
Image Processing with MATLAB

Lecture 6: Image Registration

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Lecture Contents:

1. Control Point Selection tool
 2. Fit geometric transformation to control point pairs
 3. Transformation Types
 4. Apply geometric transformation to image
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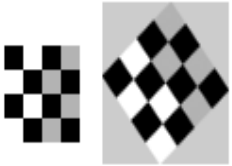
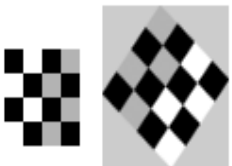

Control Point Selection tool

H = cpselect(moving image, fixed image)





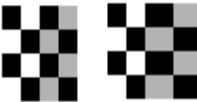
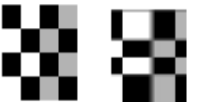
Fit geometric transformation to control point pairs

tform = fitgeotrans(movingPoints, fixedPoints, transformationType)

Transformation Type	Description	Minimum Number of Control Point Pairs	Example
'nonreflective similarity'	Use this transformation when shapes in the moving image are unchanged, but the image is distorted by some combination of translation, rotation, and scaling. Straight lines remain straight, and parallel lines are still parallel.	2	
'similarity'	Same as 'nonreflective similarity' with the addition of optional reflection.	3	
'affine'	Use this transformation when shapes in the moving image exhibit shearing. Straight lines remain straight, and parallel lines remain parallel, but rectangles become parallelograms.	3	

Fit geometric transformation to control point pairs

tform = fitgeotrans(movingPoints, fixedPoints, transformationType)

'projective'	Use this transformation when the scene appears tilted. Straight lines remain straight, but parallel lines converge toward a vanishing point.	4	
'polynomial'	Use this transformation when objects in the image are curved. The higher the order of the polynomial, the better the fit, but the result can contain more curves than the fixed image.	6 (order 2) 10 (order 3) 15 (order 4)	
'piecewise linear'	Use this transformation when parts of the image appear distorted differently.	4	
'lwm'	Use this transformation (local weighted mean), when the distortion varies locally and piecewise linear is not sufficient.	6 (12 recommended)	

Apply geometric transformation to image

$$B = \text{imwarp}(A, \text{tform})$$

transforms the image A according to the geometric transformation defined by tform , which is a geometric transformation object. B is the transformed image.

$B = \text{imwarp}(___, \text{Interp})$ specifies the form of interpolation to use

Interpolation Method	Description
'linear'	Linear interpolation
'nearest'	Nearest-neighbor interpolation—the output pixel is assigned the value of the pixel that the point falls within. No other pixels are considered.
'cubic'	Cubic interpolation

Next Lab Test

Apply image registration procedure to the following image using a Matlab syntax:



Supplementary files:

- <https://www.youtube.com/watch?v=mCYS09wRmPo>

- *MATLAB Tutorial:*

- *Automatic image or video frame registration*

- MATLAB Tutorial:

http://www.mathworks.com/products/matlab/matlab_tutorial.html

- MATLAB documentation:

<http://www.mathworks.com/access/helpdesk/help/techdoc/matlab.shtml>

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