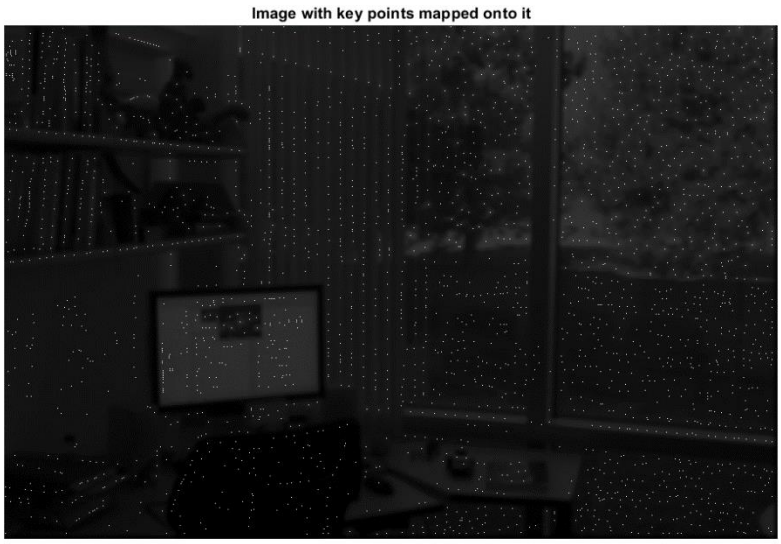
Lab #8

Name: Grant Beatty SID: 862037946

EE146 Section (022)

1. a)



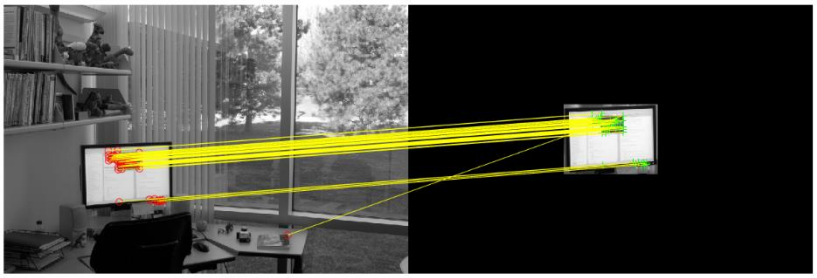

```
Time taken for Pyramid level generation is :6.094823

Time taken for finding the key points is :4.613973
```

b)

