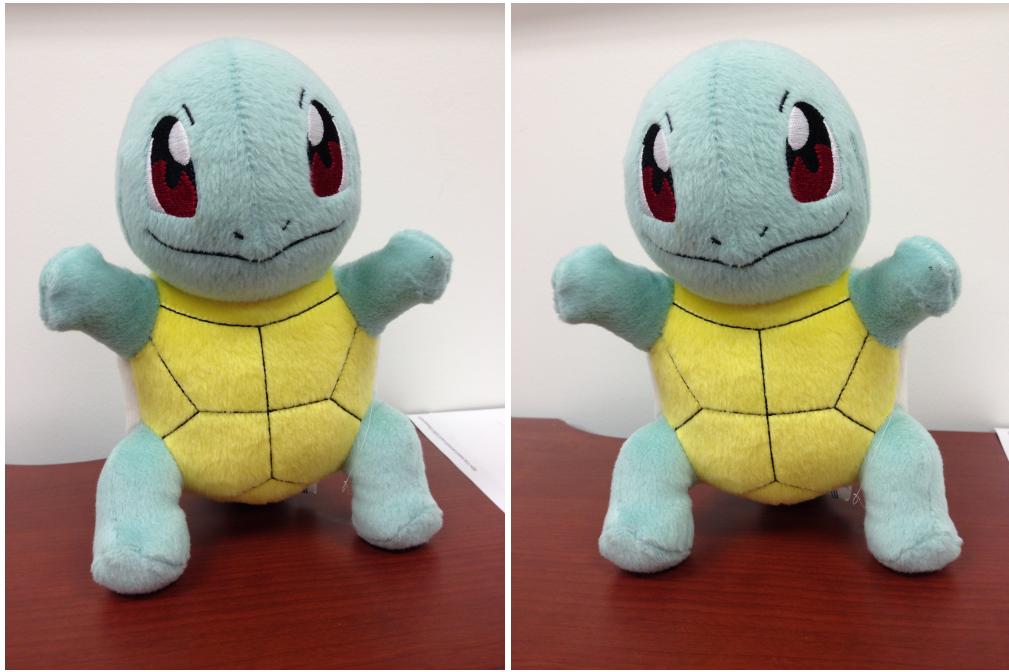


CS 217 Homework 2

Zachary DeStefano, 15247592

Due Date: May 12, 2015



(a) Left Image

(b) Right Image

Figure 1: Original Pictures of Stuffed Squirtle

Problem 1

The following are examples of running the SIFT matching code on my own objects

Squirtle Example

Figure 1sq1 shows the original pictures that I took of a stuffed Pokemon named Squirtle. Figure 2sq2 show 50 random points found by running SIFT. Figure 3sq3 shows some of the matches found using SIFT.

