University of Dayton

Lab 6

CPS 563 – Data Visualization

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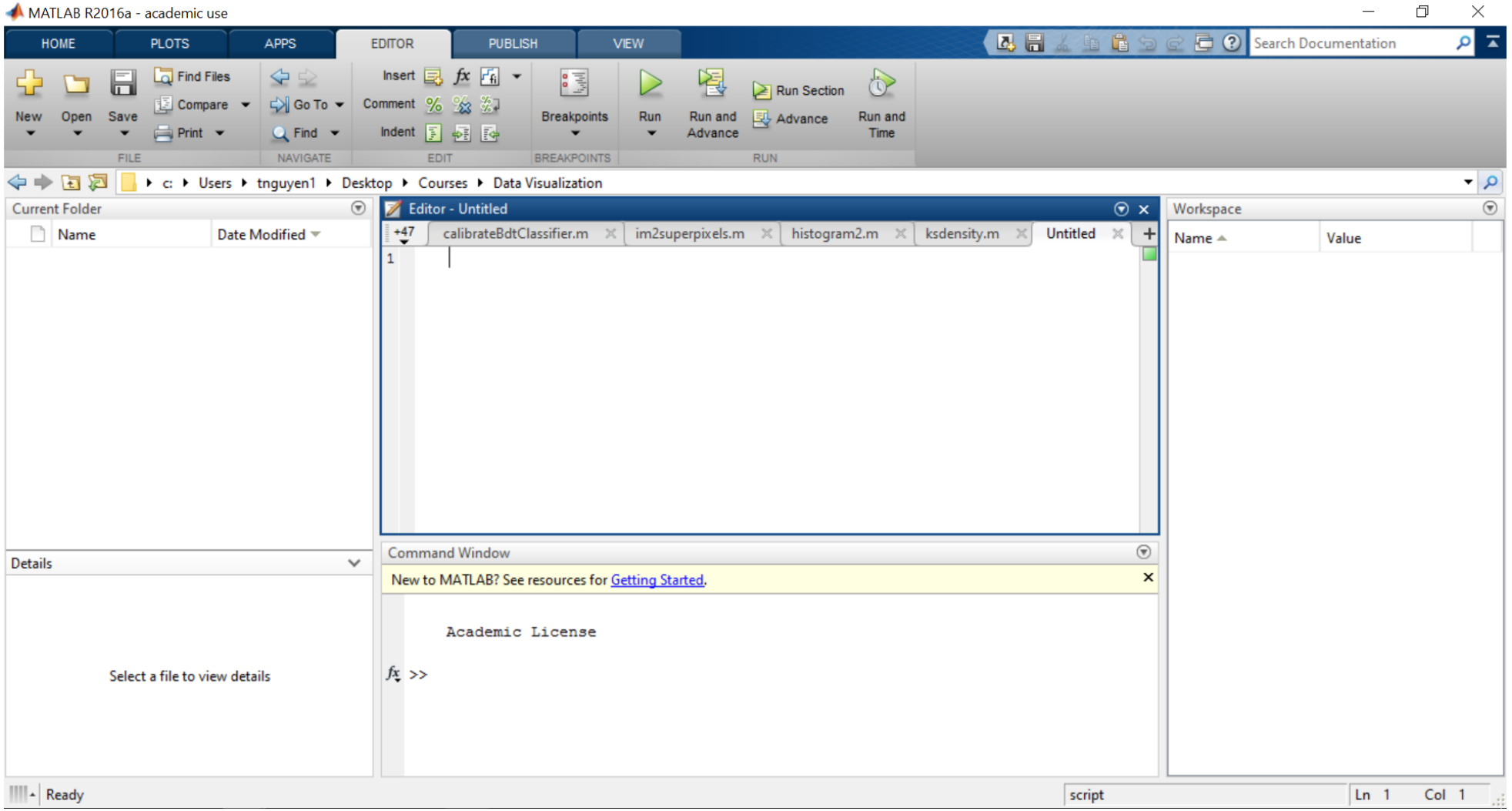
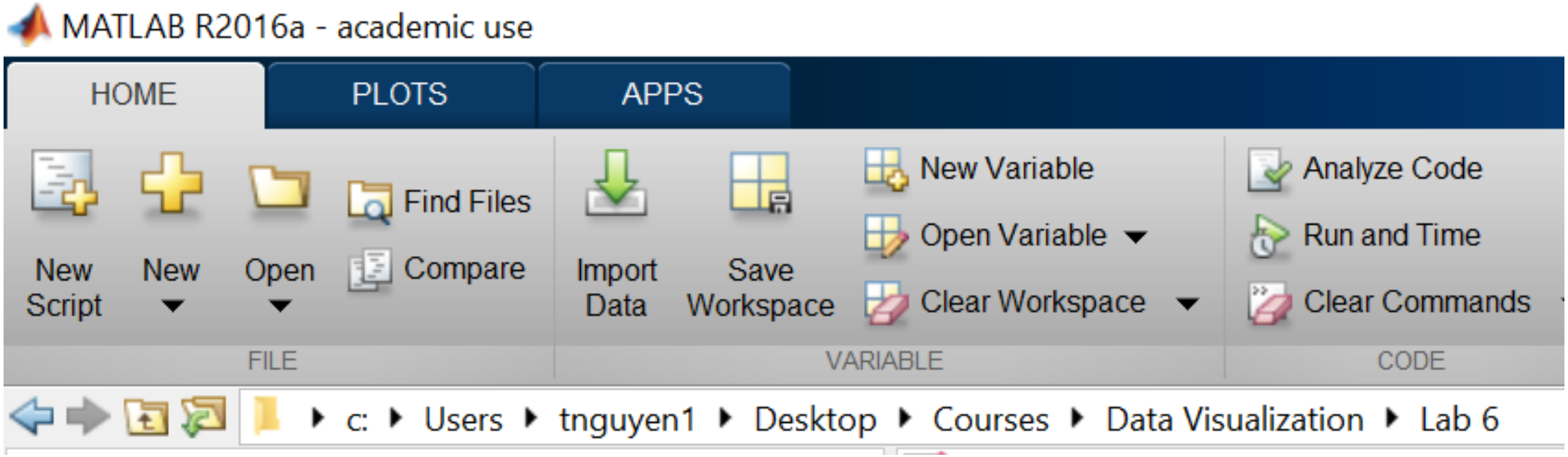
Outline