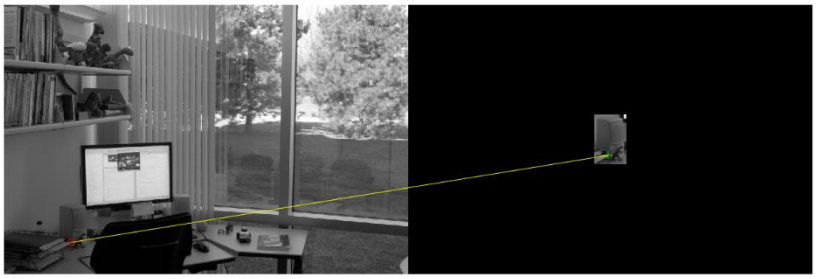
1) Scale

Apple

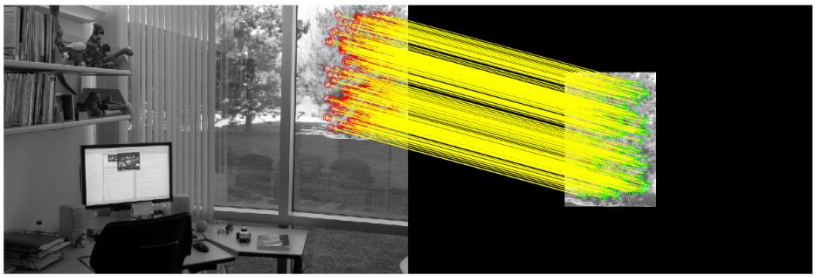
Screen



Speaker



Pine Tree

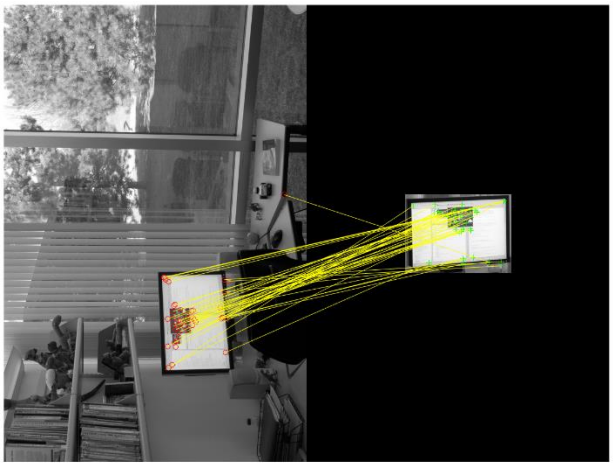


time = 1.3274

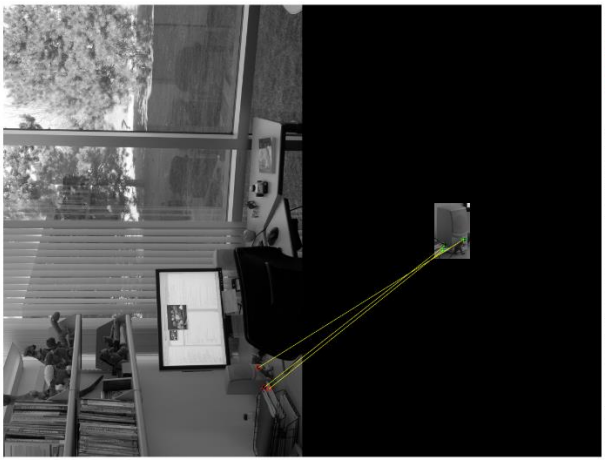
2) Pose

Apple

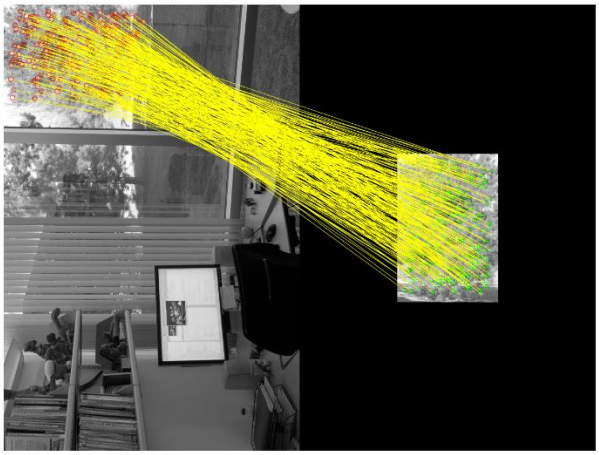
Screen



Speaker



Pine Tree

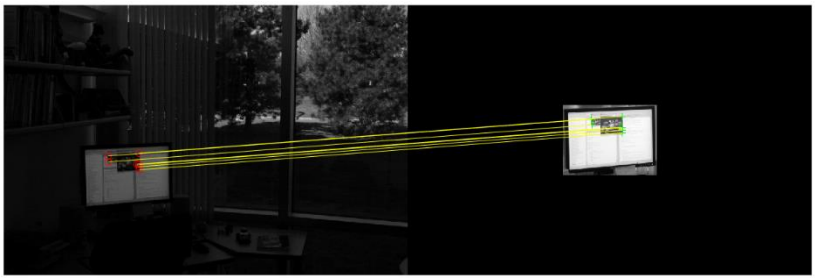


```
time = 1.5858
```

3) Illumination

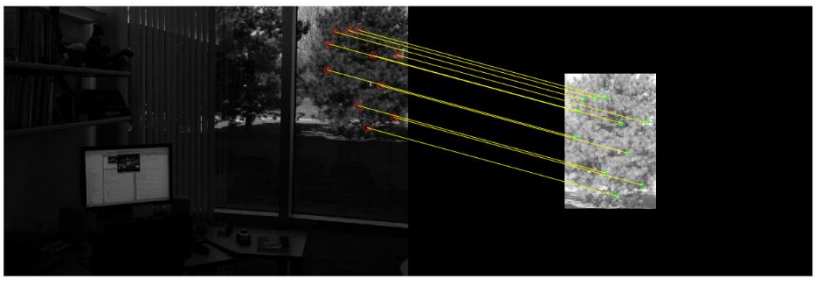
Apple

Screen



Speaker

Pine Tree

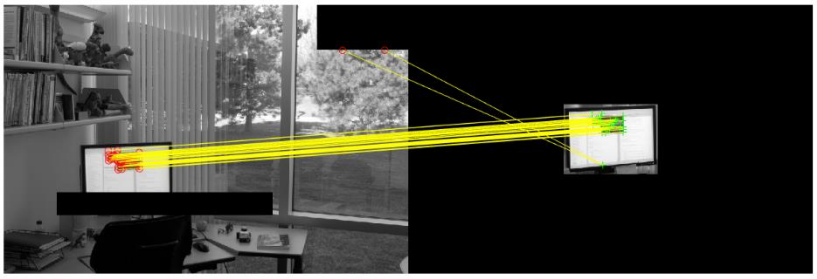


