Stereo Motion Tracking

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Abstract : Motion Tracking and Stereo Vision are complicated, albeit well-understood problems in computer vision. Existing softwares that combine the two approaches to perform stereo motion tracking typically employ complicated and computationally expensive procedures. The purpose of this study is to create a simple and effective solution capable of combining the two approaches. The study aims to explore a strategy to combine the two techniques of two-dimensional motion tracking using Kalman Filter; and depth detection of object using Stereo Vision. In conventional approaches objects in the scene of interest are observed using a single camera. However for Stereo Motion Tracking; the scene of interest is observed using video feeds from two calibrated cameras. Using two simultaneous measurements from the two cameras a calculation for the depth of the object from the plane containing the cameras is made. The approach attempts to capture the entire three-dimensional spatial information of each object at the scene and represent it through a software estimator object. In discrete intervals, the estimator tracks object motion in the plane parallel to plane containing cameras and updates the perpendicular distance value of the object from the plane containing the cameras as depth. The ability to efficiently track the motion of objects in three-dimensional space using a simplified approach could prove to be an indispensable tool in a variety of surveillance scenarios. The approach may find application from high security surveillance scenes such as premises of bank vaults, prisons or other detention facilities; to low cost applications in supermarkets and car parking lots.

Keywords : kalman filter, stereo vision, motion tracking, matlab, object tracking, camera calibration, computer vision system toolbox

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