

融合全局-颜色信息的尺度不变特征变换

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SIFT matching with color invariant characteristics and global context

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摘要 由于尺度不变特征变换(SIFT)算法只针对图像的局部特征进行描述且忽略了图像的彩色信息,当待匹配图像中存在大量形状相似区域时,误匹配率很高.本文对SIFT图像匹配法进行了改进,提出了SCARF(Shape-color Alliance Robust Feature)图像匹配算法.为解决SIFT常出现的误匹配现象,构造的SCARF算子利用SIFT检测子提取图像的特征点集,通过建立同心圆坐标系,在SIFT原有框架的基础上融入全局形状信息和颜色不变信息,并采用欧氏距离作为匹配代价函数进行描述子匹配.对包括SCARF算法和SIFT算法在内的5种不同匹配算法通过INRIA数据库进行了实验验证,实验结果表明:SCARF算法在图像模糊、局部特征相似、JPEG压缩和光照变化等复杂变换情况下,匹配准确率优于SIFT等其他算法,降低了误匹配的概率,明显提高了匹配的稳定性 and 鲁棒性.

关键词 : 尺度不变特征变换, 颜色描述子, 全局描述子, SCARF算法

Abstract : As Scale Invariant Feature Transform(SIFT)describes local characteristics of images only and ignores the color information of the images, it has higher match errors when a lot of similar regions in the images are matched. This paper improves the SIFT algorithm and proposes a novel method as an extension of the SIFT, called a Shape-color Alliance Robust Feature (SCARF) descriptor, to resolve the problems mentioned above. The proposed approach SCARF uses the SIFT descriptor to extract the feature point set of the images. Then, by building a concentric-ring model, it integrates a color invariant space and a shape context with the SIFT to construct the SCARF descriptor, and uses the Euclidean distance as cost function to match the descriptor. A comparative evaluation for different descriptors is carried out by the INRIA database, which verifies that the SCARF approach provides better results than other four state-of-the-art related methods in many cases, such as viewpoint change, zoom+ rotation, image blur and illumination change. It concludes that the SCARF reduces the probability of mismatch and improves the stability and robustness of matching process greatly.

Key words : Scale Invariant Feature Transform(SIFT) color invariance global information Shape-color Alliance Robust Feature (SCARF)

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