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信息科学

双CMOS成像系统中运动模糊图像的复原

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摘要： 为获取高空间分辨率的清晰图像,设计了一种双CMOS成像系统。该系统的两片CMOS传感器可同时获取相同场景的图像,其中CMOS传感器获取高帧率、低空间分辨率的图像序列;另一片CMOS传感器获取低帧率、高空间分辨率的运动模糊图像。首先,通过光流高帧率、低空间分辨率CMOS传感器获取图像序列的全局运动路径,在能量守恒和能量与积分时间成正比2个约束条件下估计运动模糊通过贝叶斯准则交替迭代优化运动模糊核。最后,利用TV-L1方法从低帧率、高空间分辨率CMOS传感器获取的模糊图像中快速、有效清晰图像。仿真和实验结果表明:有38%以上的仿真图像复原结果误差率小于2,且受噪声影响小,复原图像的振铃小。另外,能有效去除的空间移不变运动模糊。

关键词： 运动模糊 运动轨迹估计 模糊核 CMOS传感器 图像复原

Restoration of motion blurred image in dual CMOS imaging system

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Abstract: To obtain high spatial resolution images, a imaging system with two CMOSs was designed to acquire same scene images simultaneously.Among them, one CMOS sensor was used to acquire high frame rate, low s resolution image sequences, and the other one to acquire low frame rate, high spatial resolution images.Firstly global motion path was obtained by computing the high frame rate, low resolution image sequences acquired CMOS sensor using optical flow method. Then,under the constraint conditions of energy conservation and the to be proportional to integration interval,the initial motion blur kernel was estimated and motion blur kernel wa optimized by using alternating iterative method based on Bayesian criterion. Finally, a sharp image was restor quickly and effectively from the low frame rate, high spatial resolution blur image acquired by the CMOS sensor TV-L1 algorithm. Simulation and experiment results indicate that more than 38% simulation images show their ratios to be less than 2, and has little affected by noises.Restored images have smaller ringing artifacts,and th invariance motion blurred photographs can be deblurred effectively.

Keywords: motion blur motion path estimation blur kernel CMOS sensor image restoration

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