

Lab 6

CPS 563 – Data Visualization

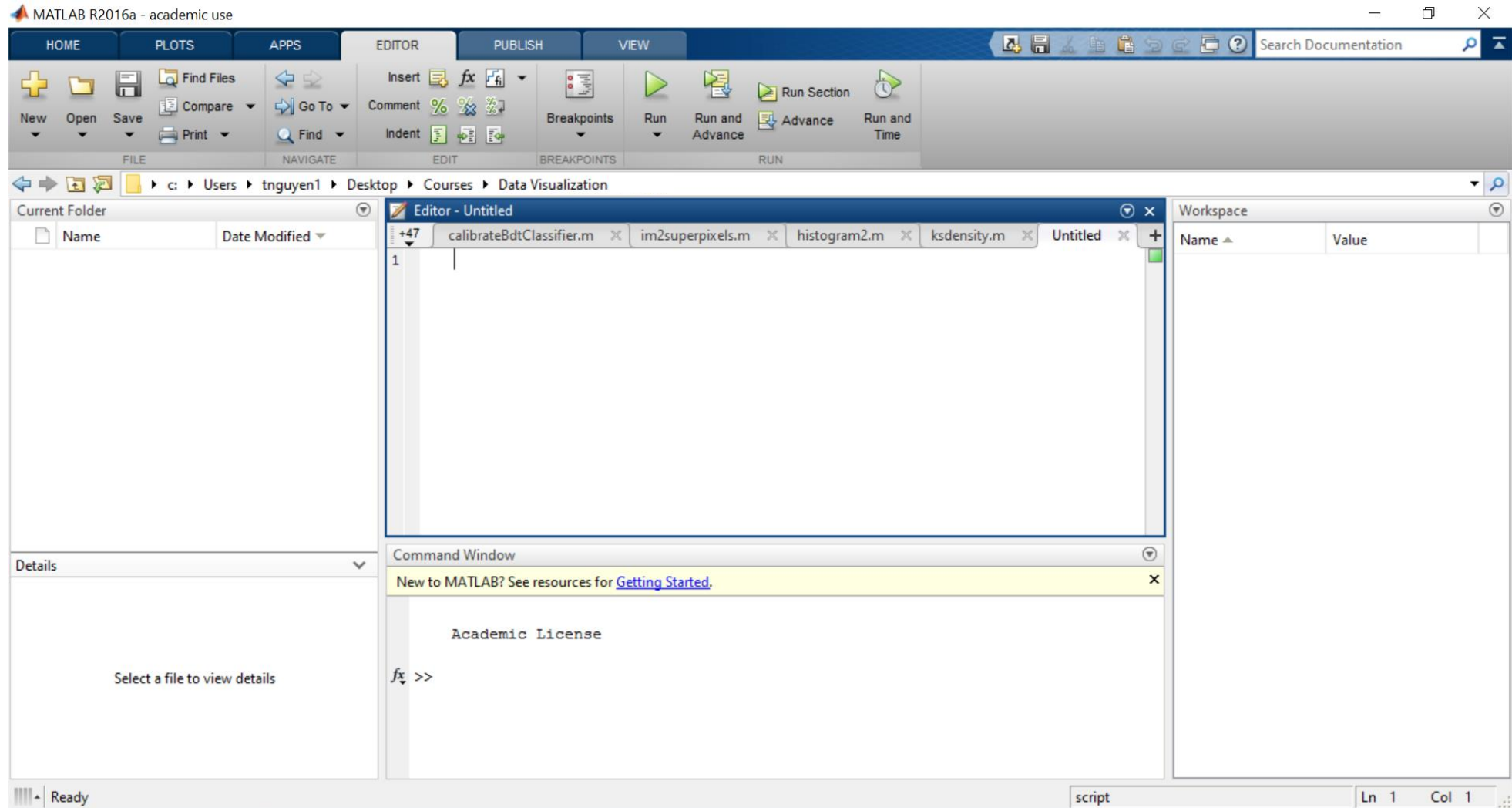
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Outline

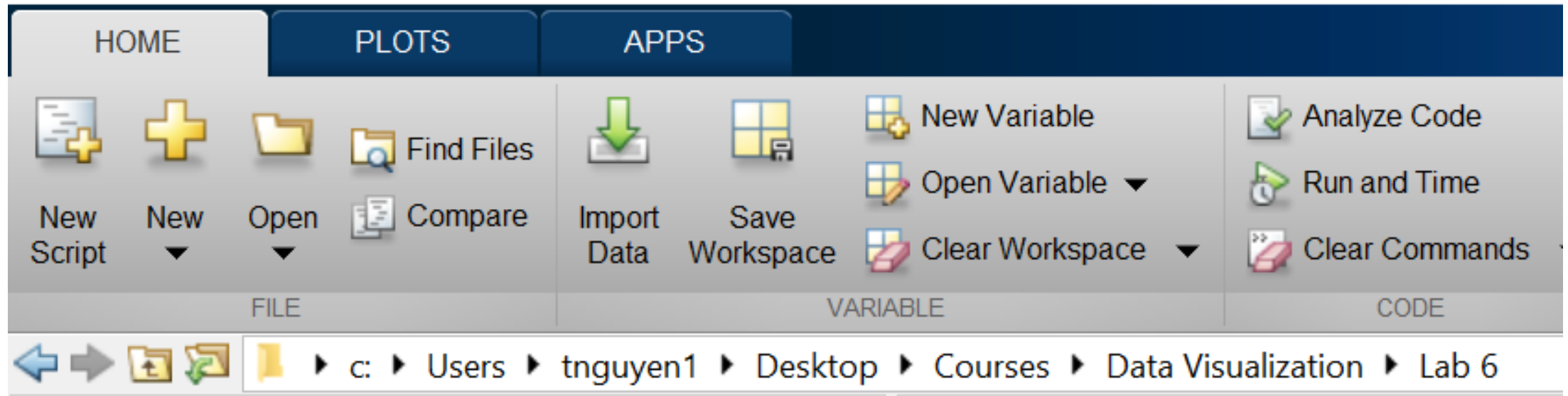
- Practice with Gaussian filter
- Create heat maps

