A comparison of SIFT, PCA-SIFT and SURF

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MORE INFORMATION
References | Cited By (442) | Abstracting & Indexing

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SIFT, PCA-SIFT, SURF, robust detectors

ABSTRACT
This paper compares three robust feature detection methods, they are, Scale Invariant Feature Transform (SIFT), Principal Component Analysis (PCA)-SIFT and Speeded Up Robust Features (SURF). Lowe presented SIFT [1], which was successfully used in recognition, stitching and many other applications because of its robustness. Yan Ke [2] gave a change of SIFT by using PCA to normalize the gradient patch instead of histogram. H. Bay [3] presented a faster method for SURF, which used Fast-Hessian detector. The performance of the three methods is compared for scale changes, rotation, blur, illumination changes and affine transformations, all of which uses repeatability as an evaluation measurement. Additionally, RANSAC is used to reject the inconsistent matches [4]. SIFT presents its stability in most situation except rotation and illumination changes. SURF is the fastest one with good performance as the same as SIFT, PCA-SIFT shows its advantages in rotation, blur and illumination changes.

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The standard SIFT representation outperforms PCA-SIFT only when extremely high false positives rates can be tolerated. Figure 3: A comparison between SIFT and PCA-SIFT ($n=20$) on some challenging real-world images taken from different viewpoints. (A) is a photo of a cluttered coffee table; (B) is a wall covered in Grafti from the INRIA Grafti dataset. The top ten matches are shown for each algorithm: solid white lines denote correct matches while dotted black lines show incorrect ones. Download Citation on ResearchGate | A comparison of sift, pca-sift and surf | This paper summarizes the three robust feature detection methods: Scale Invariant Feature Transform (SIFT), Principal Component Analysis (PCA) SIFT and Speeded Up Robust Features (SURF). This paper uses KNN (K-NearestNeighbor) and Random Sample Consensus (RANSAC) to the three... A SIFT-Based DEM Extraction Approach Using GEOEYE-1 Satellite Stereo Pairs. Article.