



Parameters selection for Blurred Image Matching



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Introduction



Key points detection on noised images satellites, drones, medical,...



Harris A Combined Corner and Edge Detector (1988) Corner Detection Algorithm with Improved Harris (2015) SURF Speeded Up Robust Features (2008) A Comparison of SIFT and SURF (2013)

FREAK

conditions

FREAK: Fast Retina Keypoint (2012) Advances in Visual Computing (2016)



Key points detection on noised images is a well known problem. A representative sample of existing techniques failed to recognize sufficient valid key points on noised images, too many are «false positive», making point filtering techniques fail.





Blurred Images Matching (BIM)



Blurred Image Matching (BIM) is a key point detection technique developped specifically for noised data.

The objective of the research is to find the ideal pre-processing parameters to get an maximum amount of significant key points.





The algorithm's implementation used by BIM, with feature selection based on convex hull and shape contouring





BIM : points matched



BIM matches significantly less points than other techniques, as shown on the left. However, Points selected are of higher quality, as shown on the right, unlike other methods, most points are kept after processing (66%).





Parameters spectrum



The following images shows the amount of key points found depending on the burring radius (x axis) and threshold value (y axis)

- a) Amount of key points found by combination
- b) Amount of unique key points
- c) Amount of unique and matched key points





Parameters spectrum, noticable features



Figure 7.1. Matched points distribution of an image a) "red", "green" and "blue" color channels b) "blue" channel only.



Figure 7.2. Trenches between color channels pikes. It is noticeable that both sides of the trenches fit together closely.



Figure 7.3. represents the root of a matched point distribution, where no results are found.

It should be noticed that:

7.1. Each colour channel has an ideal points combination set7.2. When the image's colour distribution in unequal, trenches appears7.3. When the gaussian threshold is to low, the technique is unable to perform





Points founds



Statistical repartition of points found depending on Gaussian filter kernel size.

Statistical repetition of points found depending on Threshold value.

Gaussian kernel size μ is 21 Threshold value μ is 112

Those are therefore the recommended values for single parameters pair key points matching.





Conculsion

- · Possible to recommend parameters set
- Depends on the image characteristics
- Ideal windows found
- Contributes to improve the BIM's performances



Efficiency comparison between methods on given noises. In this figure BIM shows a high performance in the treatment of noised images, only second to SURF to match "filtered" and "filtered" images and to Harris to handle "perspective" noise.

 Neural network could be use to adapt the parameters to each pictures



THANK YOU

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