Start MATLAB




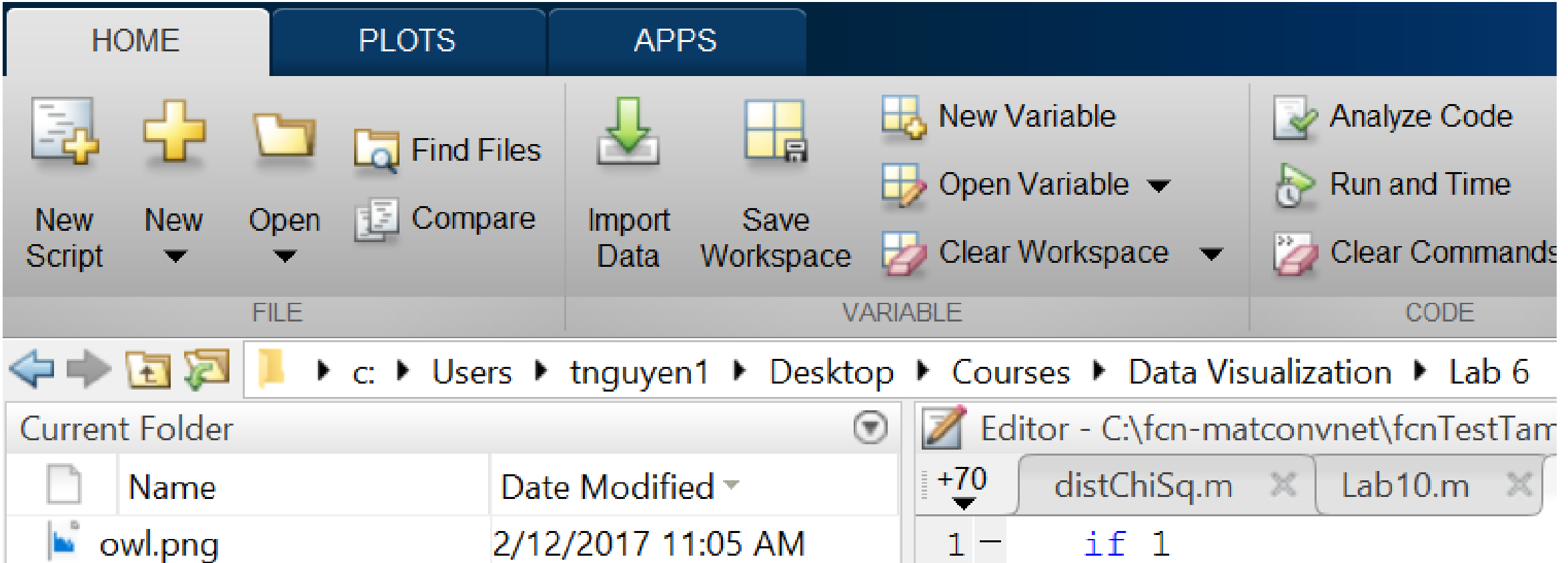
Create Lab 6 folder

 MATLAB R2016a - academic use



Copy owl.png from isidore to Lab 6 folder

 MATLAB R2016a - academic use



The MATLAB R2016a interface is shown with the HOME tab selected. The interface is divided into three main sections: FILE, VARIABLE, and CODE.

- FILE Section:** Contains icons for New Script, New, Open, Find Files, and Compare.
- VARIABLE Section:** Contains icons for Import Data, Save Workspace, New Variable, Open Variable, and Clear Workspace.
- CODE Section:** Contains icons for Analyze Code, Run and Time, and Clear Commands.

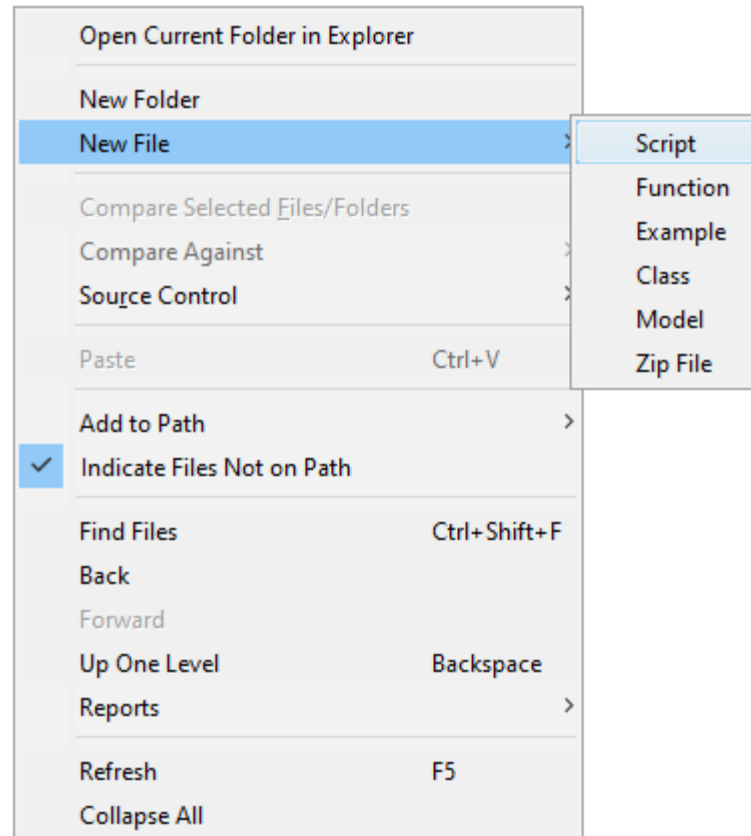
The current folder is set to `c:\Users\tnguyen1\Desktop\Courses\Data Visualization\Lab 6`. The Current Folder pane shows a list of files:

Name	Date Modified
owl.png	2/12/2017 11:05 AM

The Editor pane shows the file `distChiSq.m` with a zoom level of +70. The code editor displays the following line of code:

```
1 if 1
```

Create new script file: Lab6.m



Lab6.m

```
close all;  
clear all;  
clc;
```

Load the image (owl.png)

```
close all;  
clear all;  
clc;
```

```
img = imread('owl.png');  
figure, imshow(img);
```



Create Gaussian kernel

```
img = imread('owl.png');  
figure, imshow(img);
```

```
gaussian_kernel = fspecial('gaussian', [5 5], 5);
```

Apply Gaussian filter on the image

```
img = imread('owl.png');
```

```
figure, imshow(img);
```

```
gaussian_kernel = fspecial('gaussian', [5 5], 5);
```

```
img_gaussian = imfilter(img, gaussian_kernel, 'replicate');
```