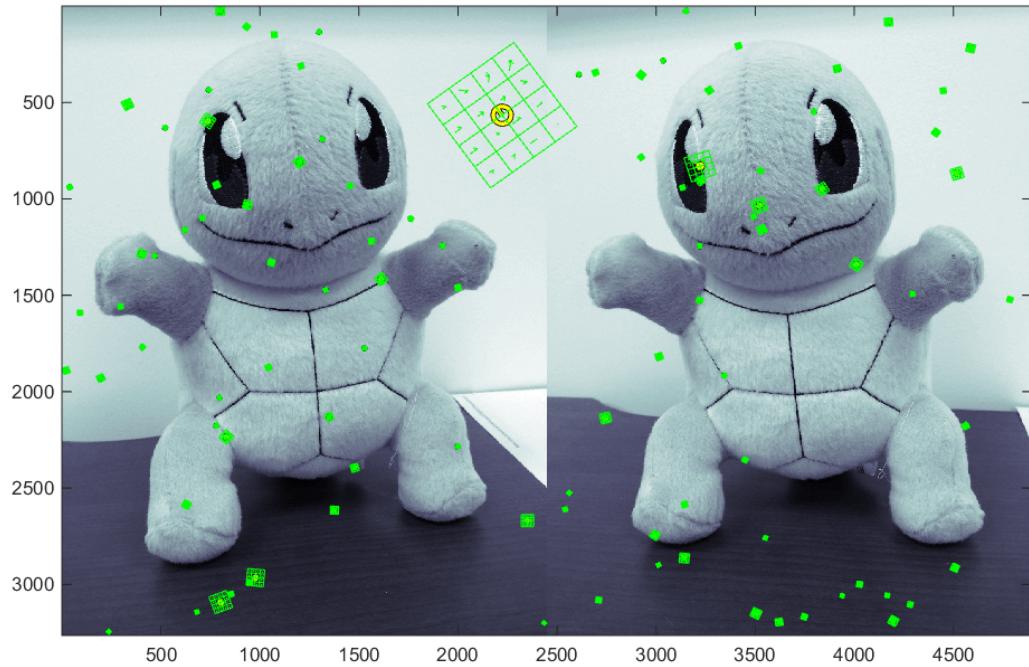


Figure 2: Squirtle Images With Points Marked

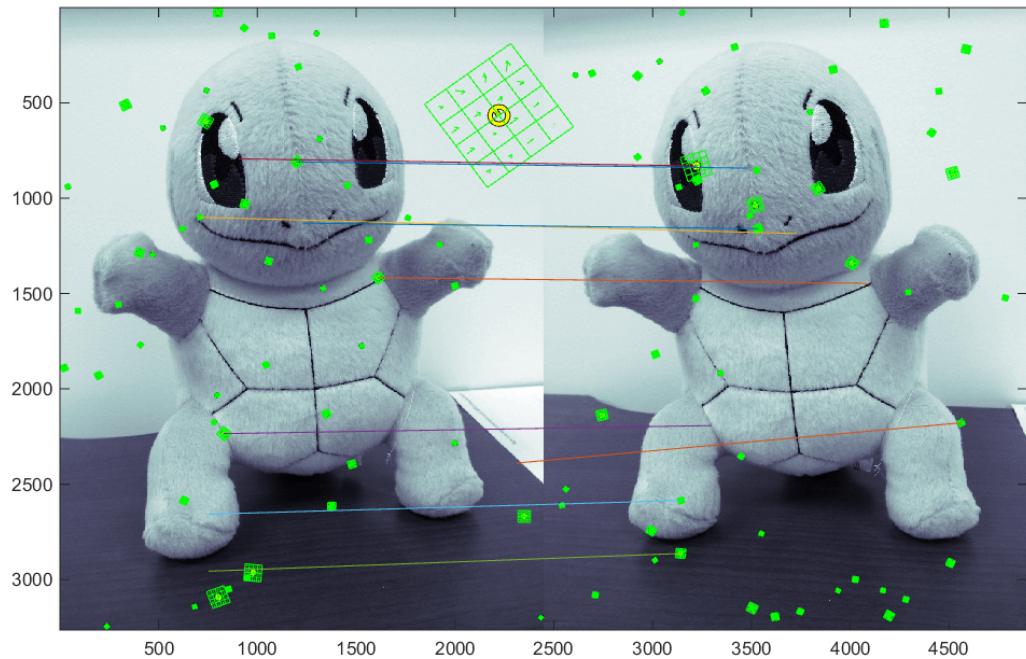
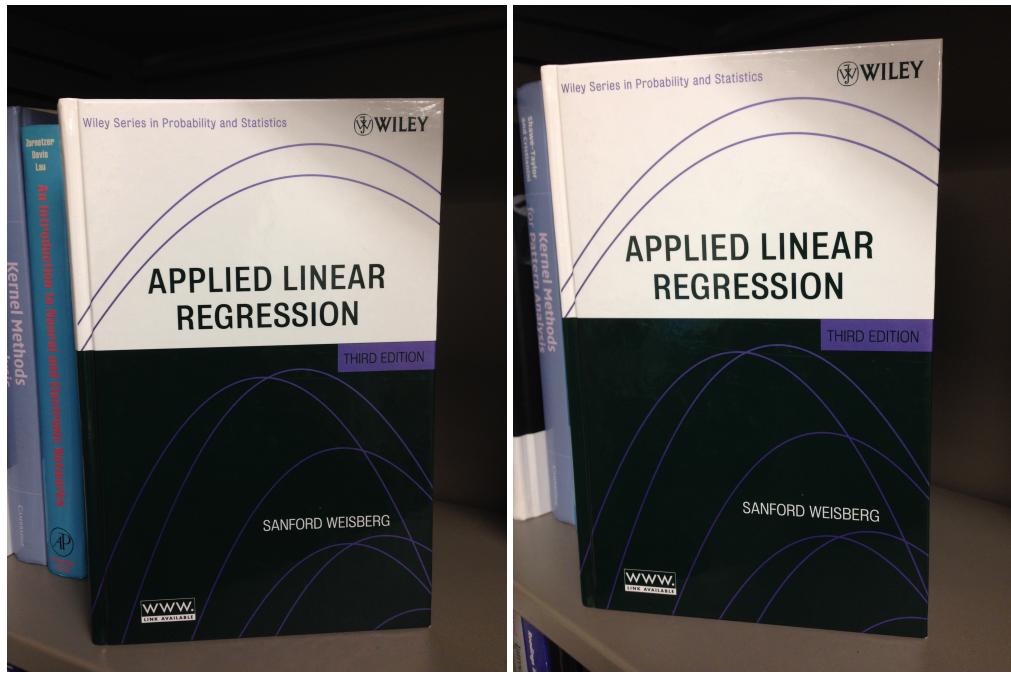


