Write Up- HW 3

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Line by line explanation of the code is written as comments in the matlab files!

Here is my warm up part code and result:

```
img=double(imread('./data/toys.jpg'));
th=[1 0 0;0 2 0;0 0 1];
[row, col,k]=size(img);
newimg=zeros(row,col/2,1);

for t=1:3
    for i=1:row
      for j=1:col/2
        v=[i,j,1];
        newcoords=th*(v.');

newimg(i,j,t)=img(newcoords(1,:),newcoords(2,:),t);
       end
    end
end
figure(1);

newimg=uint8(newimg);
imshow(newimg);


% part2
th2=[2 0 0;0 1 0;0 0 1];
newimg2=zeros(row/2,col,1);
for t=1:3
    for i=1:row/2
```

```
        for j=1:col
          v2=[i,j,1];
          newcoords2=th2*(v2.');

newimg2(i,j,t)=img(newcoords2(1,:),newcoords2(2,:),
t);
         end
     end
end
figure(2);
newimg2=uint8(newimg2);
imshow(newimg2);
```

result:

Part 1

Here is my algorithm for RANSAC

Inputs :
points – the input group of points
iter – number of iterations for sampling
thr – the threshold used to identify a points fits well
mininlier – number of required inlier points to be a line

until iter iterations have occurred

make a line equation by a sample of 2 random points from data uniformly

from each point in the data set

test the distance from the point to the line

if the distance is smaller than threshold then the corresponding point is a inlier so its

