Abstract

Image-based tracking of objects is becoming an important area of research within computer vision and image processing community. However, there are still challenges with regard to robustness of the algorithms. This paper explains an algorithm to track the pre-defined objects within stereo videos (image sequences) in a condition where cameras are fixed and objects are moving. The tracking technique used in this research, applies the intensity-based least squares matching (LSM) to find the correspondent targets in successive frames. Unlike ordinary correlation-based registration methods, LSM takes both geometric and radiometric variations of images into account, succeeding at sub-pixel scale feature tracking. The proposed algorithm combines three dimensional updated object constraints with adaptive two dimensional LSM to ensure the robustness and convergence to optimum solution. While tracking the features in stereo images, photogrammetric techniques are applied to extract the coordinates of the features in object space which result in detecting the 3D trajectory of the features. The average tracking error is about 0.11 pixel at x-direction and 0.15 pixel at y-direction. The 3D motion vectors are modeled by mean magnitude precision of 0.65 millimeter and orientation precision of 0.27 degree.
2. 5D Feature Tracking and 3D Motion Modeling

using MATLAB. Pearson Education, India

Index Terms

Computer Science

Image Processing

Keywords

Motion modeling  feature  stereo-vision  least squares matching  calibration