Figure 3: Squirtle Images With Points Marked and Some Matches Shown



(a) Left Image

(b) Right Image

Figure 4: Original Pictures of Textbook

Book Example

Figure 4bk1 shows the original pictures that I took of a textbook. Figure 5bk2 show 50 random points found by running SIFT. Figure 6bk3 shows some of the matches found using SIFT.

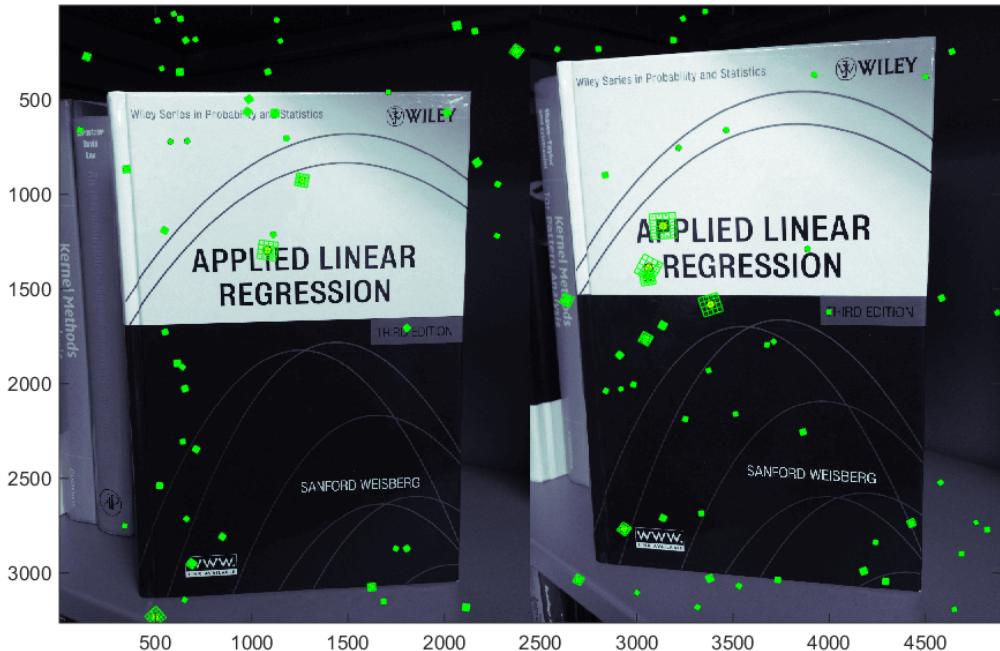


Figure 5: Textbook Images With Points Marked

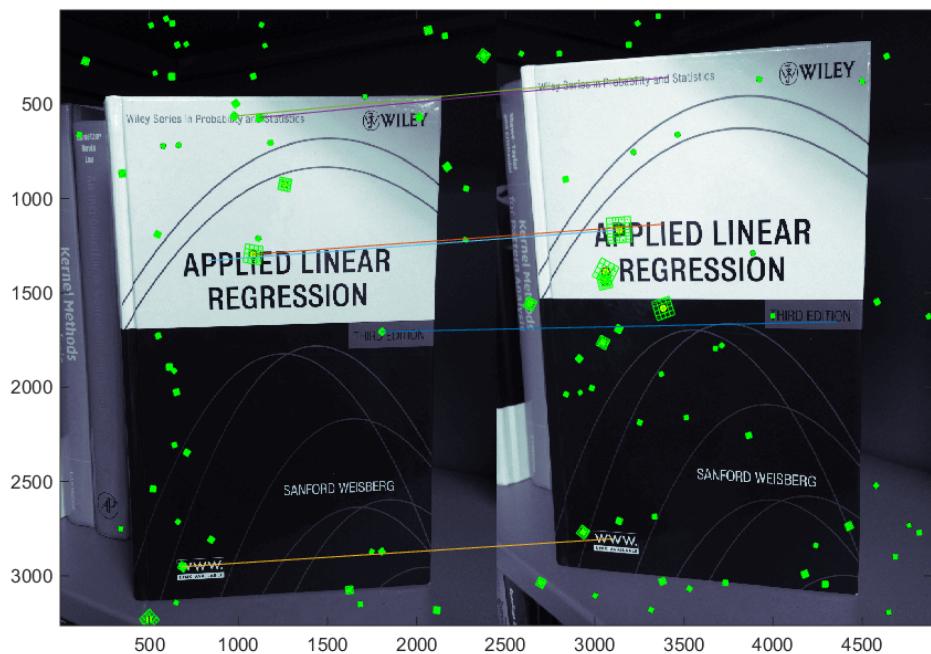


Figure 6: Textbook Images With Points Marked and Some Matches Shown



(a) Left Image

(b) Right Image

Figure 7: Original Pictures of Coffee Can

Coffee Can Example

Figure 7cc1 shows the original pictures that I took of a coffee can. Figure 8cc2 show 50 random points found by running SIFT. Figure 9cc3 shows some of the matches found using SIFT.



Figure 8: Coffee Can Images With Points Marked



Figure 9: Coffee Can Images With Points Marked and Some Matches Shown

Code for Problem 1

Here is the code I used for this problem

```
%{
This is the script used for problem 1.

Much of the code was inspired by the tutorial here:
http://www.vlfeat.org/overview/sift.html
%}

%specify the image in the folder
%imageName = 'squirtle';
%imageName = 'book';
imageName = 'coffeeCan';
image1 = strcat(imageName, '1.JPG');
image2 = strcat(imageName, '2.JPG');

%run SIFT on image1 and image2
I1 = imread(image1);
I1 = single(rgb2gray(I1));
[f1,d1] = vl_sift(I1);
I2 = imread(image2);
I2 = single(rgb2gray(I2));
[f2,d2] = vl_sift(I2);

%select random subsets fo the points
perm = randperm(size(f1,2)) ;
sel1 = perm(1:50) ;
perm = randperm(size(f2,2)) ;
sel2 = perm(1:50) ;

%does basic matching
[matches, scores] = vl_ubcmatch(d1, d2) ;

%goes through the points visualized in sel1 and sel2
% and finds their corresponding matches in the other images