Display the filtered result

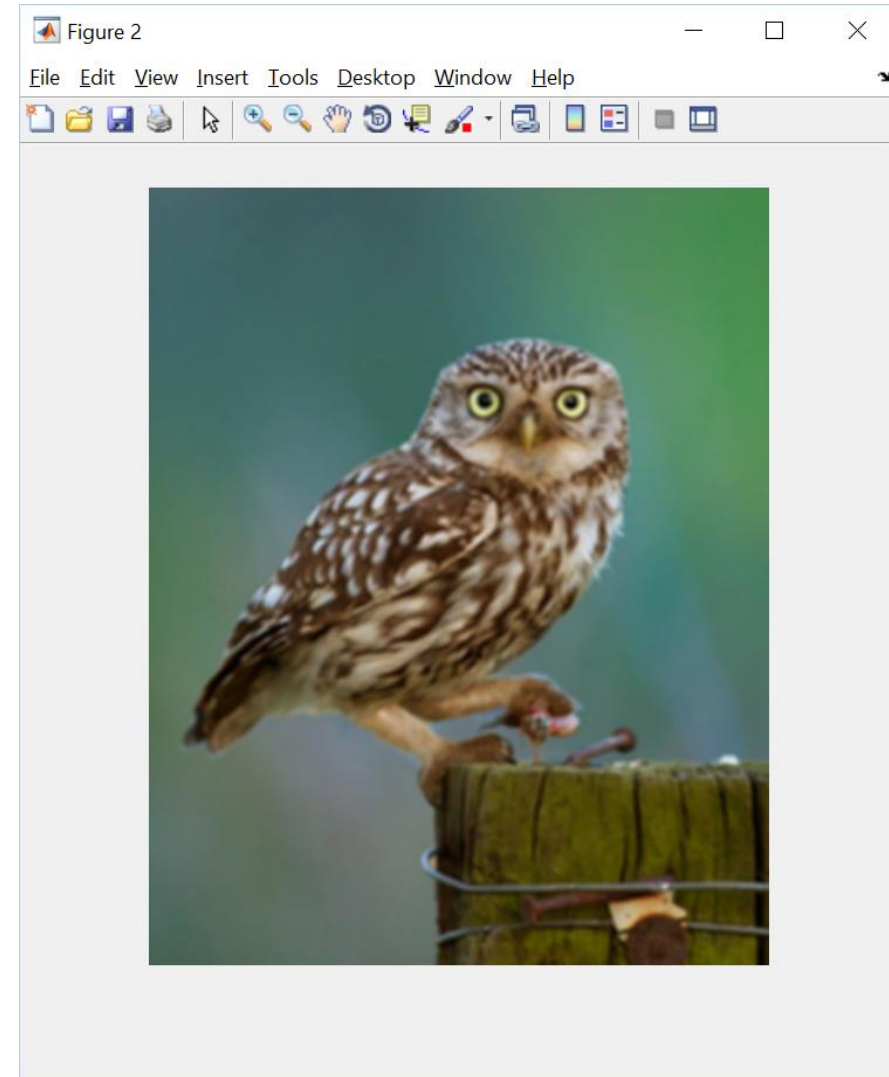
```
img = imread('owl.png');
```

```
figure, imshow(img);
```

```
gaussian_kernel = fspecial('gaussian', [5 5], 5);
```

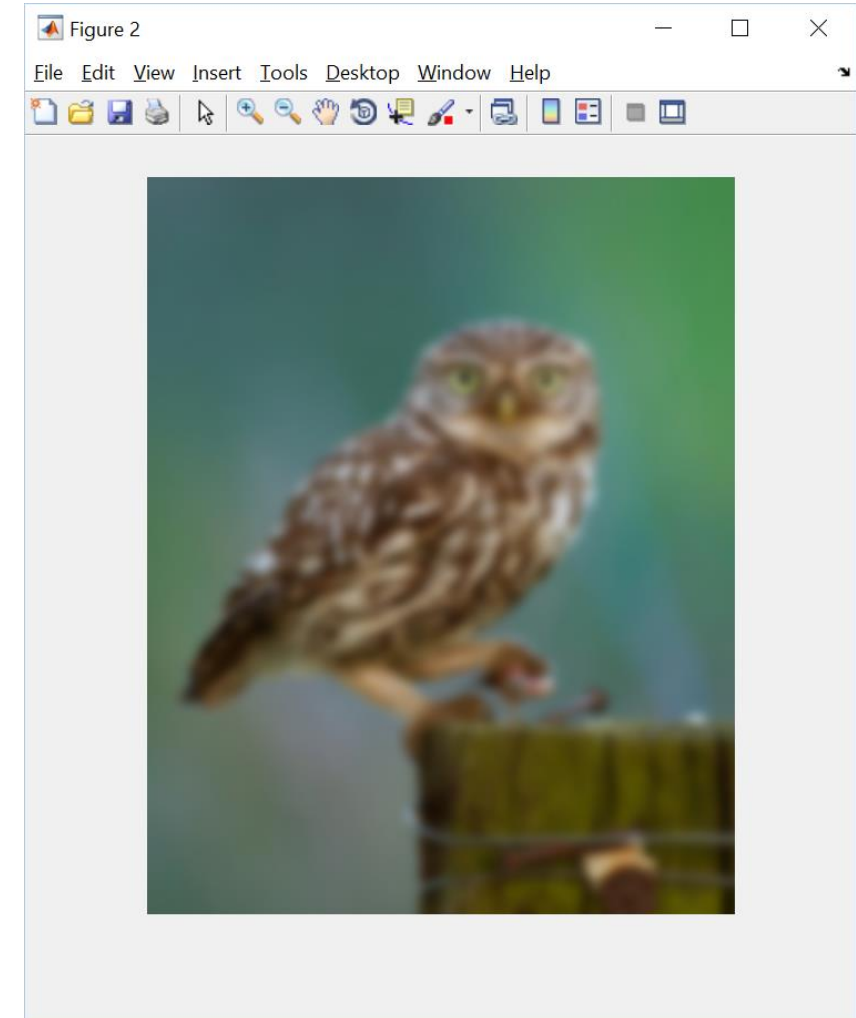
```
img_gaussian = imfilter(img, gaussian_kernel,  
'replicate');
```

```
figure, imshow(img_gaussian);
```



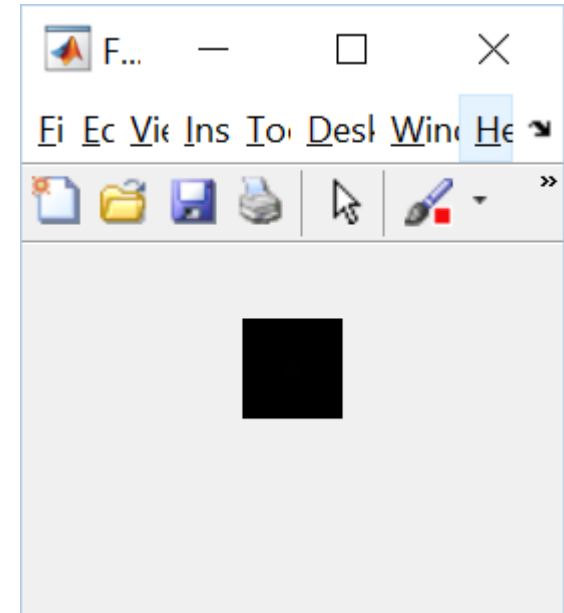
Change the kernel size

```
img = imread('owl.png');  
figure, imshow(img);  
gaussian_kernel = fspecial('gaussian', [50 50], 5);  
img_gaussian = imfilter(img, gaussian_kernel,  
    'replicate');  
figure, imshow(img_gaussian);
```