```
time = 1.6529
```

4) Occlusion

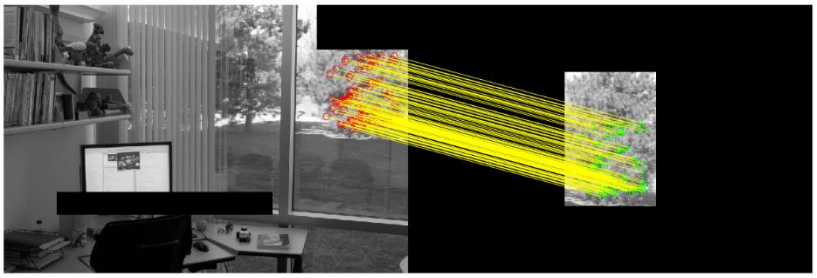
Apple

Screen



Speaker

Pine Tree

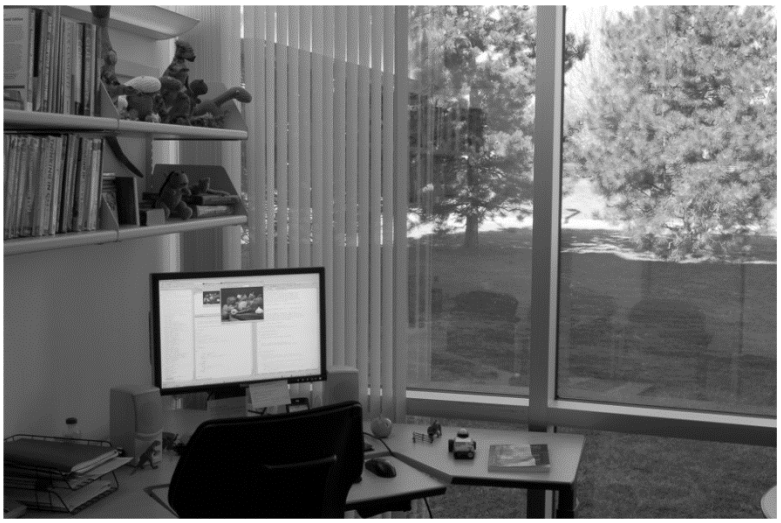


```
time = 1.5901
```

The sift algorithm was not able to scan for the apple in any of the cases. Other than that the order of speed from fastest to slowest is as follows:
Scale, Pose, Occlusion, Illumination.
The sift algorithm was mostly successful in all of the cases.
In the Illumination and partial occlusion cases the speaker was unable to be scanned for.