image1matches = matches(1,:);
image2matches = matches(2,:);
numPoints = size(sel1,2);
image1Points = [];
image2Points = [];
```

```

for i = 1:numPoints
    matchingCol = find(image1matches==sel1(i));
    if (~isempty(matchingCol))
        colNum = matchingCol(1);
        image1index = matches(1,colNum);
        image1Points = [image1Points f1(1:2,image1index)];
        img2MatchingIndex = matches(2,colNum);
        image2Points = [image2Points f2(1:2,img2MatchingIndex)];
    end
end

numPoints = size(sel2,2);
for i = 1:numPoints
    matchingCol = find(image2matches==sel2(i));
    if (~isempty(matchingCol))
        colNum = matchingCol(1);
        image2index = matches(2,colNum);
        image2Points = [image2Points f2(1:2,image2index)];
        img1MatchingIndex = matches(1,colNum);
        image1Points = [image1Points f1(1:2,img1MatchingIndex)];
    end
end

%plots the left and right image side-by-side
doubleImage = [I1 I2];
figure
imagesc(doubleImage);
colormap bone;

%plots the SIFT points for left image
h1 = vl_plotframe(f1(:,sel1)) ;
h2 = vl_plotframe(f1(:,sel1)) ;
set(h1,'color','k','linewidth',3) ;
set(h2,'color','y','linewidth',2) ;
h3 = vl_plotsiftdescriptor(d1(:,sel1),f1(:,sel1)) ;
set(h3,'color','g') ;

%plots the SIFT points for the right image
width = size(I1,2);
f2Original = f2(:,sel2);
f2Offset = repmat([width;0;0;0],1,50);

```

```
f2New = f2Original+f2Offset;
h1 = v1_plotframe(f2New) ;
h2 = v1_plotframe(f2New) ;
set(h1,'color','k','linewidth',3) ;
set(h2,'color','y','linewidth',2) ;
h3 = v1_plotsiftdescriptor(d2(:,sel2),f2New) ;
set(h3,'color','g') ;

%plots the matches for the visualized points in each image
hold on
for i = 1:size(image1Points,2)
    Xvals = [image1Points(1,i) image2Points(1,i)+width];
    Yvals = [image1Points(2,i) image2Points(2,i)];
    plot(Xvals,Yvals);
end
```