方法，而此方法主要包含二個重要的演算法：（1）可容忍物件被遮蔽的追蹤物件重建演算法和（2）可區分追蹤物件與其它相似物件的分離演算法。可容忍遮蔽的追蹤物件重建演算法會先以疊代的方式來同時找出整張影像最佳的投影係數和每個像素點的差異值，然後再根據所找出的投影係數和差異值來重建影像。當一個像素點的差異值過大時，則認定此像素點是被遮蔽，如此即可得知在一個區塊影像中有哪些像素點被遮蔽，然後根據被遮蔽部位的面積大小以及未被遮蔽部位影像的重建差異，來計算此區塊影像與追蹤物件區塊影像的相似度。另外，因為與追蹤物件區塊相似的其它物件區塊有可能會造成物件追蹤的錯誤，所以本論文進一步採用可區分追蹤物件与其它相似物件的分離演算法，而此演算法可建構出能用來區分追蹤物件與相似物件的投影子空間，然後在此子空間下，判斷候選區塊影像是否屬於追蹤物件或是屬於其它物件。由於可容忍遮蔽的追蹤物件重建演算法和可區分追蹤物件与其它相似物件的分離演算法的運算量較大，所以本論文在進行這些運算之前，也會先以快速的區塊比對運算，來減少追蹤物件的候選區塊數目，讓所提出的多物件追蹤方法，可達到即時處理的速度要

* 通訊作者：黃雅軒

電子郵件：yeashuan@chu.edu.tw

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求。針對五組公用的物件追蹤資料序列，我們將九種常見的物件追蹤方法和本論文所提的方法進行實驗比較，結果顯示本論文的方法無論是在追蹤正確率或是在追蹤覆蓋率方面都得到了最佳的效果，如此即可知本方法的優異性。

關鍵詞：物件追蹤、可容忍遮蔽的重建技術、將追蹤物件與相似追蹤物件的背景分離之演算法、區塊比對、特徵降維



Robust Multi-Object Tracking Technology

Yea-Shuan Huang^{1,*}, Chi-Shien Lin²

¹Associate Professor, Department of Computer Science and Information Engineering,
Chung Hua University

²Master, Department of Computer Science and Information Engineering, Chung Hua University

Abstract

This paper proposes a robust multi-object tracking method, which consists of two important properties. First, it can resume the object tracking after a tracked object has been occluded by other scenes but reappears again. Second, it has a high ability to distinguish a tracked object from its surrounding regions even they are similar to each other. The two properties are made possible by two individual algorithms: an Occlusion-Tolerable Object Reconstruction algorithm (OTOR) and a Similar Object Separation algorithm (SOS). For a candidate tracking region image, OTOR can iteratively derive both its projection coefficients of the tracking templates collected from the previous tracking results and the individual pixel differences between it and the reconstruction image, and then it can produce a reconstructed image according to the final projection coefficients and pixel differences. Conceptually, if a pixel has a large pixel difference, this pixel is quite possibly to be occluded. This provides a mean to know which pixels are occluded in an image region, and we can compute the difference of the tracked image and a region image by just considering the difference of the un-occluded pixels. Also, because it often results in tracking error when the surrounding region images are similar to the tracked object image, SOS further constructs a projection subspace which has a good ability to separate the tracked object image with its similar surrounding region images. Then, based on this constructed subspace it is much able to make a correct determination whether a candidate tracking region is belonged to the tracked object or not. Due to the high

* Corresponding Author: Yea-Shuan Huang
E-mail: yeashuan@chu.edu.tw

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computation demand for both OTOR and SOS, we decrease the number of the candidate tracking regions by simply using a fast region matching algorithm. From experiments, the proposed multi-object tracking method has been shown to be able to achieve an outstanding tracking accuracy in real time.

Keywords: object tracking, tolerable shelter reconstruction, track objects and background separation algorithm, block matching, feature reduction