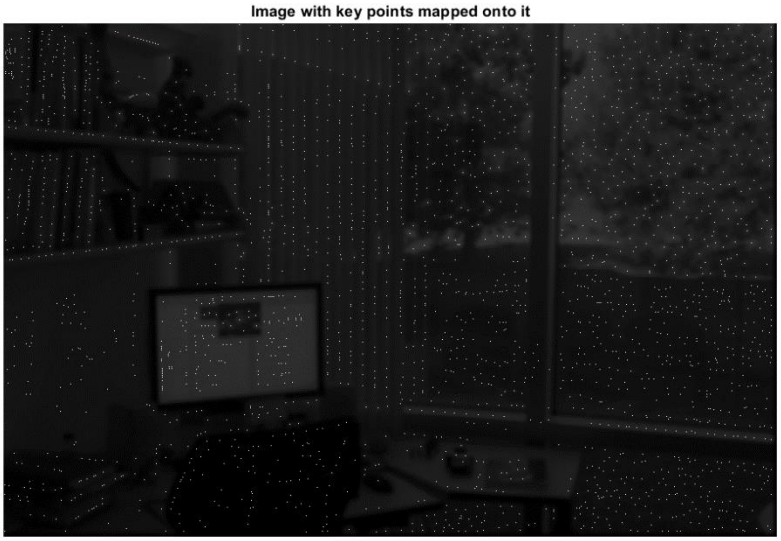
Lab #8 Code

```
IM=imread('office_4.jpg');
IM=rgb2gray(IM);
imshow(IM)
```



```
[kpd,kploc]=SIFT(IM);
```

```
Time taken for Pyramid level generation is :6.094823

Time taken for finding the key points is :4.613973
```




```
Time taken for magnitude and orientation assignment is :5.721477
```

```
Time taken for finding key point desctiptors is :8.364861
```

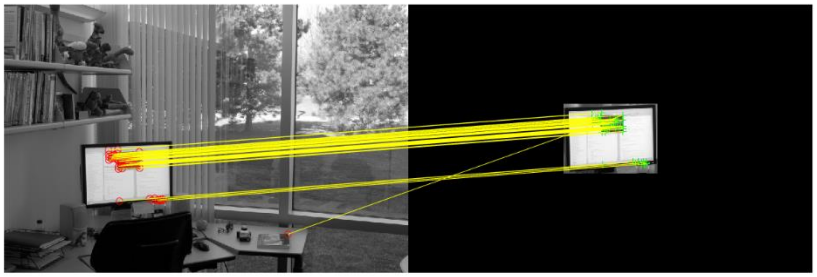
```
apple=IM(471:507,427:457);
imshow(apple)
```

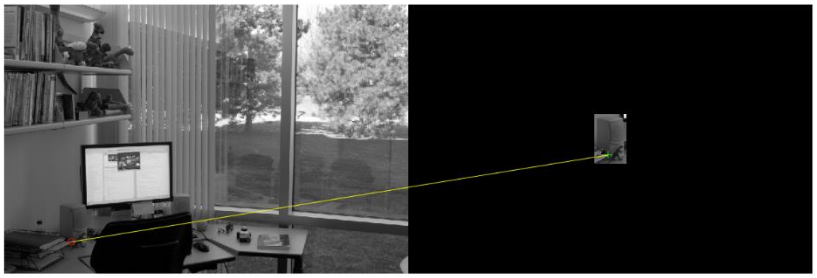
```
screen=IM(305:460,170:380);
imshow(screen)
```

