HW#3: Automatic Panoramic Image Stitching

You can check this classical slides: http://slideplayer.com/slide/5056021/

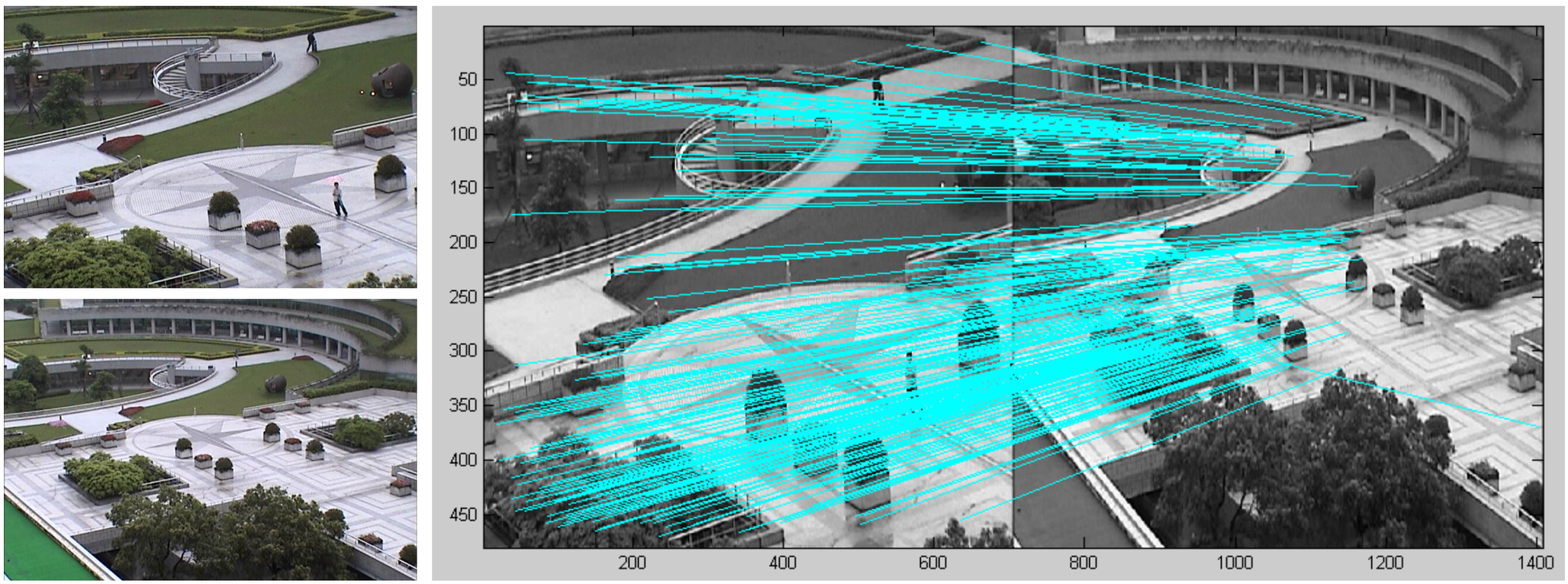
HW#3: Automatic Panoramic Image Stitching

1. Interest points detection & feature description by SIFT
   - OpenCV/Python, VLFeat/Matlab
2. Feature matching by SIFT features
   - ratio distance for good matches (last lecture)

$$\frac{\|f_1 - f_2\|}{\|f_1 - f_2'\|}$$

Note: It is good for you to try different features, e.g. MSER

- You need to show the feature matching results as:



Note: You can have better visualization, more colorful:)

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1. Interest points detection & feature description
2. Feature matching by SIFT features
3. RANSAC to find homography matrix *H*
   - You need a function
     $H = homomat(points\_in\_img1, points\_in\_img2)$
   - Then write the RANSAC algorithm to find the best homography matrix between two images
     - hint: you sample *S* correspondences from the feature matching results, compute the homography matrix based on these sampled correspondences, check the number of inliers/outliers by a threshold, iterate for *N* times, get the best homography matrix with smallest number of outliers

