

# SKF-Based Image Template Matching for Distance Measurement by Using Stereo Vision



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**Abstract** In this paper, a novel image template matching approach to tackle distance measurement problem has been proposed. There are many conventional algorithms to increase the accuracy of distance measurement as reported in the literature such as Semi-global algorithm to produce the disparity map. Meanwhile, in this paper, the reverse engineering technique had been implemented to get the correct depth value by applying the image template matching method as reference for the distance measurement. The traditional algorithm to solve image matching problem take a lot of memory and computational time. Therefore, image matching problem can be considered to optimization problem and can be solved precisely. The search of the image template has been performed exhaustively by using Simulated Kalman Filter (SKF) algorithm. The experiment is conducted with a set of images taken by using stereo vision system. Experimental results show the accuracy of the distance measurement by using stereo camera, after applying (1) the estimate error model, (2) SKF and (3) PSO algorithm are 89.95%, 96.09%, 95.29% and 58.51% respectively. The limitation of estimate error model that it can only be applied into the same setup of the experiment, environment, parameters of the camera and acquired images. Instead, the proposed algorithm which is SKF can be applied to original image and image under the vision problems like illumination and partially occluded. The SKF algorithm shows more robust, more efficient and more accurate to solve the distance measurement problem.

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