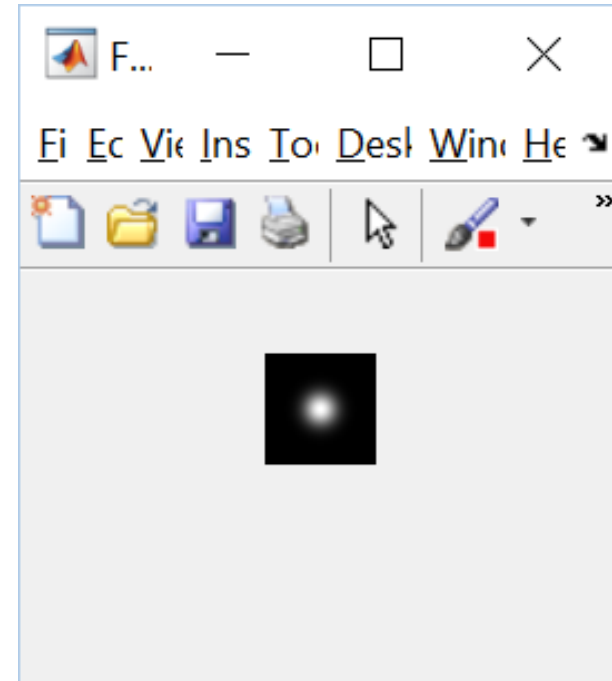
What does the kernel look like?

```
img = imread('owl.png');  
figure, imshow(img);  
gaussian_kernel = fspecial('gaussian', [50 50], 5);  
img_gaussian = imfilter(img, gaussian_kernel, 'replicate');  
figure, imshow(img_gaussian);  
figure, imshow(gaussian_kernel);
```

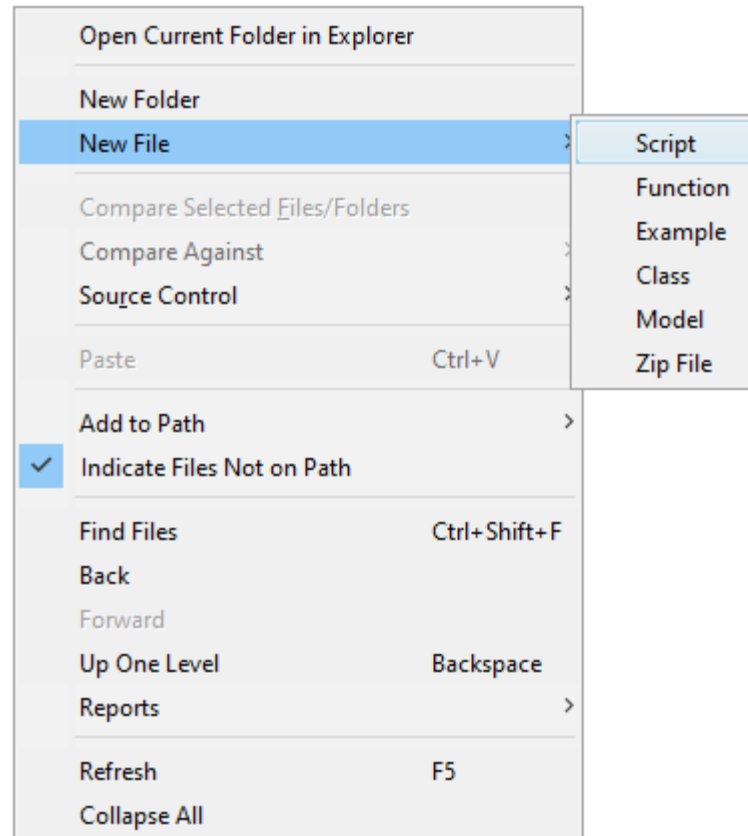


What does the kernel look like?

```
img = imread('owl.png');  
figure, imshow(img);  
gaussian_kernel = fspecial('gaussian', [50 50], 5);  
img_gaussian = imfilter(img, gaussian_kernel, 'replicate');  
figure, imshow(img_gaussian);  
figure, imshow(gaussian_kernel, []);
```



