

HYBRID APPROACH TO THE SOLUTION OF THE PROBLEM OF WARPING ESTIMATION OF FRAMES IN VIDEO SEQUENCES

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In the report problems of estimation of warping parameters of frames in video sequence, image stabilizing and object tracking are concerned. Affine, projective and quadratic warping are used as a model of warping.

Proposed algorithms were created to provide two main qualities: robust operation in a wide range of shooting conditions and working in a real time on conventional computational systems.

A combination of three main approaches is used to solve this problem: method of the optical flow, method of feature points and direct method using brightness of points. That allows us to use all their advantages and compensate drawbacks.

As a great improving of these algorithms a method of detailed analysis of correlation function of frames is used. That allows avoiding unnecessary computations, control accuracy of estimation and confident region of values of these estimation, what finally result in increasing in accuracy, robustness and speed of calculations.

Proposed algorithms were tested on synthetic sequences. The resulting accuracy of estimation of shift is up to 0.07 pixels, estimation of angle is up to 0.034° with the processing speed up to 715 frames per sec for the frame size of 320x240 pixels.

Efficiency of algorithms was tested on more then hundred real videos of different character and quality. A crash probability was estimated and amounted less then 0.1%.

One should note the proposed algorithms are agile and work with different warping models, able to exclude moving objects, robust with different types of noise etc.