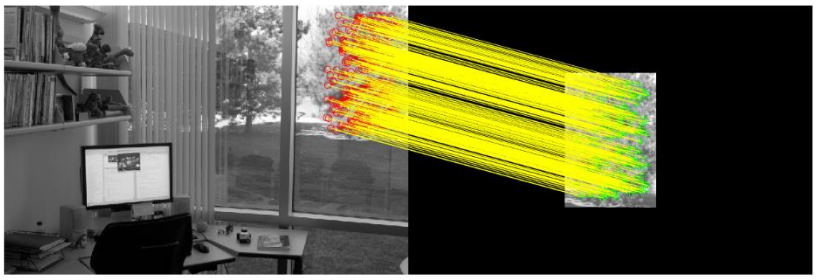
```
speaker=IM(440:550,120:190);
imshow(speaker)
```

```
pinetree=IM(1:300,700:903);
imshow(pinetree)
```

```
 count={apple,screen,speaker pinetree};
 tic
 for k=1:4
 points1= detectHarrisFeatures(IM);
 points2= detectHarrisFeatures(count{k});
 [features1,valid_points1]=extractFeatures(IM,points1);
 [features2,valid_points2]=extractFeatures(count{k},points2);
 indexpairs=matchFeatures(features1,features2);
 matchedPoints1 = valid_points1(indexpairs(:,1),:);
 matchedPoints2 = valid_points2(indexpairs(:,2),:);
 figure;showMatchedFeatures(IM,count{k},matchedPoints1,matchedPoints2,'montage')
;
 end
```