Create new script file: Lab6b.m



Lab6b.m

```
close all;  
clear all;  
clc;
```

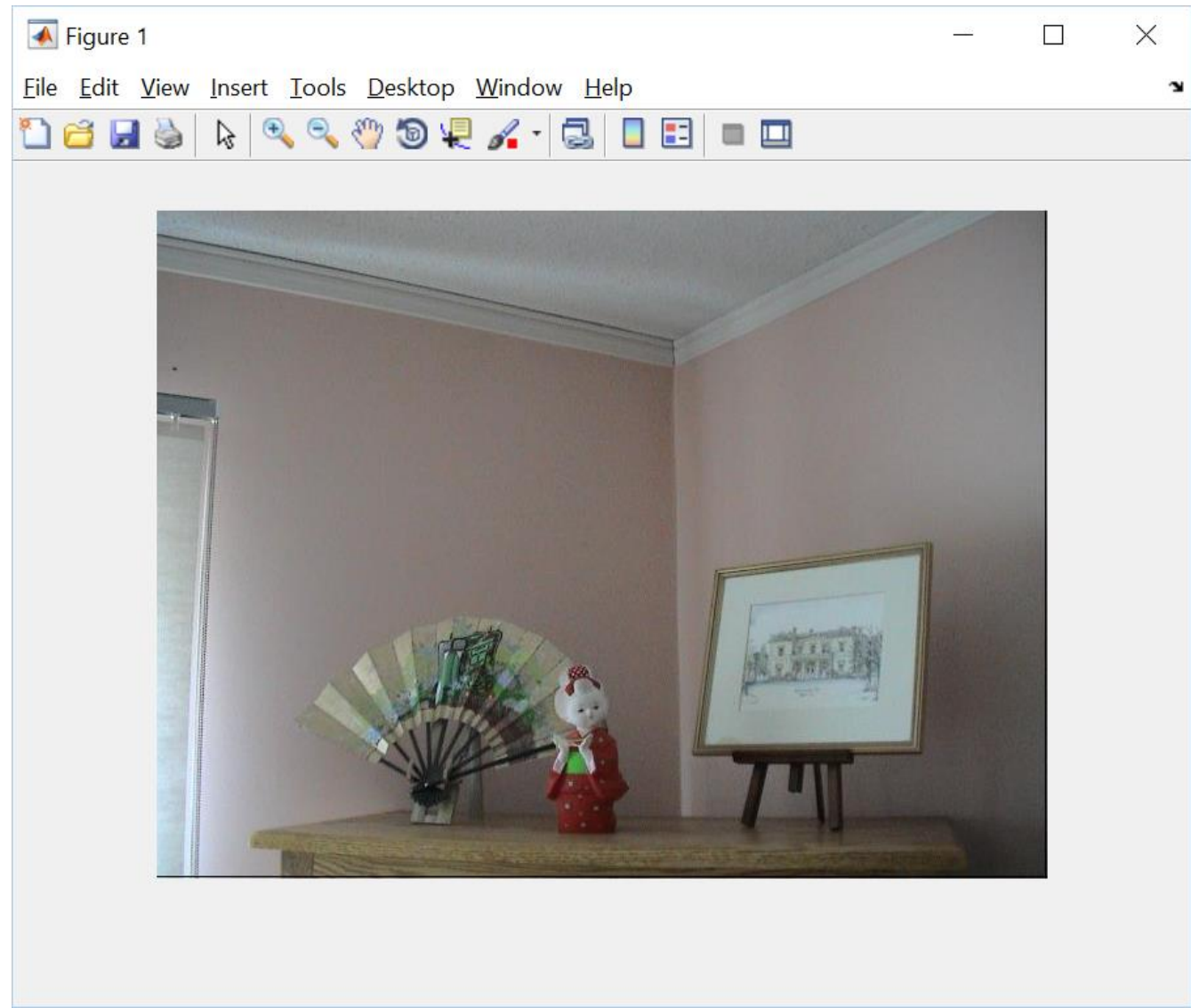

Read image from file

close all;

clear all;

clc;

```
img = imread('21.jpg');  
figure, imshow(img);
```

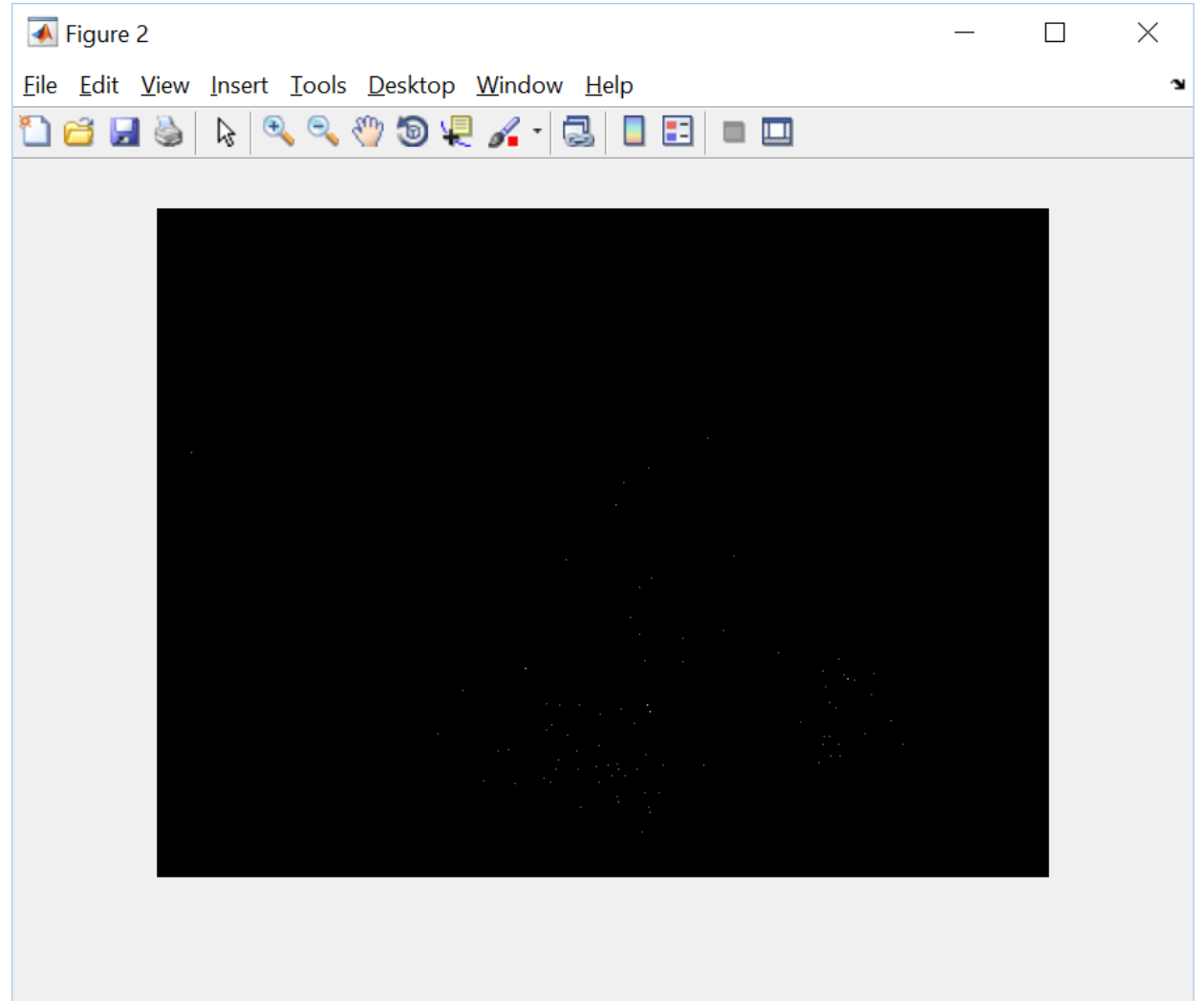


Read fixation data

```
close all;  
clear all;  
clc;
```

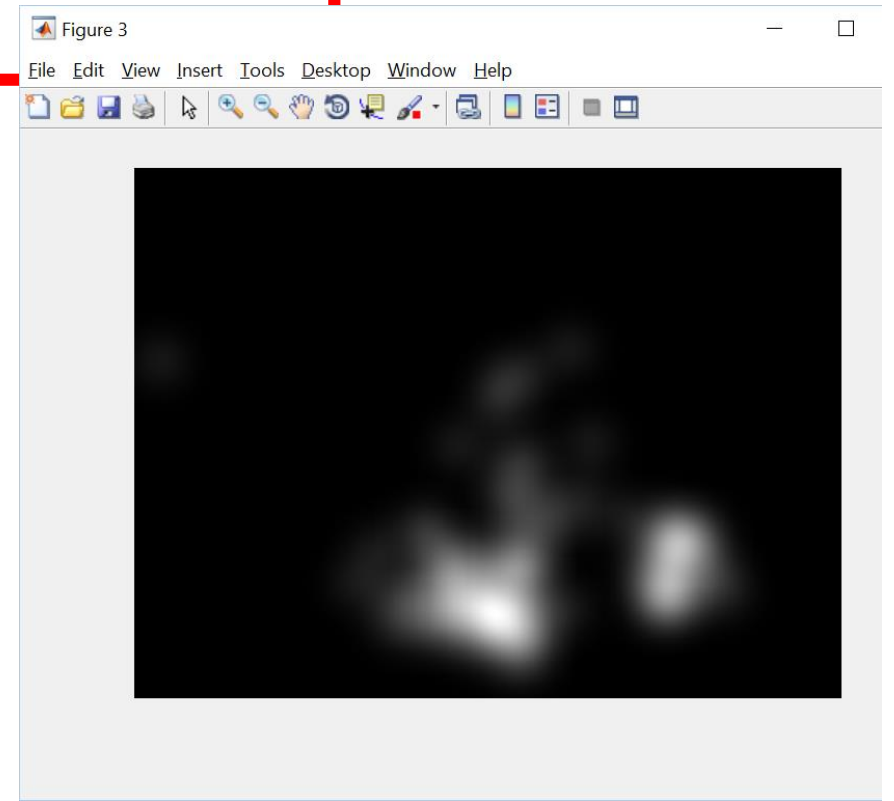
```
img = imread('21.jpg');  
figure,imshow(img);
```

```
load('fixations.mat');  
figure,imshow(fixations,[]);
```