- Practice with Gaussian filter
- Create heat maps

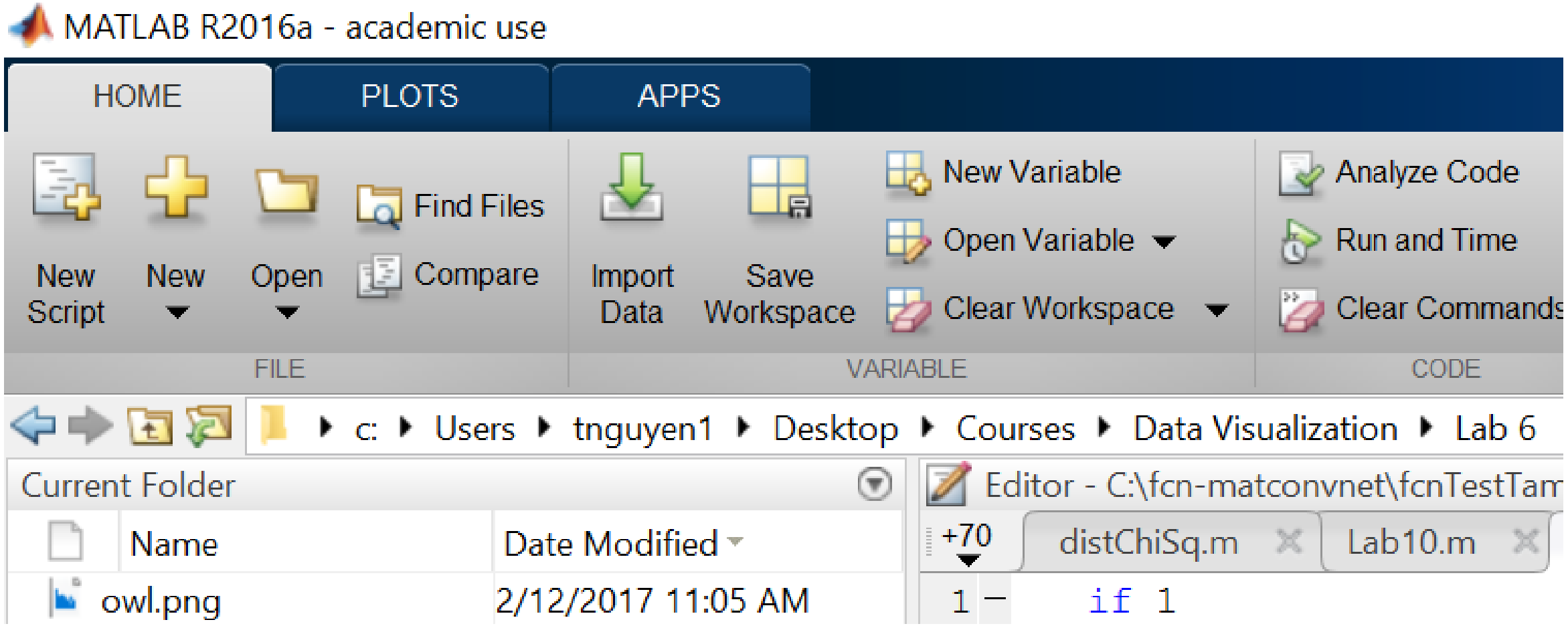
Start MATLAB



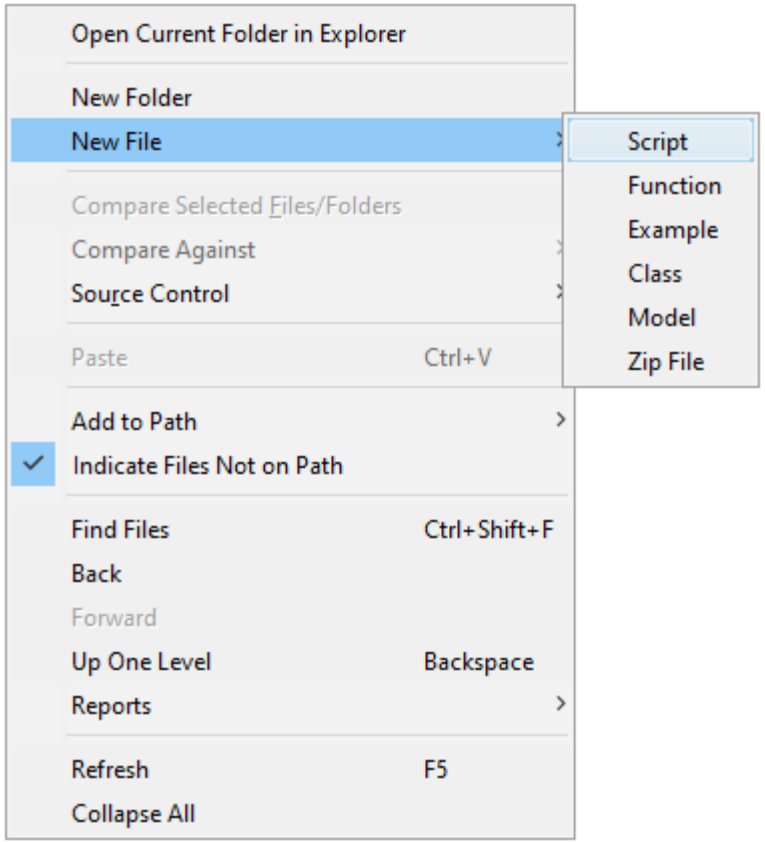
Create Lab 6 folder



Copy owl.png from isidore to Lab 6 folder



