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REAL-TIME VIDEO STABILIZATION BASED ON VIBRATION COMPENSATION BY USING FEATURE BLOCK

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Abstract. *Based on feature-block (FB) basis, this paper presents a real-time video stabilization method by using motion compensation for repairing unstable frames captured by a vibrating camera. The basic strategy is first to check if the frame is vibrant and then select the feature block to calculate the vibration vector for compensating the vibration area. The feature block, which is selected from nine fixed observation blocks (FOBs), has certain features and hence can avoid interference of any moving-object intrusion. With the vibration vector, the vibration area can be compensated in order to adjust the vibrating frames to be stable. Experimental results show that the proposed algorithm can effectively stabilize the video frames with moderate vibration (smaller than 20 pixels) in real-time. Besides, a comparison with four reported methods demonstrates that the proposed video stabilization method can cope with the problem of moving-object interference and has less computation time. From the comparison, it also manifests the attractiveness of the proposed approach, when compared with other reported methods.*
Keywords: Video stabilization, Frame vibration, Motion compensation, Feature block

1. **Introduction.** Generally, the video frames captured by a vibrating camera always have unstable appearance which will disturb the visual perception. Besides, many applications of video processing [1-4], such as video compression, video analysis, video object segmentation, moving-object tracking and object recognition, are also seriously affected by frame vibration. Therefore, video stabilization becomes more and more important and should be developed to improve the quality of the frame's appearance and also further the following video processing. Many reported researches [5-14] in video stabilization have been proposed to overcome frame vibration for some specific situations.

Basically, video stabilization process mainly involves three parts: feature selection, vibration vector estimation and frame repair. For the vibration vector estimation, it is necessary to decide the major vibration type existed in the vibrating process and then define a model to calculate the vibration vector. In [5], an affine model is adopted for modeling the vibrant frames, but such a model is unsuitable for large variation because it will cause large error for rotational estimation. To cope with the above problem, the detection of horizontal-line in a distant place is introduced due to the fact that the horizontal-line will not be affected by the small translation of the video camera [6,7]. These reports claimed that the horizontal lines would usually appear in common images and can be detected by edge detection. However, it usually works only for the situation that the horizontal-line will exist and be far away from the camera. So, such a method may