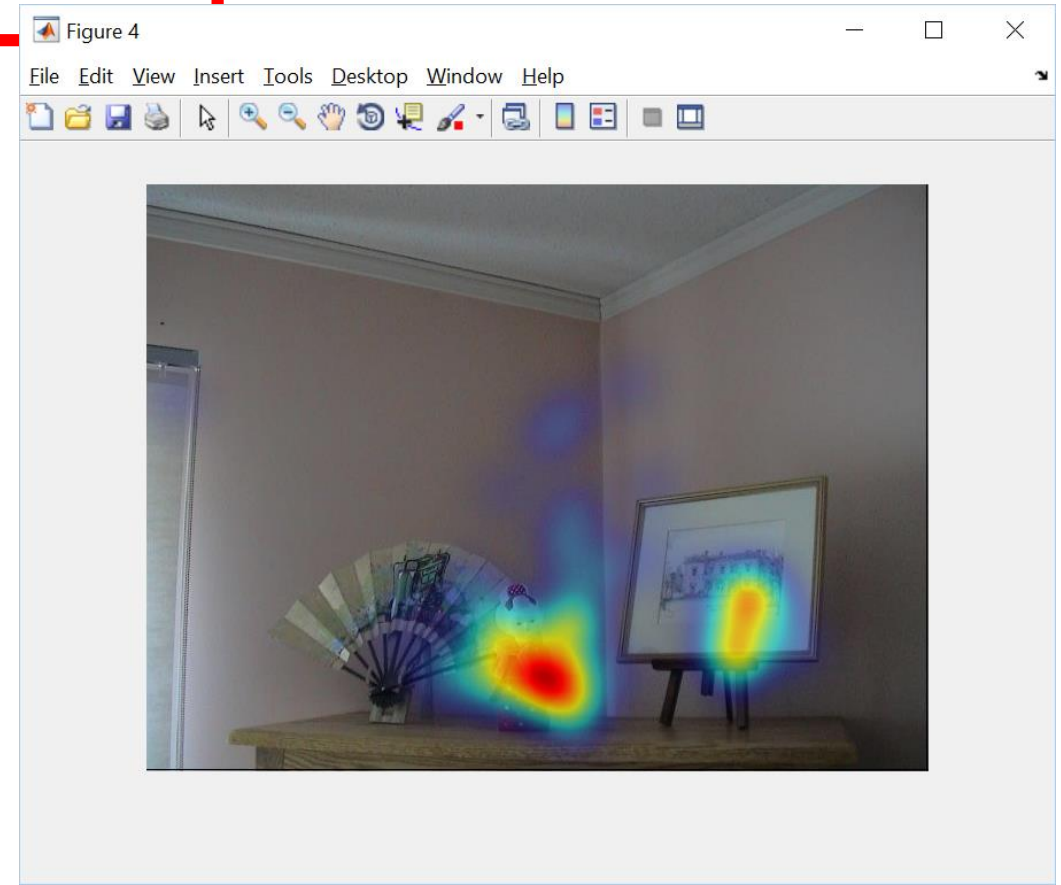
Apply Gaussian filter on fixation data

```
gaussian_kernel = fspecial('gaussian', [100 100], 20);  
density = imfilter(fixations, gaussian_kernel, 'replicate');  
figure,imshow(density,[]);
```



Overlay the density map on the image

```
omask = heatmap_overlay( img , density, 'jet' );  
figure,imshow(omask);
```



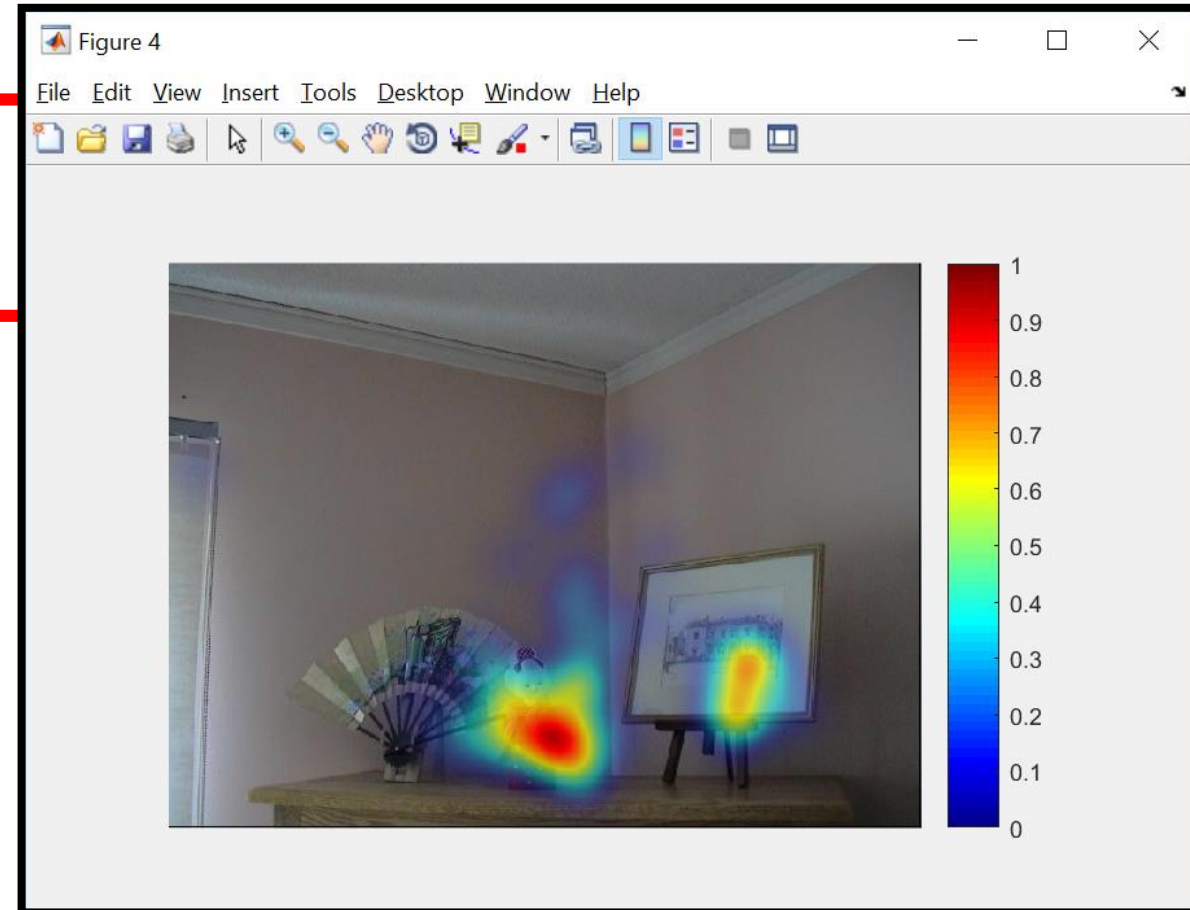
Add colormap

```
omask = heatmap_overlay( img , density, 'jet' );
```














```
figure,imshow(omask);
```

```
colormap(jet);
```

```
colorbar;
```