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

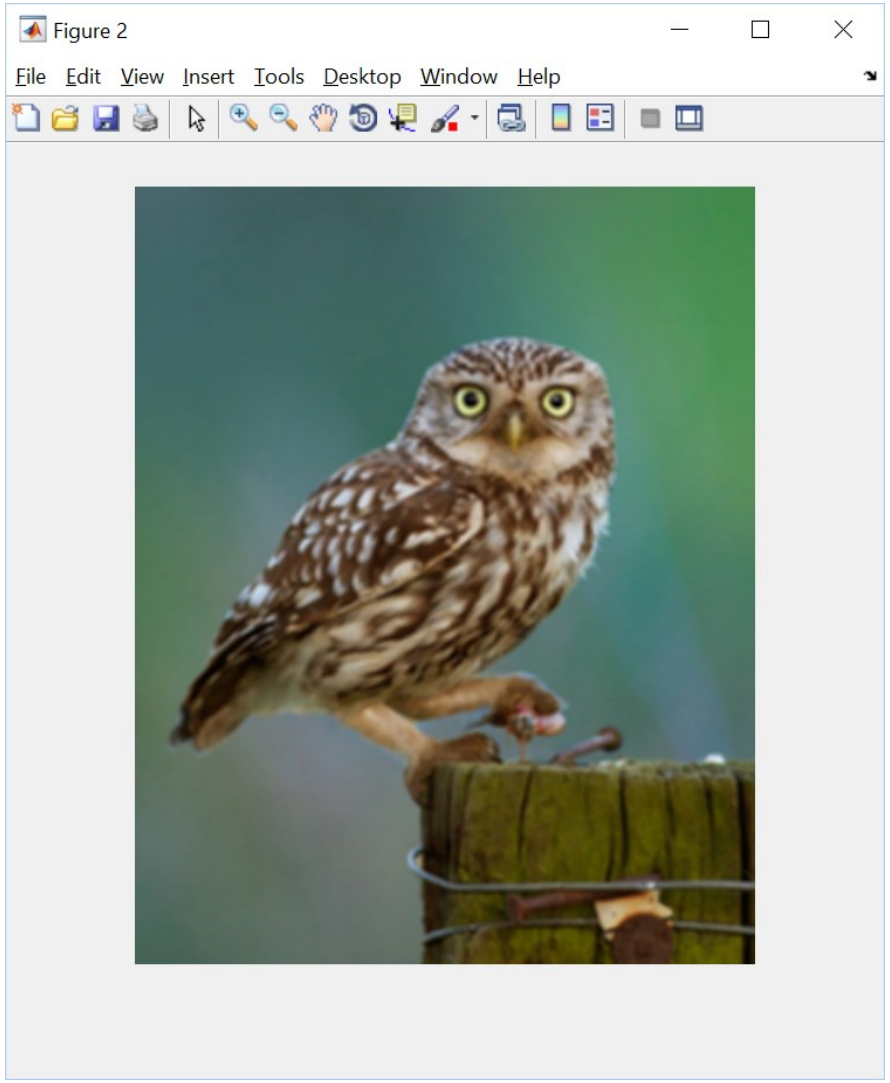
```
img = imread('owl.png');
figure, imshow(img);

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');
```

