CSC420 Assignment 3

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1

From wikipedia: Size of the 5 dollar canadian bill is height: 69.85 mm and width: 152.4 mm

We round to 700 x 1524 pixels, 1 per 1/10 of a mm.

From the output of q1, we can see that the bill is roughly 45% of the shoe in length. We can also so that it is roughly 80% of the shoe in width. Measuring the pixels, we can see that the estimated shoe size is roughly
26cm in length 10.5cm in width

Editor - C:\Users\alex0219\Desktop\CSCf17\eCSC420f17\Assignments\Assignment3\q1a.m

q1a.m

```
1 -    img = imread('shoe.jpg');
2
3 -    x = [775; 1067; 1367; 1159];
4 -    y = [985; 509; 587; 1147];
5
6 -    x2 = [1; 1524; 1524; 1];
7 -    y2 = [1; 1; 698.5; 698.5];
8
9 -    t_out = maketform('projective', [x,y], [x2,y2]);
10 -   [projected_out] = imtransform(img, t_out, 'bicubic', 'XYScale', 1);
11
12 -   imshow(projected_out)
```

Figure 1: Projection matlab code for q1

Figure 2: Output

2

(a + b)

affineX.m | RANSAC.m

```
function [ransac_pts, ransac_affine] = affineX(i1, i2, ~)


%run('/h/u9/g6/00/changkao/Downloads/vlfeat-0.9.20/toolbox/vl_setup')

%img1 = imread('/h/u9/g6/00/changkao/csc420/assignments/Assignment2/book.jpg');
%img2 = imread('/h/u9/g6/00/changkao/csc420/assignments/Assignment2/findBook.JPG');
threshold = 0.5;

img1 = single(rgb2gray(i1));
img2 = single(rgb2gray(i2));


[f,d] = vl_sift(img1) ;

[f2, d2] = vl_sift(img2) ;


e_dist= pdist2(double(d)', double(d2)', 'euclidean');
ascending_l = sort(e_dist, 2);
r=ascending_l(:,1)./ascending_l(:,2);

t_index = find(threshold>r);
num_matches = zeros(size(t_index,1), 3);


for i = 1:size(e_dist, 1)

    if threshold > r(i)

        num_matches(i,1) = r(i);
        num_matches(i,2)= i;
        t_matches = (e_dist(i,:)==ascending_l(i,1));
        num_matches(i,3)=find(t_matches);
    end
end

tesmp = any(num_matches, 2);
num_matches( ~tesmp, : ) = [];
mscores = zeros(size(num_matches,1), 1);
x_coordinates = zeros(size(num_matches,1),2);
y_coordinates = zeros(size(num_matches,1),2);

for i = 1:size(num_matches,1)

    mscores(i) = num_matches(i,1);
    x_coordinates(i,1:2) = [f(1,num_matches(i,2)) f2(1,num_matches(i,3))];
    y_coordinates(i,1:2) = [f(2,num_matches(i,2)) f2(2,num_matches(i,3))];

end
```

Figure 3: main function - RANSAC code matlab part 1

```
43
44 - for i = 1:size(num_matches,1)
45
46 -     mscores(i) = num_matches(i,1);
47 -     x_coordinates(i,1:2) = [f(1,num_matches(i,2)) f2(1,num_matches(i,3))];
48 -     y_coordinates(i,1:2) = [f(2,num_matches(i,2)) f2(2,num_matches(i,3))];
49
50 - end
51
52 -     k = size(mscores,1)
53
54      %helper to get k top matches and their coordinates
55 -     top = topmatches(mscores, x_coordinates, y_coordinates, k);
56 -     trials = 100;
57 -     num_perm = 3;
58 -     threshold2 = 2.21;
59
60      %RANSAC ( matches, num of trials, num or pairs )
61 -     [ransac_index, ransac_affine] = RANSAC(top, trials, num_perm, threshold2);
62 -     ransac_pts = top(ransac_index,:);
63
64 - end
```

