电子与信息学报 2006 28 (12): 2277-2282 ISSN: 1009-5896 CN: 11-4494/TN

论文

基于运动矢量场和方向自适应的快速运动估计算法

倪 伟[①], 郭宝龙[①], 丁贵广[②], 杨 镪[①]

[①]西安电子科技大学智能控制与图像工程研究所 西安 710071;[②]清华大学自动化系宽带网络媒体实验室 北京 100084

收稿日期 2005-5-16 修回日期 2006-1-16 网络版发布日期 2007-11-12 接受日期

摘要
该文提出了一种基于运动矢量场和方向自适应的快速搜索算法。算法针对序列图像的运动矢量场所具有的中心偏置性和时空相关性进行预判，对静止块设定阈值直接中止搜索；根据运动类型自适应选择搜索起始点和搜索策略；采用了两种新的混合搜索方法，对小运动和大运动宏块使用线性-菱形搜索，对中等运动块使用六边形-菱形搜索算法，搜索模板具有强烈的方向特性。实验结果表明，该文算法的搜索速度和搜索精度优于现有的快速运动估计算法，而搜索精度非常接近于全搜索法。

关键词 运动估计 块匹配算法 视频编码 运动矢量场

分类号 TP391

A Fast Motion Estimation Algorithm Based on Motion Vector Field and Direction Adaptive Techniques

Ni Wei[①], Guo Bao-long[①], Ding Gui-guang[②], Yang Liu[①]

[①]Institute of ICIE, Xidian University, Xi'an 710071, Chinap;[②]Broadband Networks & Digital Media Lab, Tsinghua University, Beijing 100084, China

Abstract
In this paper, a novel fast motion estimation algorithm called the motion vector field and direction adaptive search is proposed. According to center-bias property and spatial-temporal correlation of the motion vector field, the type of local motion activity is first determined. Based on the decision, different strategies are adaptively utilized. Stop criteria is introduced to detect the stationary macroblock, thus terminating current search immediately. Two novel search strategies with strong directional property are adopted, including the Line-Diamond Search for the macroblock with low or high motion activity, and the Hexagon-Diamond Search for the macroblock with middle motion. To achieve high searching speed for those macroblocks with large motion activity, the initial search center is predicted by the motion vector of its neighboring blocks. Experimental results show that the proposed algorithm provides faster speed and higher precision than most existing fast block-matching algorithm, while the distortion is almost the same as the FS.

Key words Motion estimation BMA Video coding Motion vector field

DOI:

通讯作者

作者个人主页 倪 伟[①]; 郭宝龙[①]; 丁贵广[②]; 杨 镪[①]