

基于颜色与梯度方向联合直方图的Mean Shift跟踪

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Mean Shift tracking algorithm using joint histogram of colors and oriented gradients

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摘要

由于单一的基于方向纹理特征的模板匹配跟踪算法不能准确跟踪目标旋转,无法应对光变、目标旋转以及部分遮挡的复杂场景下的跟踪,本文在mean shift算法框架下提出一种基于颜色与梯度方向联合直方图的跟踪算法,该算法通过扩展直方图的维度将颜色与梯度方向特征融合到一个直方图中构成联合直方图。由光照变化模型计算出光变因子表征光照变化程度,并作为两种特征的比例系数对联合直方图归一化。当光变因子小于某个阈值则选取颜色作为主特征,否则以梯度方向为主特征,以便充分发挥颜色对旋转鲁棒性以及梯度方向对光照变化鲁棒的优势。通过将目标分为若干子区域单独跟踪,由匹配相似程度较大的子区域标记目标的位置解决部分遮挡问题。实验结果表明,提出的算法很好地处理了光照变化、目标旋转以及部分遮挡的复杂场景跟踪。

关键词 : 目标跟踪, Mean Shift跟踪, 联合直方图, 光照变化, 部分遮挡, 目标旋转

Abstract :

The single orientation feature gets ineffective when tracking rotational object. For the sake of fulfilling object tracking in the scenes of illumination variation, rotation and partial occlusion, a joint histogram of colors and oriented gradients based Mean Shift tracking algorithm is presented. The joint histogram fuses the features of colors and oriented gradients by expanding the dimensions of the histogram. In this algorithm, IVF(illumination variation factor) is calculated by the model of illumination, which detects the degree of illumination variation. In the process of tracking, if IVF is below a certain threshold, color feature is taken as the principal feature so that the algorithm is robust to rotation, otherwise choose oriented gradients as principal feature for its robustness to illumination variation. The problem of partial occlusion can be figured out by dividing the object template into sub areas, and the position of object can be determined by the area that obtains largest similarity coefficient. The presented algorithm shows good performance in the experiments when dealing with complex scenes such as target rotation, illumination change and partial occlusion.

Key words : object tracking Mean Shift tracking joint histogram illumination variation partial occlusion object rotation

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