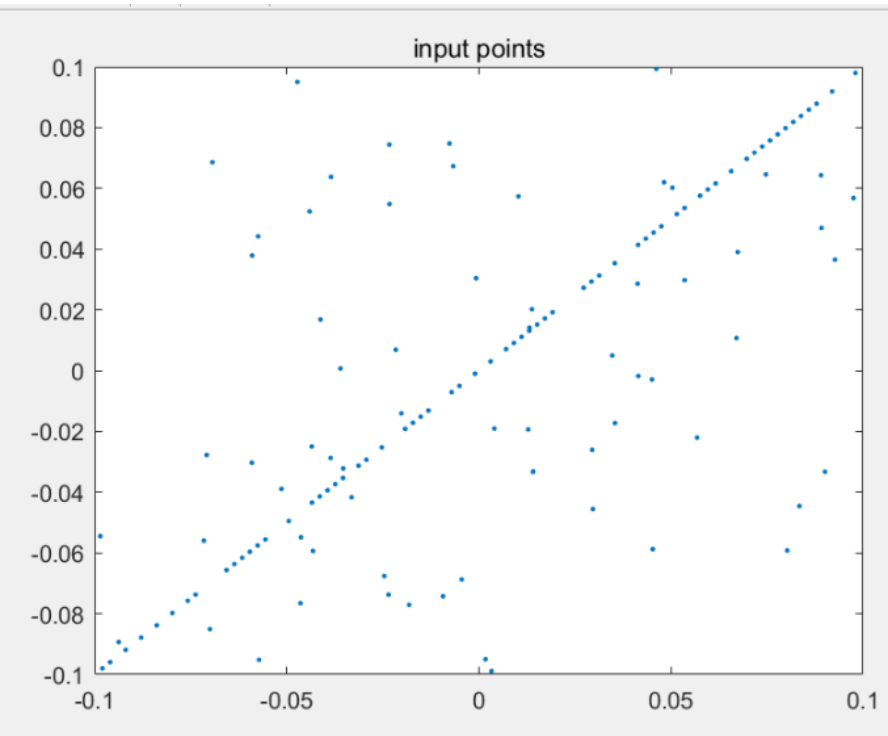
inlier = 1

otherwise it is outlier = 0

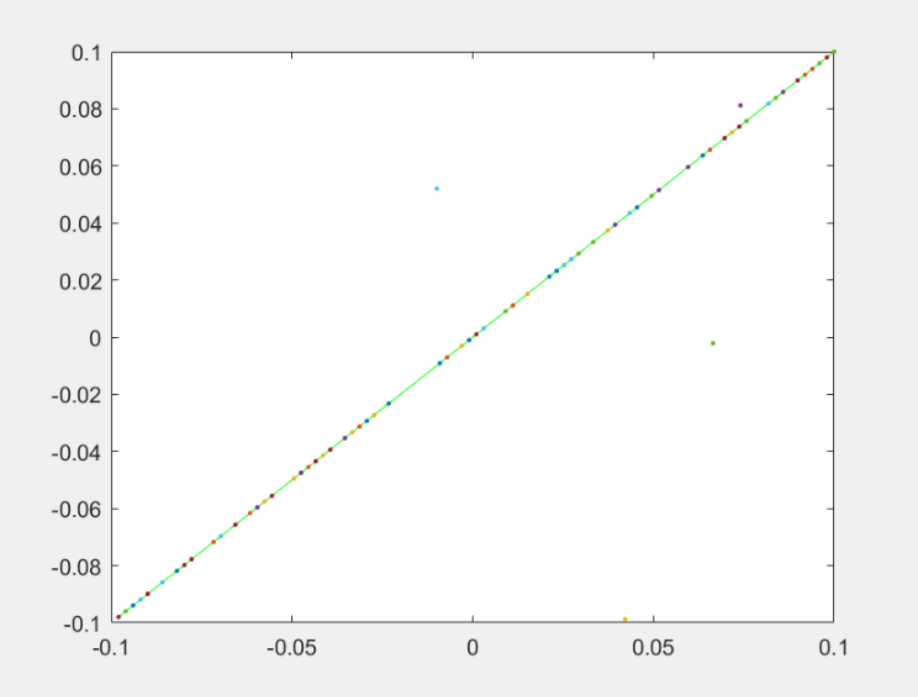
if more than mininlier points are inlier so it is a good fit so we change the value of minlier to

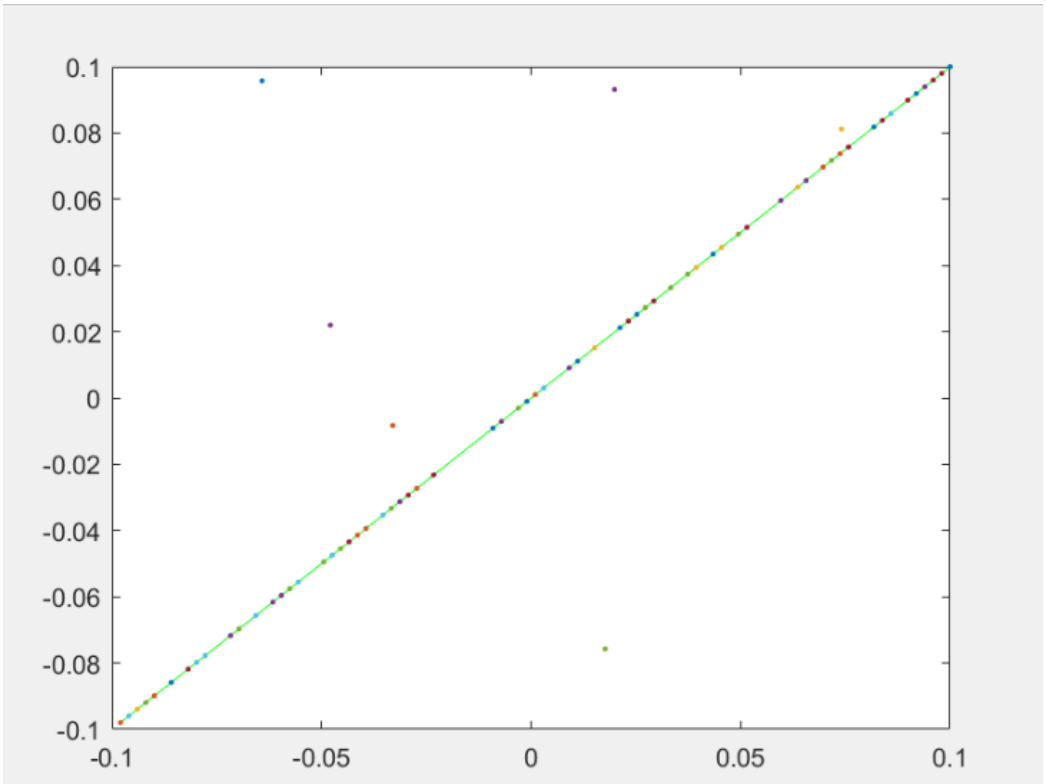
the number of inlier points of present line to find best fit every time we found a better fit