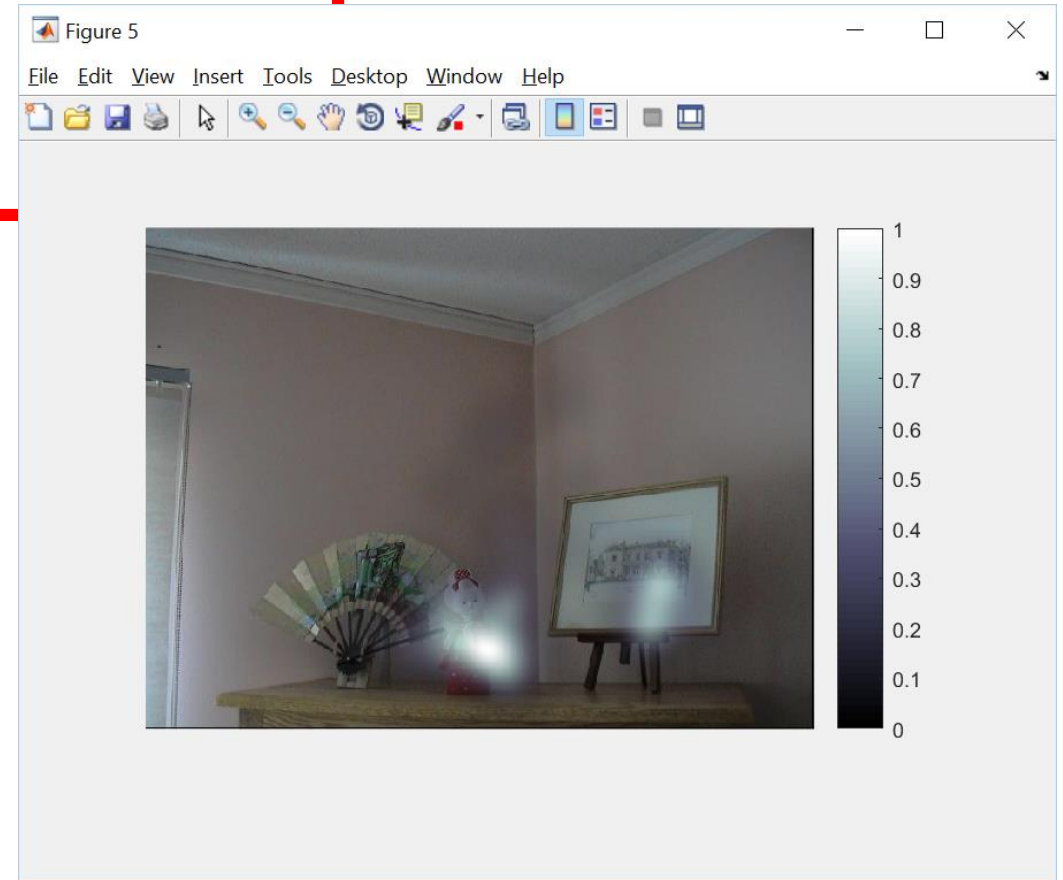


Colormaps in MATLAB

Colormap Name	Color Scale
parula	
jet	
hsv	
hot	
cool	
spring	
summer	
autumn	
winter	
gray	
bone	
copper	
pink	

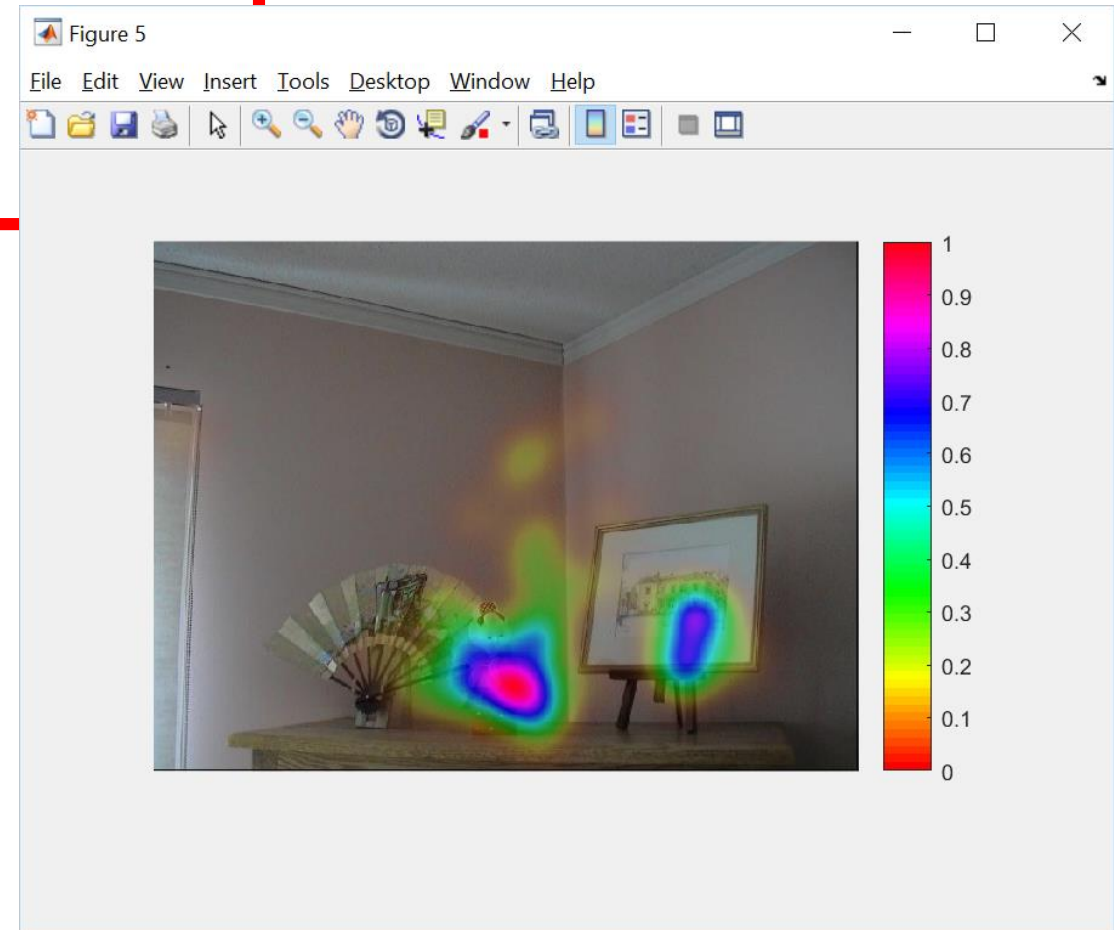
Try different colormap

```
omask = heatmap_overlay( img , density, 'bone' );  
figure,imshow(omask);  
colormap(bone);  
colorbar;
```



