Analysis of Image Registration Using RANSAC Method

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Abstract

Image registration is a prerequisite step prior to image fusion or image mosaic. It is a fundamental image processing technique and is very useful in integrating information from different sensors, finding changes in images taken at different times, inferring three- dimensional information from stereo images, and recognizing model-based objects. RANSAC is applied for removal the wrong matching points.

Keywords: *Image Registration, RANSAC*

I. INTRODUCTION

Image registration is multi spectral. Satellite image is a crucial problem for remote sensing applications, and remains challenging because of the inherent nonlinearity in intensity changes [1].Image registration is the process of overlaying two or more images of the same scene taken at different times, from different viewpoints, and by different sensors. It geometrically aligns two images - the reference and sensed images [2].Image processing which are possibly able to visualize objects inside the human body, are of special interest. Advances in computer science have led to reliable and efficient image processing methods useful in medical diagnosis, treatment planning and medical research. In clinical diagnosis using medical images, integration of useful data obtained from separate images is often desired. The images need to be geometrically aligned for better observation. This procedure of mapping points from one image to corresponding points in another image is called Image Registration. It is a spatial transform. The reference and the referred image could be different because were taken [3].

- At different times
- Using different devices like MRI, CT, PET, SPECT etc (multi modal).
- From different angles in order to have 2D or 3D perspective (multi temporal).

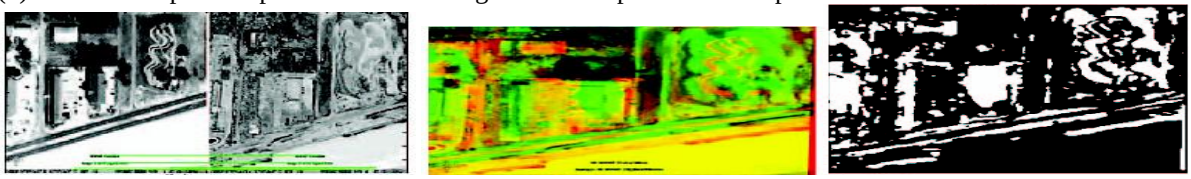
II. IMAGE REGISTRATION ALGORITHM

2.1 RANSAC

RANSAC (RANdom SAmple Consensus) is an iterative method to estimate parameters of a mathematical model from a set of observed data which contains outliers. It is a non-deterministic algorithm in the sense that it produces a reasonable result only with a certain probability, with this probability increasing as more iteration are allowed. The algorithm was first published by Fischler and Bolles in 1981.RANSAC is a re sampling technique that generates candidate solutions by using the minimum number observations (data points) required to estimate the underlying model parameters. As pointed out by Fischler and Bolles unlike conventional sampling techniques that use as much of the data as possible to obtain an initial solution and then proceed to prune outliers, RANSAC uses the smallest set possible and proceeds to enlarge this set with consistent data points [4].

The Algorithm Steps

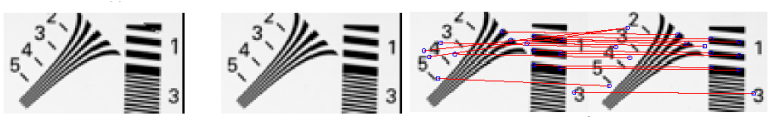
(1) Select the randomly the no of points required to determine the images.
(2) Determine the how many points from the set of all points fit with a images.
(3) Select the optimum parameters according to the final parameters output.



(a) (b) (c)

(d) (e)

Figure 1 - Sample of results (a) Matched points after RANSAC, (b) The two images after registration, (c) The change mask, (d) Changes in first image, (e) Changes in second Image [5].



(a) (b) (c)

Figure 2 – (a) Input Image, (b) Reference Image, (c) RANSAC Point Matching [6].

Simulation Result More than 2 Input Images

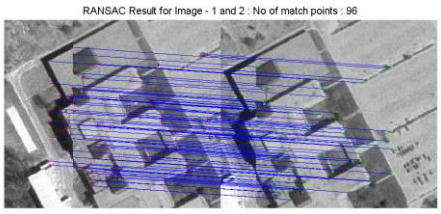


Figure 3 – Input image and reference image with output

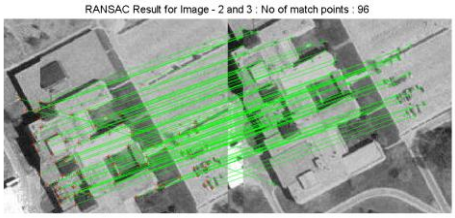


Figure 4–Reference image and reference image with output

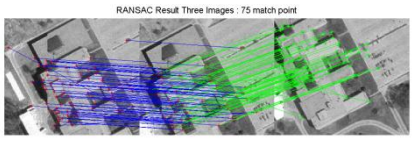


Figure 5– Input image and reference output and reference images with output

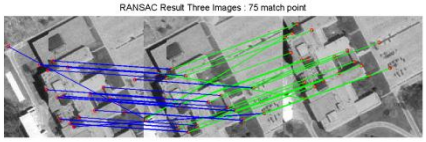


Figure 6 – Input image and reference and reference images with output

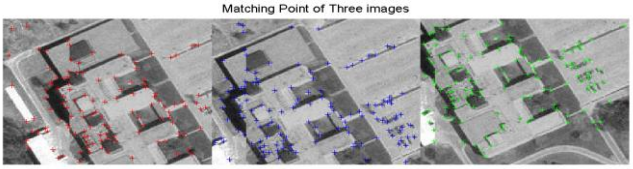


Figure 7 – Input image and reference and reference images with output

Figure 8 – Input image and reference output and reference images with output

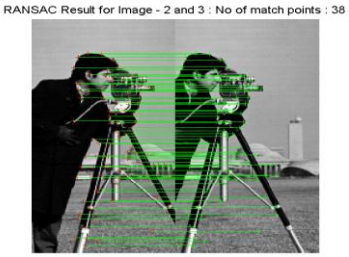


Figure 9 – reference and reference and reference images with output

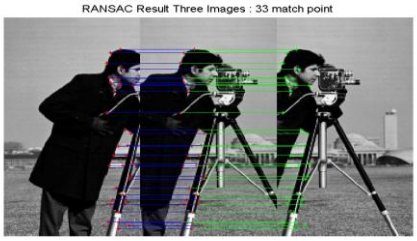


Figure 10– Input image

2.2 RANSAC Methods

RANSAC (RANdom SAmple Concensus)
This method checks the number of elements of the input feature point data set which are consistent with the model just chosen.
RANSAC repeats the two steps within a specified threshold until it finds the maximum number of elements within a model. It then selects this model and rejects mismatches.
In the transform fits a certain number of matches, it is considered a 'good' transform. Any points that do not match are discarded and then the transformation is recalculated using these new points.
In RANSAC when reinserted window it gives much better result with very short process.
RANSAC is much more efficient than the Hough transform when SIFT Features are used.
Nevertheless, for symmetric environments or when there is a lack of features, global localization with the current frame may be uncertain and the robot should rotate or move around.

III. CONCLUSION

These Algorithms recover good registered images for more than two input images using RANSAC methods. This algorithm is applicable when there is matching point between two images. Image registration algorithm using RANSAC method take few minutes to register images. So the delay execution is time is very less comparatively to other methods i.e. one minute This algorithms are applicable to stereo images to find feature points.

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