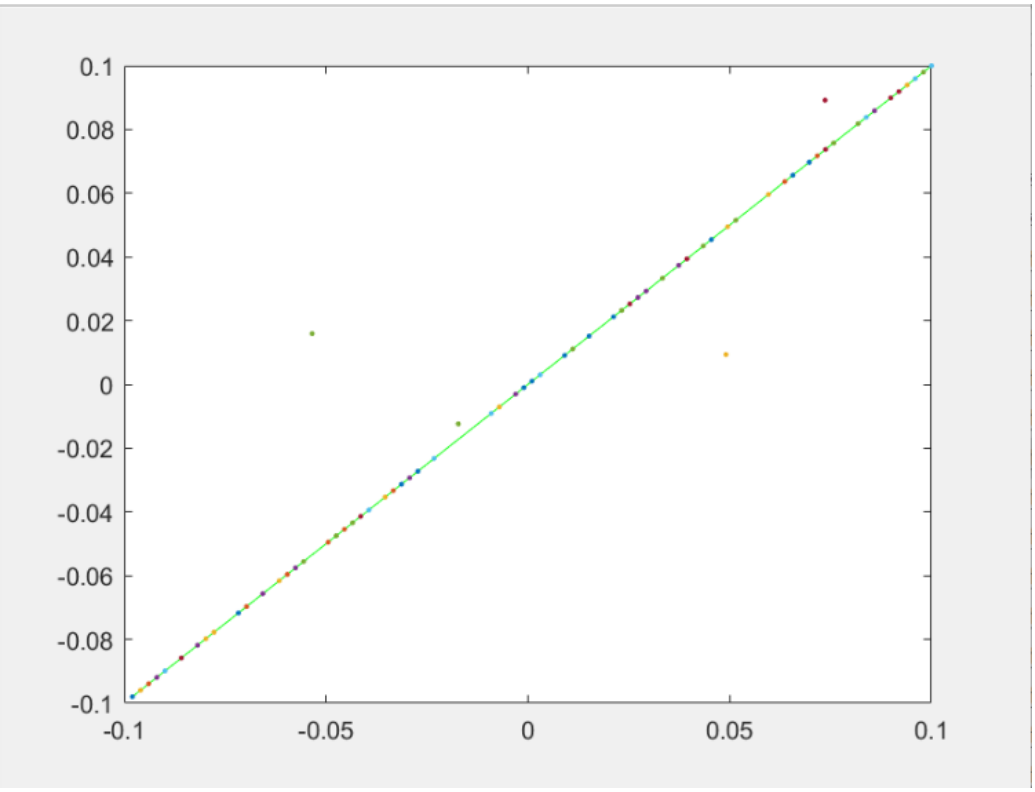
we update mininlier

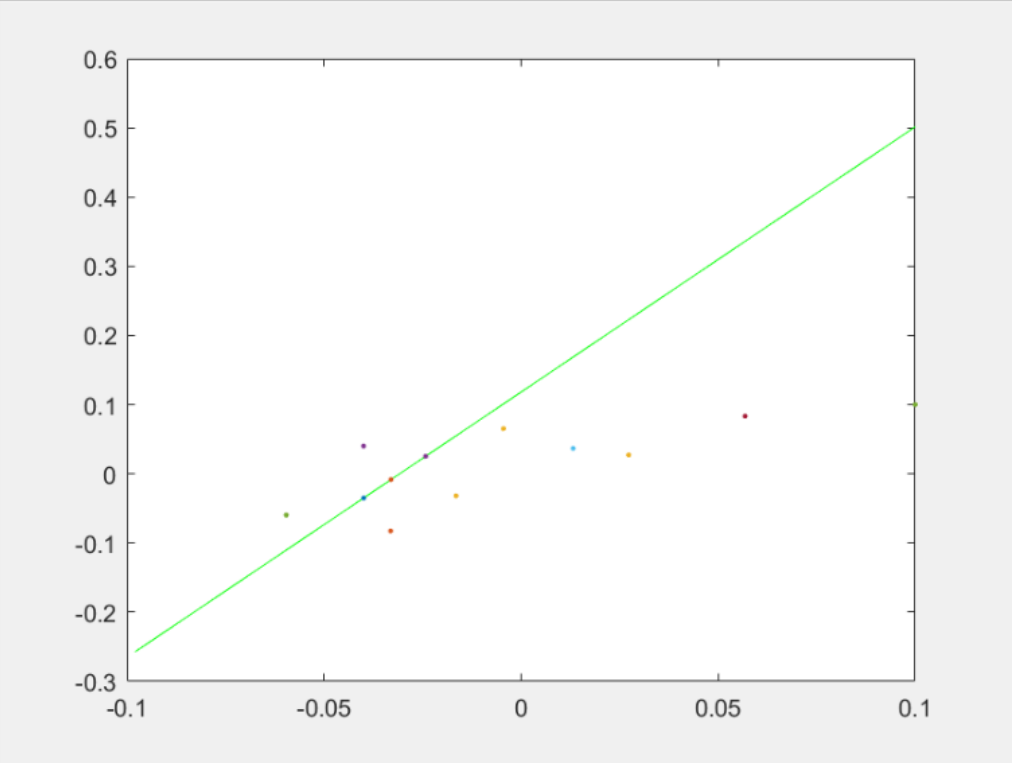