Figure 4: main function - RANSAC code matlab part 2

Q2bShredded.m | affine.m | RANSAC.m*

```
function [indexs, max_affine] = RANSAC(top_pts, trials, num_perm, threshold)

    indexs = [];
    max_matches = 0;


    P = [];
    Pa = [];
    for i = 1:size(top_pts, 1);

        x1 = top_pts(i,2);
        y1 = top_pts(i,4);


        x2 = top_pts(i,3);
        y2 = top_pts(i,5);

        P(size(P,1)+1,:) = [x1 y1 0 0 1 0];
        P(size(P,1)+1,:) = [0 0 x1 y1 0 1];

        Pa(size(Pa,1)+1,:) = x2;
        Pa(size(Pa,1)+1,:) = y2;
    end


    while trials > 0

        random_choices = randperm(size(top_pts,1), num_perm);
        random_pts = top_pts(random_choices,:);

        trials = trials-1;
        Rp = [];
        Rpa = [];

        for i = 1:3

            % random points from img 1
            x1 = random_pts(i,2);
            y1 = random_pts(i,4);

            % random points from img 2
            x2 = random_pts(i,3);
            y2 = random_pts(i,5);

            Rp(size(Rp,1)+1,:) = [x1 y1 0 0 1 0];
            Rp(size(Rp,1)+1,:) = [0 0 x1 y1 0 1];

            Rpa(size(Rpa,1)+1,:) = x2;
            Rpa(size(Rpa,1)+1,:) = y2;
```

Figure 5: RANSAC code matlab part 1

```
        end


        %affine = P'*inv(P*P')*Pa;
        random_affine = inv(Rp'*Rp)*Rp'*Rpa;

        transform = P*random_affine;

        T_x = transform(1:2:length(transform));
        T_y = transform(2:2:length(transform));
        Pa_x = Pa(1:2:length(Pa));
        Pa_y = Pa(2:2:length(Pa));

        diff_x = abs(Pa_x - T_x);
        diff_y = abs(Pa_y - T_y);
        diff_total = abs(diff_x+diff_y);
        closest = find(diff_total < threshold);

        if max_matches < size(closest, 1);
            max_matches = size(closest,1);
            max_affine = random_affine;
            indexs = closest;
        end
    end
end
```

Figure 6: RANSAC code matlab part 2

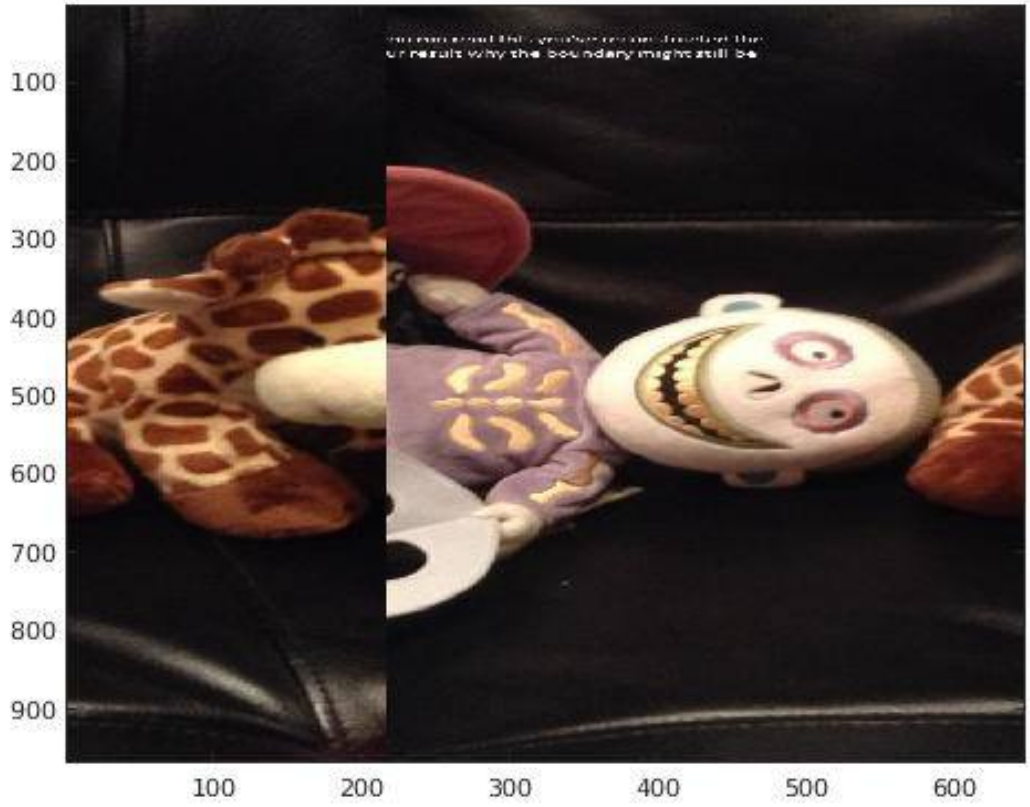

Figure 7: Output - 100 trials, 0.68 threshold