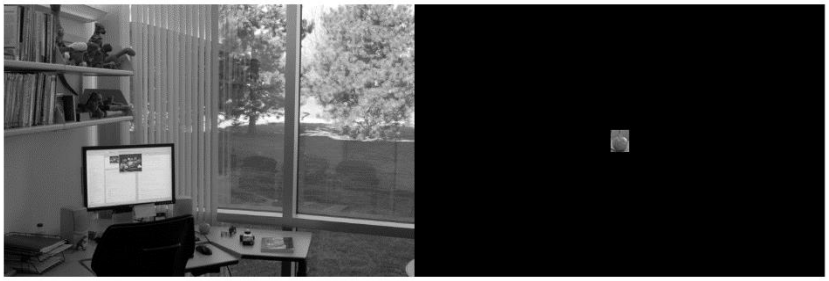


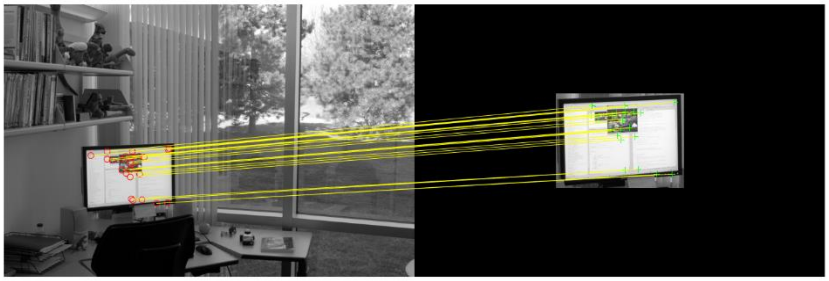
```
time=toc
```

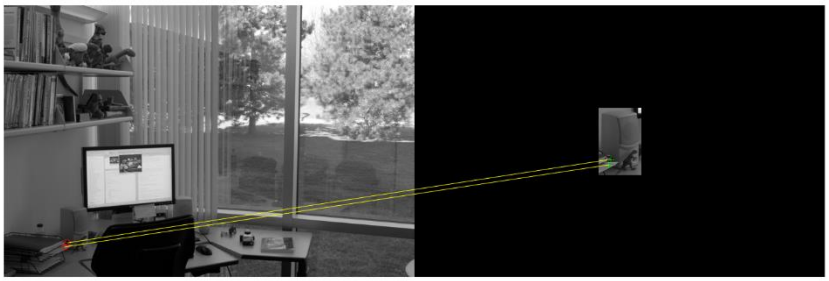
```
time = 2.0497
```

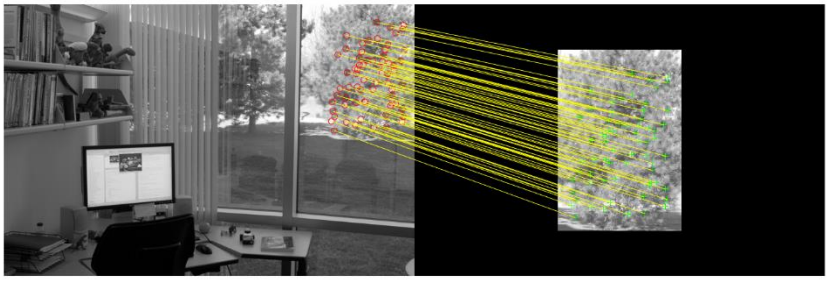
1) Scale

```
I=imresize(IM,0.75);
tic
for k=1:4
points1= detectSURFFeatures(I);
points2= detectSURFFeatures(count{k});
[features1,valid_points1]=extractFeatures(I,points1);
[features2,valid_points2]=extractFeatures(count{k},points2);
indexpairs=matchFeatures(features1,features2);
matchedPoints1 = valid_points1(indexpairs(:,1),:);
matchedPoints2 = valid_points2(indexpairs(:,2),:);
figure;showMatchedFeatures(I,count{k},matchedPoints1,matchedPoints2,'montage');
end
```