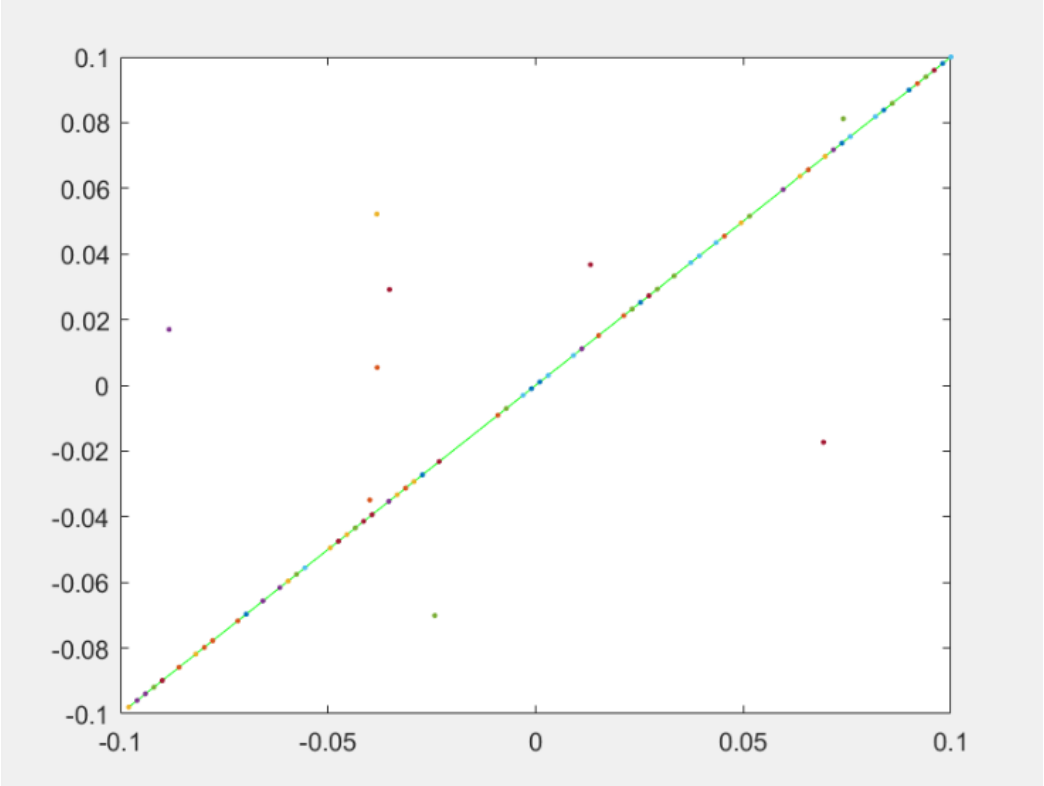
here are the outputs:

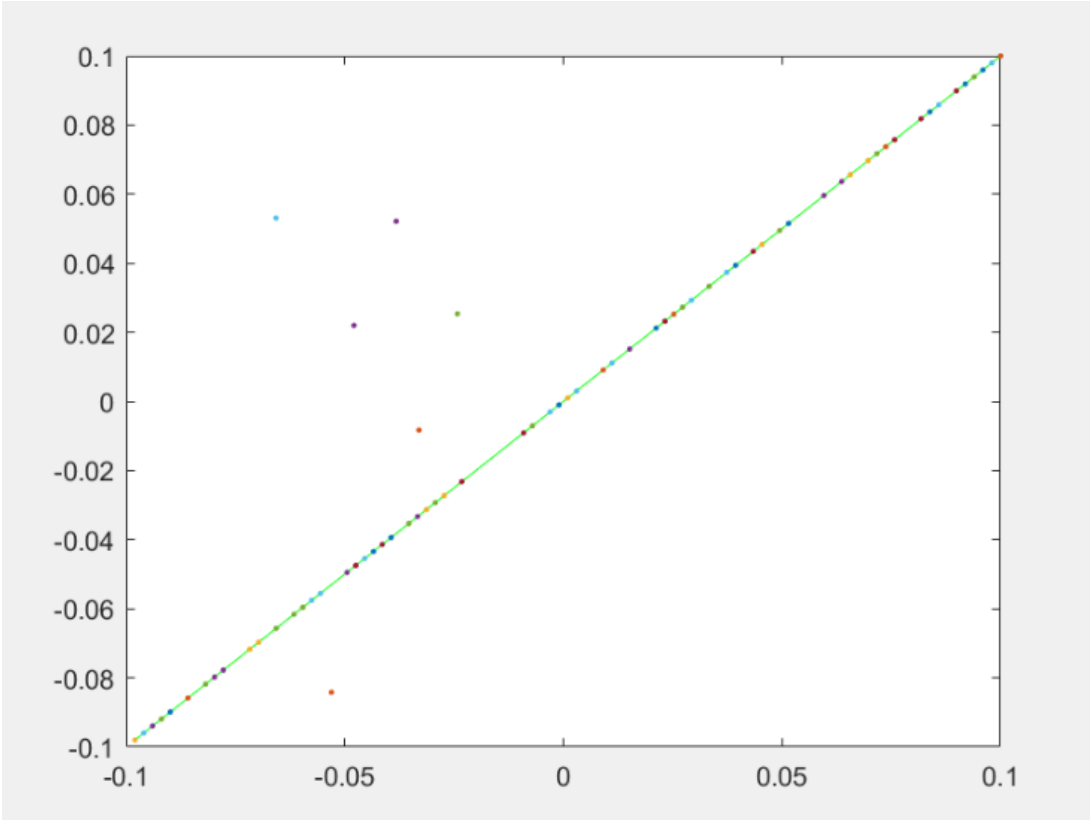

0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.1
-0.05
0
0.05
0.1


0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.1
-0.05
0
0.05
0.1


0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.1
-0.05
0
0.05
0.1


0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.1
-0.05
0
0.05
0.1


0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.1
-0.05
0
0.05
0.1


0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
-0.1
-0.05
0
0.05
0.1

All of the iterations shows the x=y line and there are some noises that are detected as inline that I think it is related to distance function.

Part 2

Here is the algorithm for compute H:

Detect key points :

Randomly choose 4 pair points

Calculate the error cost

Choose the minimum cost among k number of sampling

Calculate C as CH=0

Then by using svd obtain H

[U,S,V] = svd(A) performs a singular value decomposition of matrix A, such that A = U*S*V'.

$$\begin{bmatrix} x_1 & y_1 & 1 & 0 & 0 & 0 & -x'_1x_1 & -x'_1y_1 & -x'_1 \\ 0 & 0 & 0 & x_1 & y_1 & 1 & -y'_1x_1 & -y'_1y_1 & -y'_1 \\ & & & & & \vdots & & & \\ x_n & y_n & 1 & 0 & 0 & 0 & -x'_nx_n & -x'_ny_n & -x'_n \\ 0 & 0 & 0 & x_n & y_n & 1 & -y'_nx_n & -y'_ny_n & -y'_n \end{bmatrix} \begin{bmatrix} h_{00} \\ h_{01} \\ h_{02} \\ h_{10} \\ h_{11} \\ h_{12} \\ h_{20} \\ h_{21} \\ h_{22} \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \\ 0 \end{bmatrix}$$

C is left matrix

```
[U,S,V]= svd(C);
     h=V(:,end);
     H= [h(1) h(2) h(3);h(4) h(5) h(6); h(7) h(8) h(9)];
```

Second pat:

computeHnorm

First normalize coordinates for each image

translate for zero mean and scale so that average distance to origin is sqrt(2) : could not

apply how to apply it to matlab

normX=TX $\text{norm}X' = TX'$

* this makes problem better behaved numerically

Second compute Hnorm using DLT in normalized coordinates (here I used already implemented compute)

Part 3

In the first part is wrap up the Iin with H so do as below:

```
for t=1:k
  for i=1:n/H(1,1)
    for j=1:m/H(2,2)
        vec=[i,j,1];
        newcoords=H*(vec.');

Iwarp(i,j,t)=Iin(newcoords(1,:),newcoords(2,:),t);
    end
  end
end
```

Here is the algorithm to calculate the mosaic image ;

Compute transformation between refremcend input image (in this part used already impleamented function)

Transform the second image to overlap with the first

Blend the two together to create a mosaic

Could not find out the way to merge the images and belending.