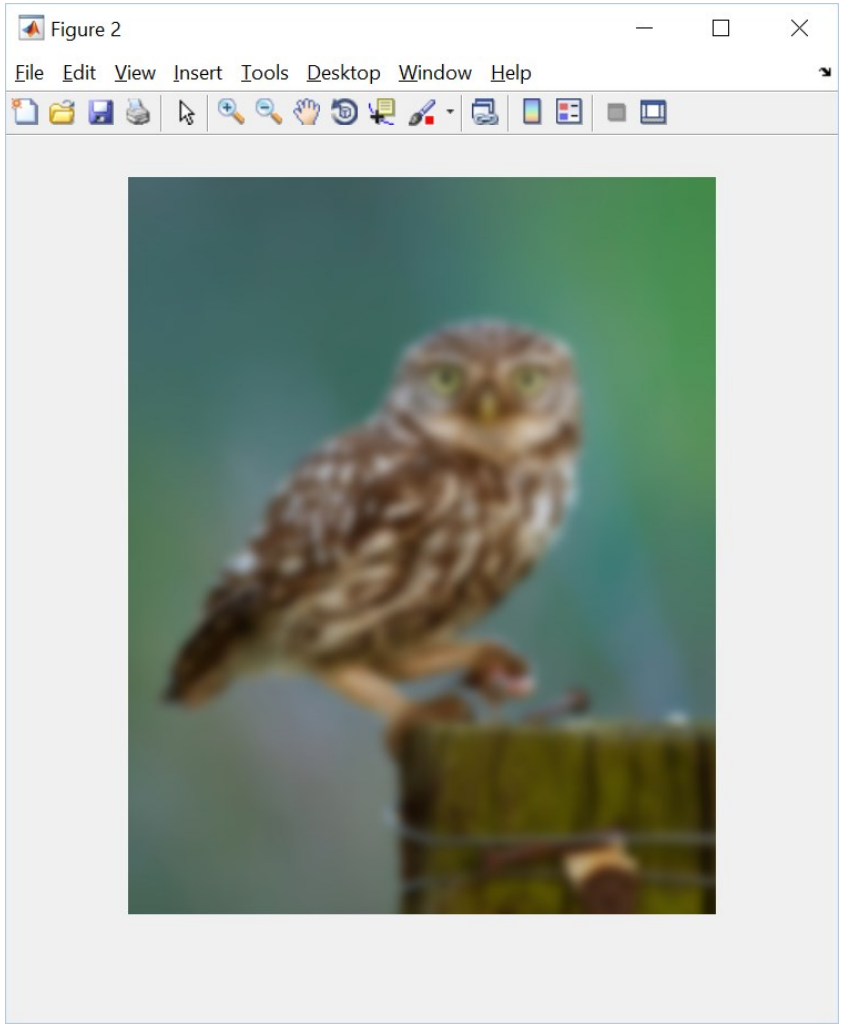
Display the filtered result

```
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);
```



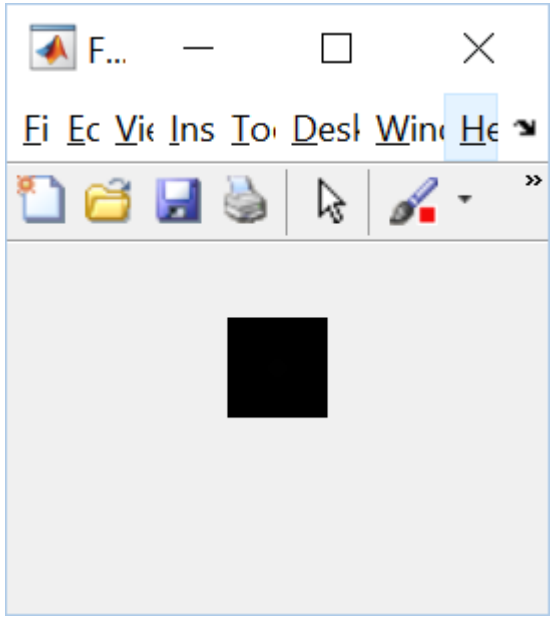
Change the kernel size

```
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);
```



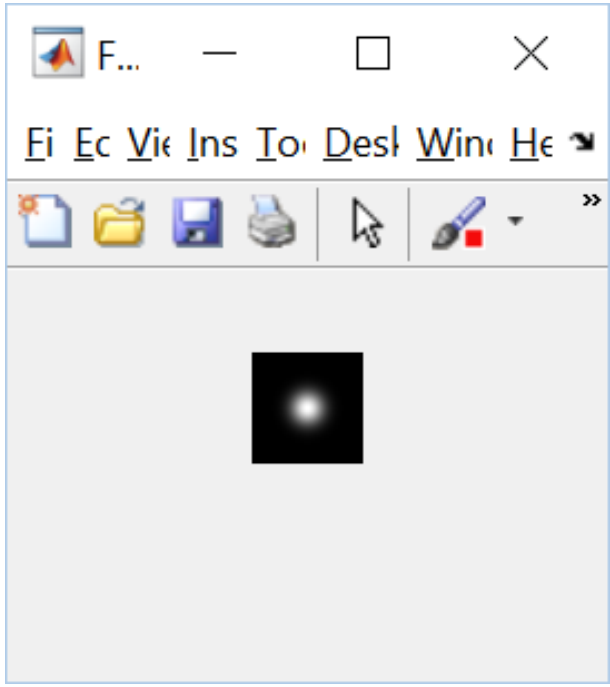
What does the kernel look like?

```
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);
```

