

Pset 6

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09 November 2017

1 Photomerge

1.1 Sift Algorithm

After compiling the sift algorithm, and running it on the pictures provided, we get the following correspondence between points in the two images shown in figure 1. In figure 2, we can see the detected features.

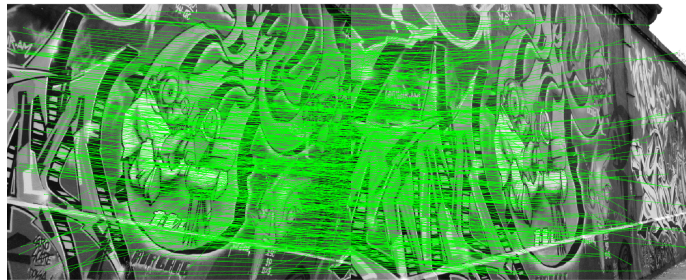


Figure 1: SIFT demo matching correspondences

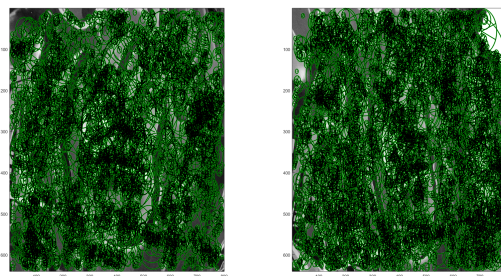


Figure 2: SIFT demo Detected features

1.2 RANSAC Transformation

For the RANSAC Transformation Algorithm we used the homography calculations used for the last pset and applied that to each set of 4 random samples chosen. The parameters that worked best for the final result, are a threshold of $\epsilon = 50$ and a number of iterations $n = 10000$.

The code used is attached.

```
function [ T ] = TransformRANSAC(x1, x2)
fprintf('RANSAC STARTED...');

M = size(x1,1);
numIter=1000;
max_inliers=0;
thresh = 10;

for n=1:numIter
    if (mod(n,1000)==0)
        disp(n);
    end

    sampleIndeces = randsample(M, 4, false)';
    p=x1(sampleIndeces,:);
    pp=x2(sampleIndeces,:);

    A=zeros(8,9);
    for i=1:4
        A(2*i-1,:)= [p(i,:),1,0,0,0,-pp(i,1)*p(i,1), -pp(i,1)*p(i,2), -pp(i,1)];
        A(2*i,:)= [0,0,0,p(i,:),1,-pp(i,2)*p(i,1), -pp(i,2)*p(i,2), -pp(i,2)];
    end

    [eigs,scrap]=eig(A.'*A);
    h_v=eigs(:,1);
    H=reshape(h_v,[3,3]);
    H=H/H(3,3);
    % display(H);
    inliers=0;
    for j=1:M
        p_in=[x2(j,1); x2(j,2); 1];
        p_out = H*p_in;
        d=norm([p_out(1) p_out(2)] - x1(j,:));
        if (d<thresh)
            inliers=inliers+1;
        end
    end

    if (inliers>max_inliers)
```

```

        max_inliers=inliers
        bestHomo = H;
        best_p = p;
        best_pp = pp;
    end

end

T = bestHomo;
disp(" T assigned");

end

```

1.3 MakePanorama

In order to stitch the pictures together, we need to first transform the pictures according to the homography we have.

To do that, I implemented the matlab `maketform` function and the `imtransform` function, according to the snippet below, and in a similar fashion to the previous pset.

```

T=maketform('projective',H);
[im2t,xdataim2t,ydataim2t]=imtransform(im2,T,'XYScale',1);

```

1.4 Photomerge

In order to produce the panorama picture, we need a function that stitches the two pictures together. By applying the Photomerge function, we get the following picture for the best values of RANSAC.

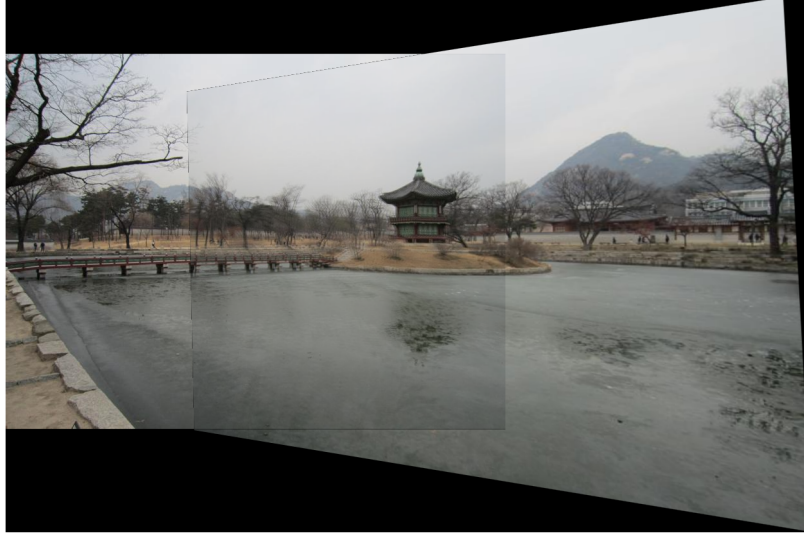


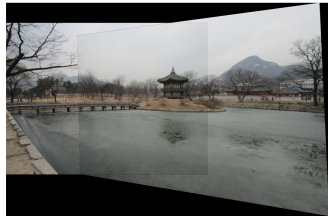
Figure 3: $\epsilon = 50, n = 10000$



(a) $\epsilon = 10, n = 100$



(b) $\epsilon = 100, n = 1000$



(c) $\epsilon = 5, n = 100000$



(d) $\epsilon = 100, n = 10000$

Figure 4: Other RANSAC Parameters