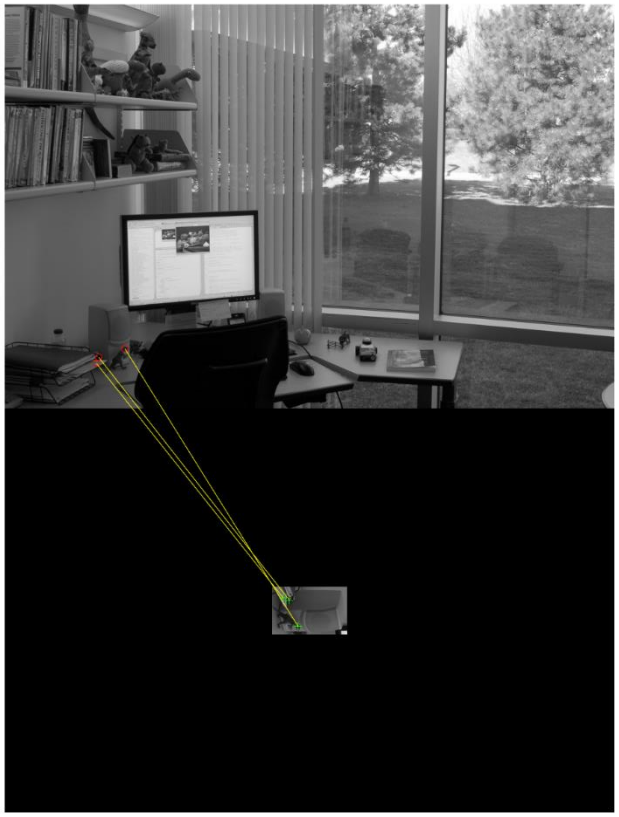
```
time=toc
```

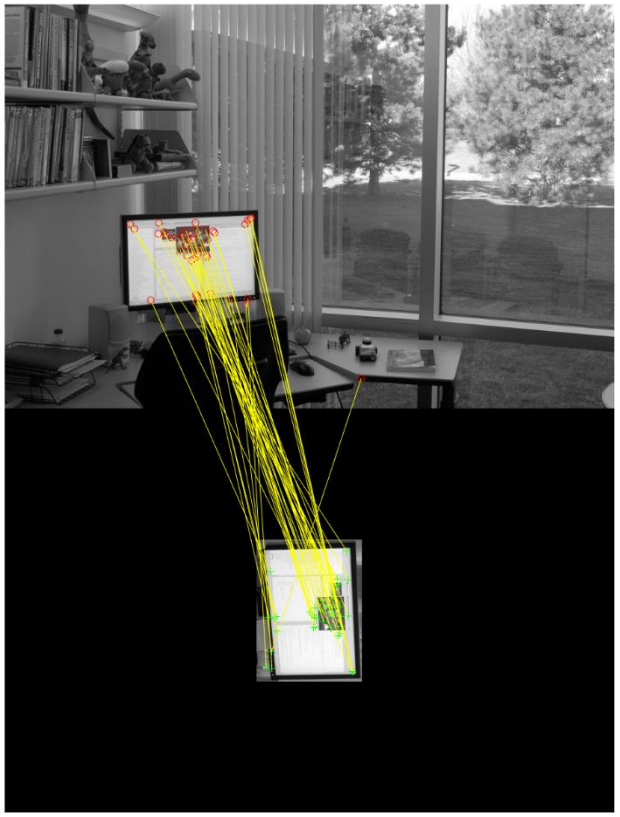
```
time = 1.3274
```

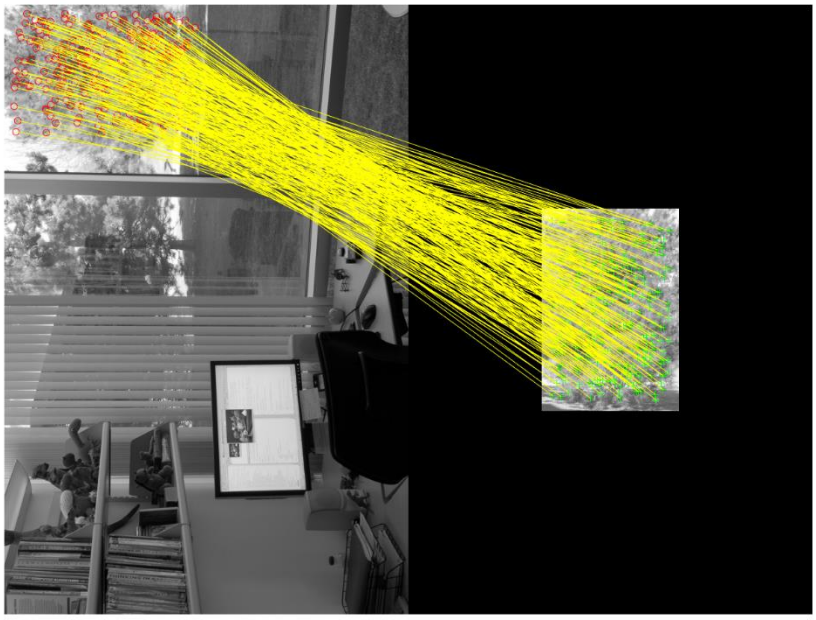
2) Pose

```
I=imrotate(IM,90);
tic
for k=1:4
```

```
points1= detectSURFFeatures(I);
points2= detectSURFFeatures(count{k});
[features1,valid_points1]=extractFeatures(I,points1);
[features2,valid_points2]=extractFeatures(count{k},points2);
indexpairs=matchFeatures(features1,features2);
matchedPoints1 = valid_points1(indexpairs(:,1),:);
matchedPoints2 = valid_points2(indexpairs(:,2),:);
figure;showMatchedFeatures(I,count{k},matchedPoints1,matchedPoints2,'montage');
end
```