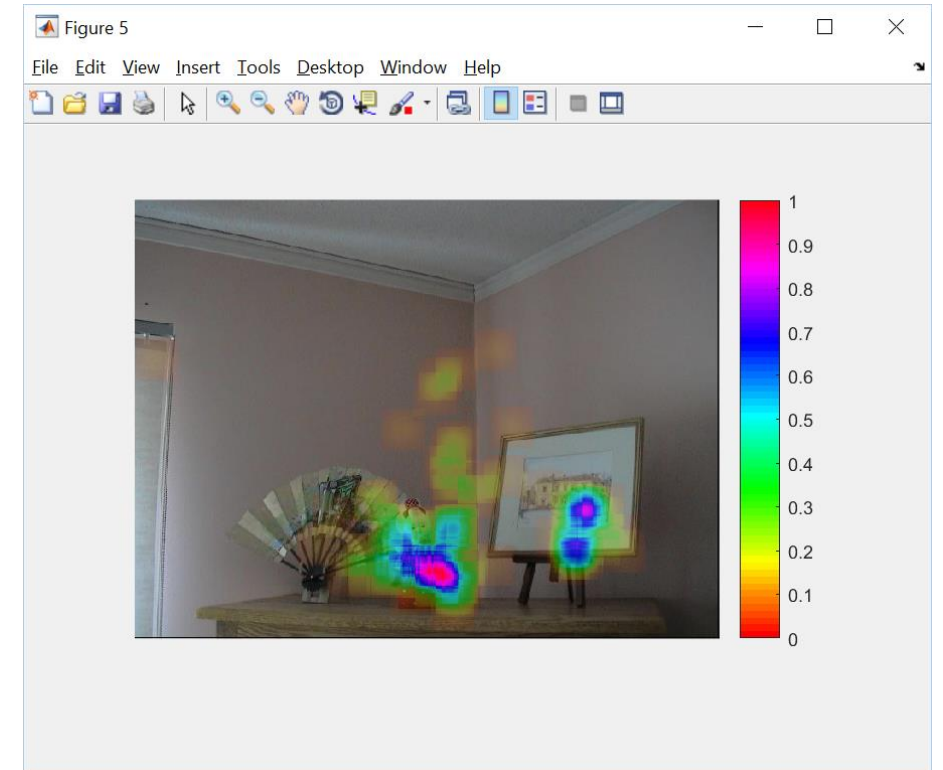
Try different colormap

```
omask = heatmap_overlay( img , density, 'hsv' );  
figure,imshow(omask);  
colormap(hsv);  
colorbar;
```



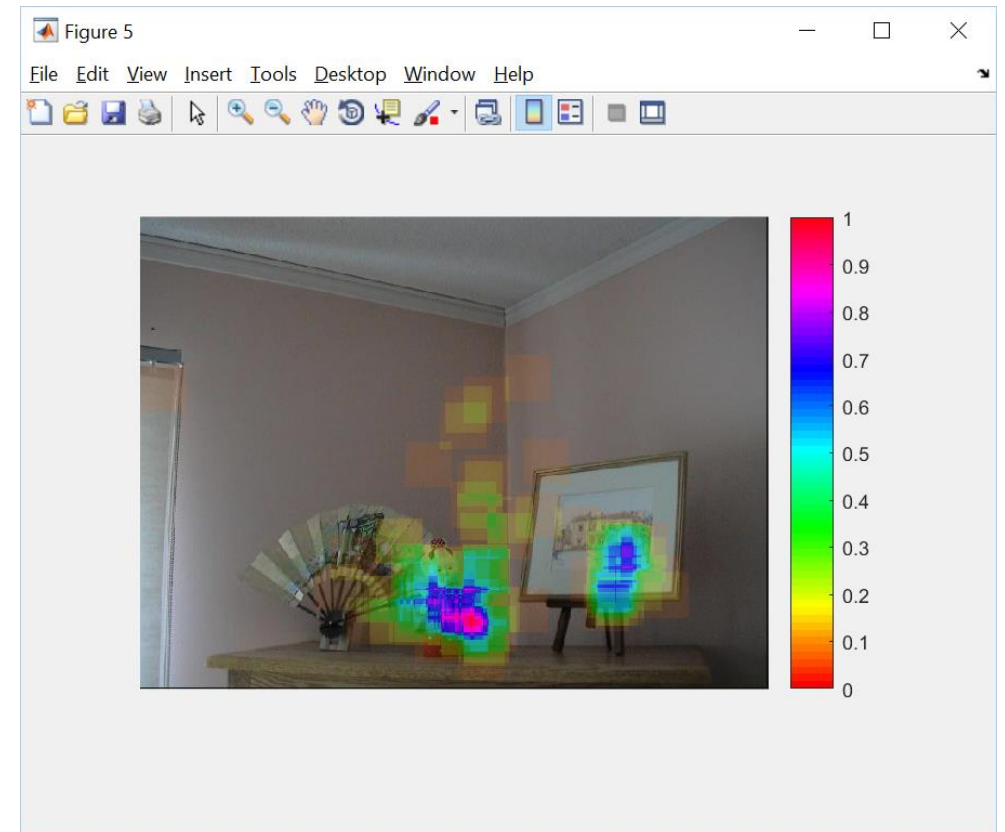
Change parameters of Gaussian filter

```
gaussian_kernel = fspecial('gaussian', [50 50], 20);  
density = imfilter(fixations, gaussian_kernel, 'replicate');  
figure,imshow(density,[]);
```



Change parameters of Gaussian filter

```
gaussian_kernel = fspecial('gaussian', [50 50], 50);  
density = imfilter(fixations, gaussian_kernel, 'replicate');  
figure,imshow(density,[]);
```



Q&A