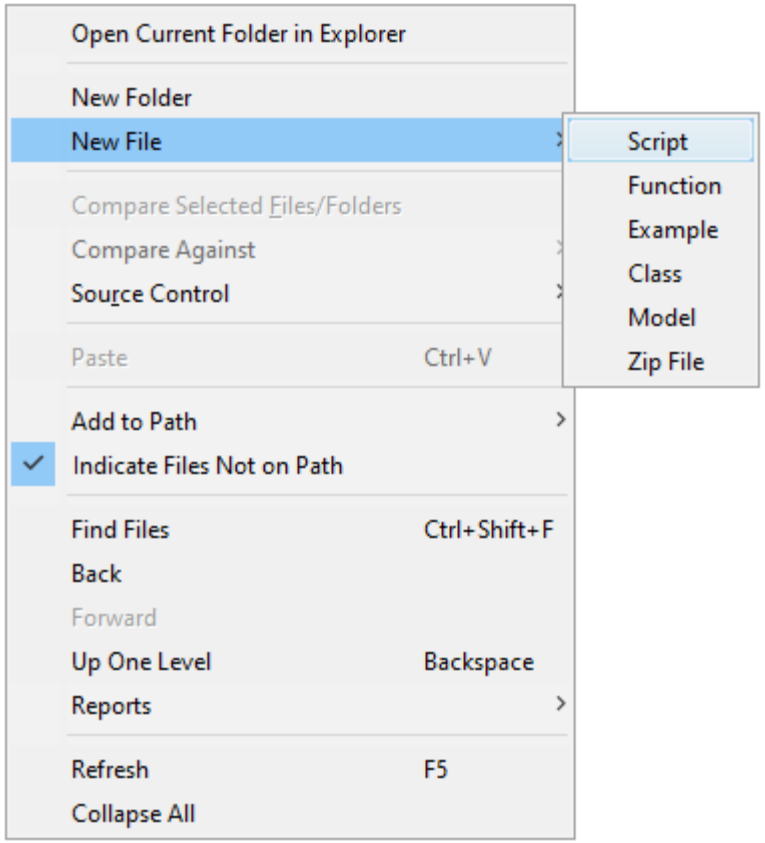


What does the kernel look like?

```
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