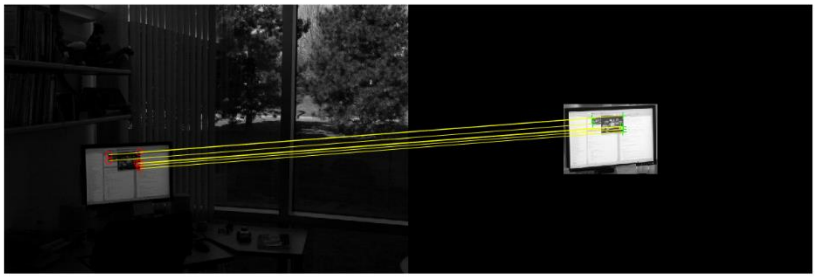


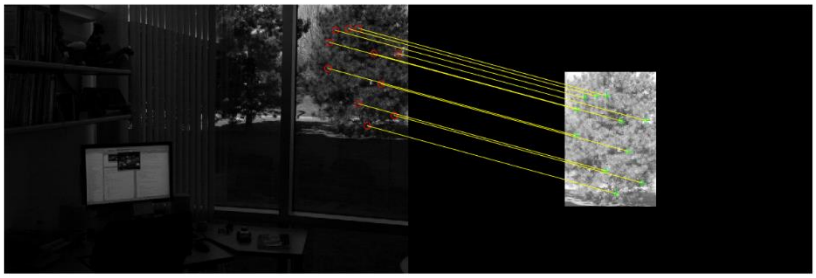
```
time=toc
```

```
time = 1.5858
```

3) Ilumination

```
I=imread('office_1.jpg');
I=rgb2gray(I);
tic
for k=1:4
points1= detectHarrisFeatures(I);
points2= detectHarrisFeatures(count{k});
[features1,valid_points1]=extractFeatures(I,points1);
[features2,valid_points2]=extractFeatures(count{k},points2);
indexpairs=matchFeatures(features1,features2);
matchedPoints1 = valid_points1(indexpairs(:,1),:);
matchedPoints2 = valid_points2(indexpairs(:,2),:);
figure;showMatchedFeatures(I,count{k},matchedPoints1,matchedPoints2,'montage');
end
```





```
time=toc
```

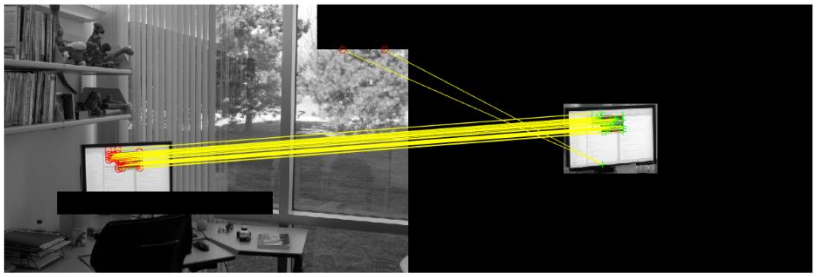
```
time = 1.6529
```

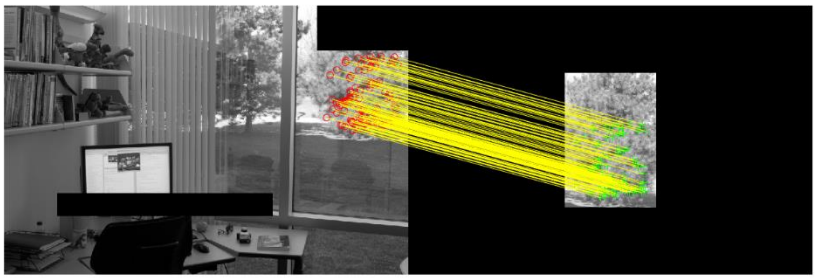
4) Partial Occlusion

```
I=IM;
for r=420:470
for c=120:600
```

```
I(r,c)=0;
end
end
for r=1:100
for c=700:903
I(r,c)=0;
end
end
imshow(I)
```

```
for k=1:4
tic
points1= detectHarrisFeatures(I);
points2= detectHarrisFeatures(count{k});
[features1,valid_points1]=extractFeatures(I,points1);
[features2,valid_points2]=extractFeatures(count{k},points2);
indexpairs=matchFeatures(features1,features2);
matchedPoints1 = valid_points1(indexpairs(:,1),:);
matchedPoints2 = valid_points2(indexpairs(:,2),:);
figure;showMatchedFeatures(I,count{k},matchedPoints1,matchedPoints2,'montage');
end
```





```
time=toc
```

```
time = 1.5901
```