USING VIDEO IMAGES TO OBTAIN CAMERA ORIENTATION AND TRANSLATION PARAMETERS

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KEY WORDS: Homography, motion estimation, computer vision, feature matching

ABSTRACT: The objective of this research is using video frames or highly overlapped images to obtain the camera orientation and translation parameters more efficiency. One form of measurements comes from the computer vision community where successive frames from a camera approximately looking at the ground can be used to compute the translation between frames. The developed algorithms consist of five steps for determining the camera orientation and translation: (1) data collection and preprocessing; (2) feature points detection; (3) feature points matching; (4) homography calculation; (5) accuracy validation. The first step is data collection. Usually the video frame rate is about 30 frames per second. However, it is not necessary to use all of them in order to reduce data amount and increase computation efficiency. Different interval thresholds were tested to validate the influences to the final result. Then, FAST corner detector is employed to extract the feature points and match them between the frames. After that, this research uses RANSAC to delete the outliner of the previous step, because the outliner will generate errors when calculating camera orientation and translation. The final step is the accuracy validation. This study compared the results with traditional photogrammetry and on-site measurement. Different frame interval and number of feature points were used to evaluate the results. The determined camera orientation and translation parameters can be used in various applications, such as providing initial conditions to realtime positioning and tracking in indoor or outdoor environments.