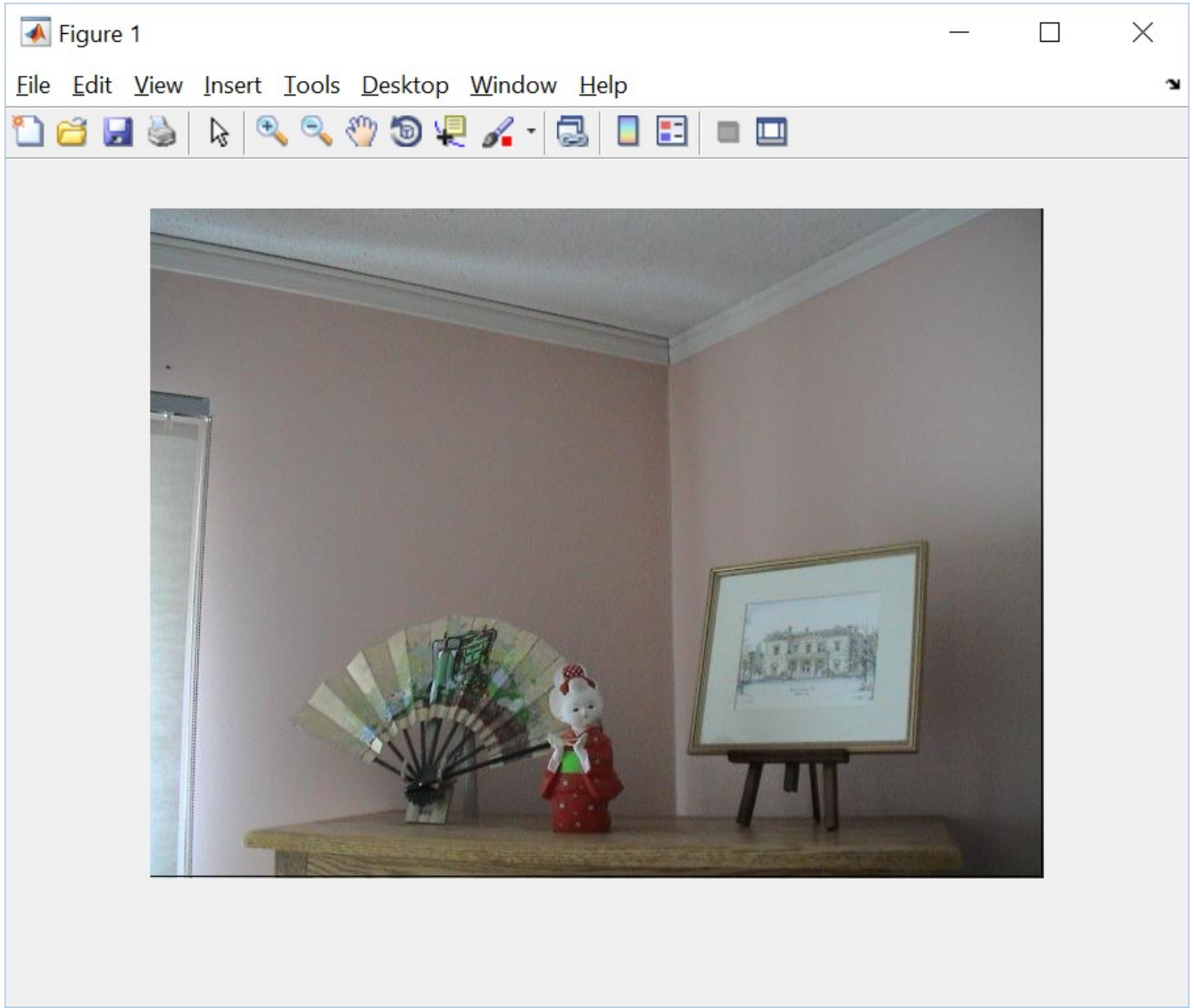


Lab6b.m

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

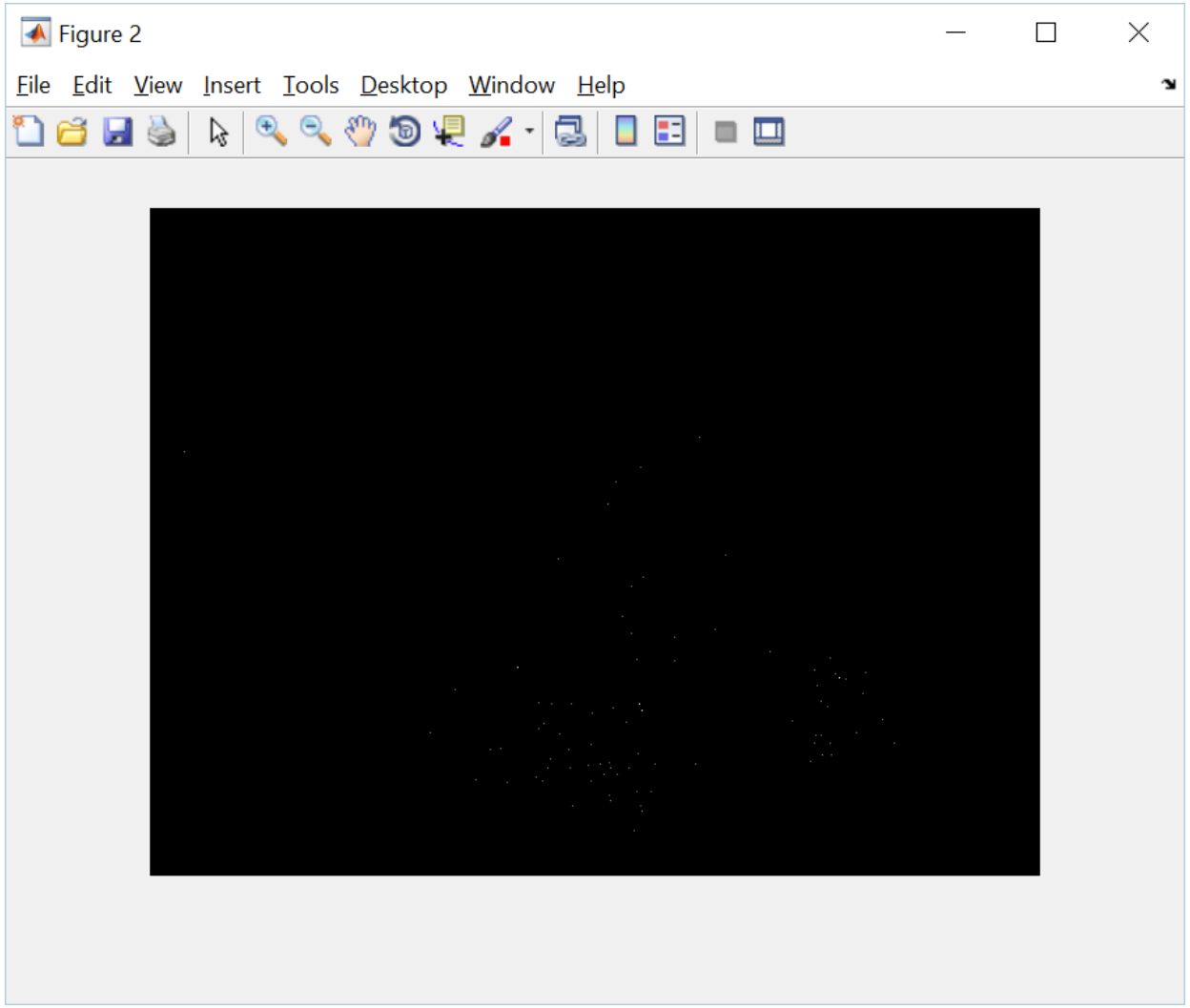
Read image from file