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1. Interest points detection & feature description
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3. RANSAC to find homography matrix *H*
4. Warp image to create panoramic image
   - You need to first write a function which warps one image onto the other using homography and provide examples *warp(img1, img2, H)*

here you can manually annotated correspondences across images in order to compute homography

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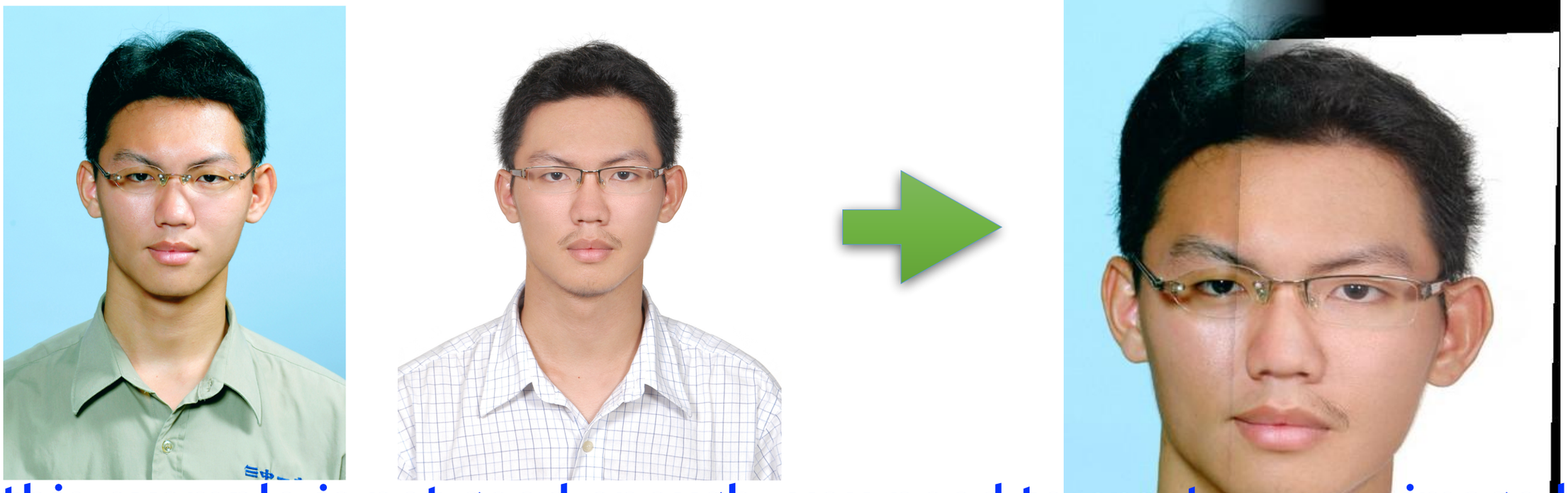

here this example is not good enough, you need to create a new image big enough to hold the composited image into it

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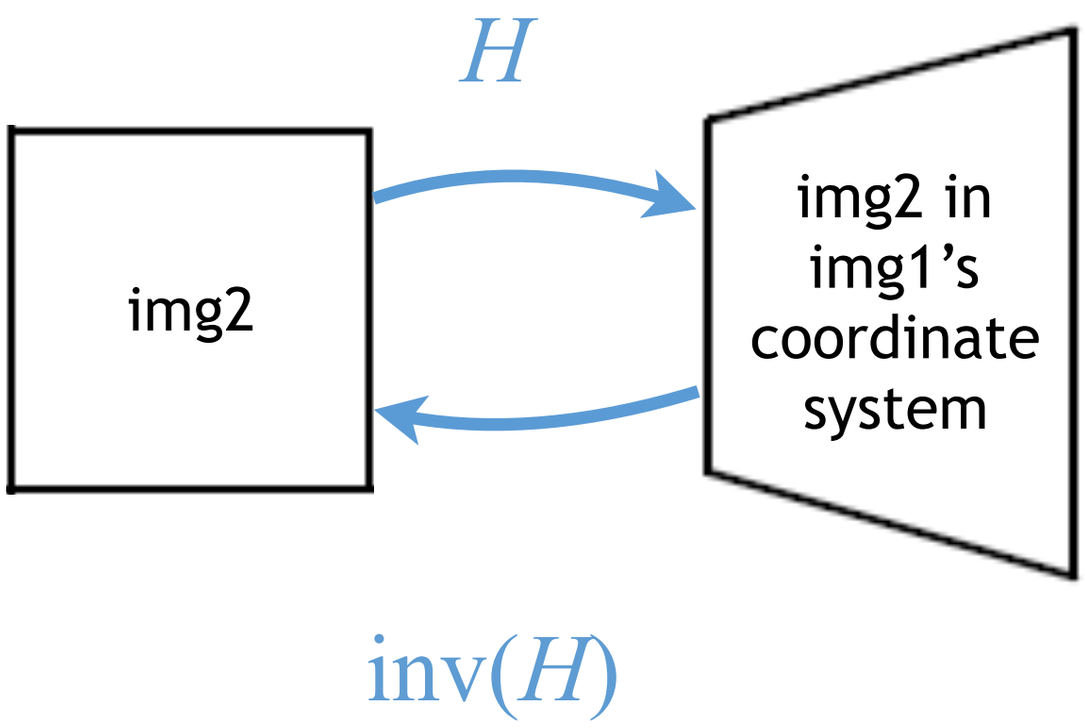
4. Warp image to create panoramic image
   - *warp(img1, img2, H)*
     - hint:



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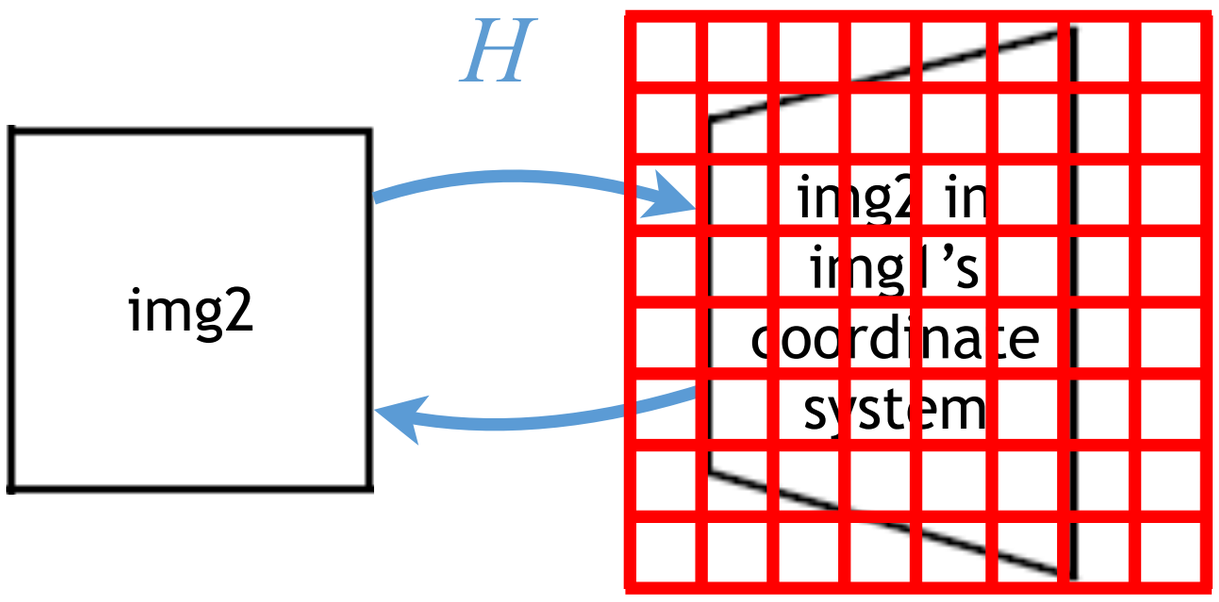
   - *warp(img1, img2, H)*
     - hint:



to see where to get pixel values from original img2
there could be non-integer coordinates,
you can use interpolation or just nearest neighbor

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   - Linear blending
   - Multi-band blending

refer to http://slideplayer.com/slide/5056021/ to see how to blend the overlapping area, what we learn in 05-frequncy: pyramid blending

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try to take your own photos and stitch more and more!
you can also try other things (bundle adjustment, straightening)
to impress your reviewers!