```
close all;
clear all;
clc;

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



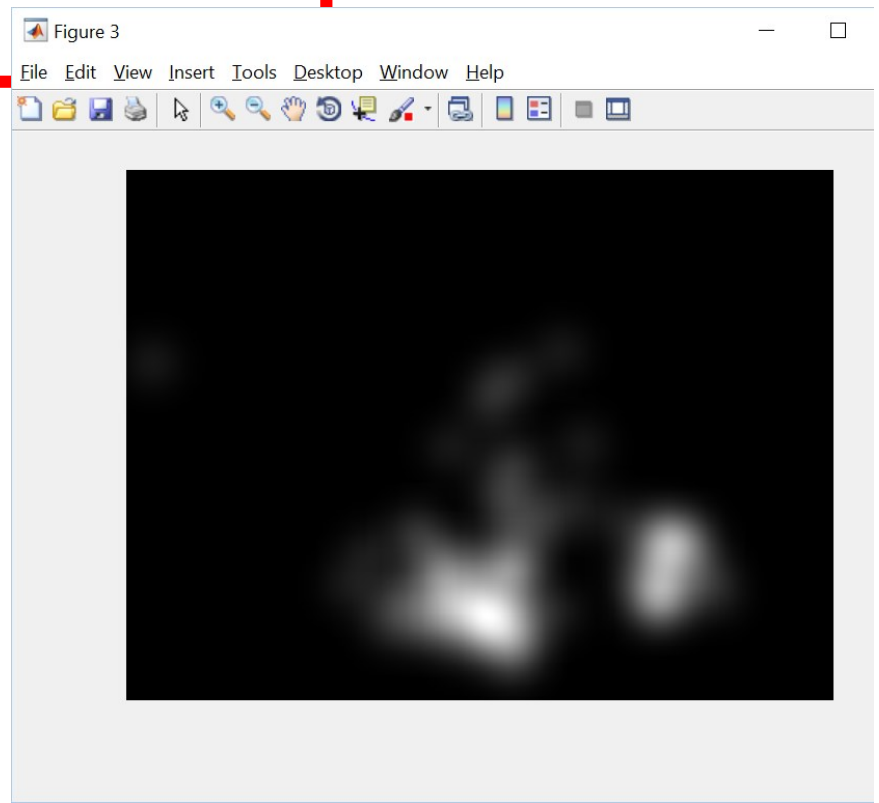
Read fixation data

```
close all;
clear all;
clc;

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

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



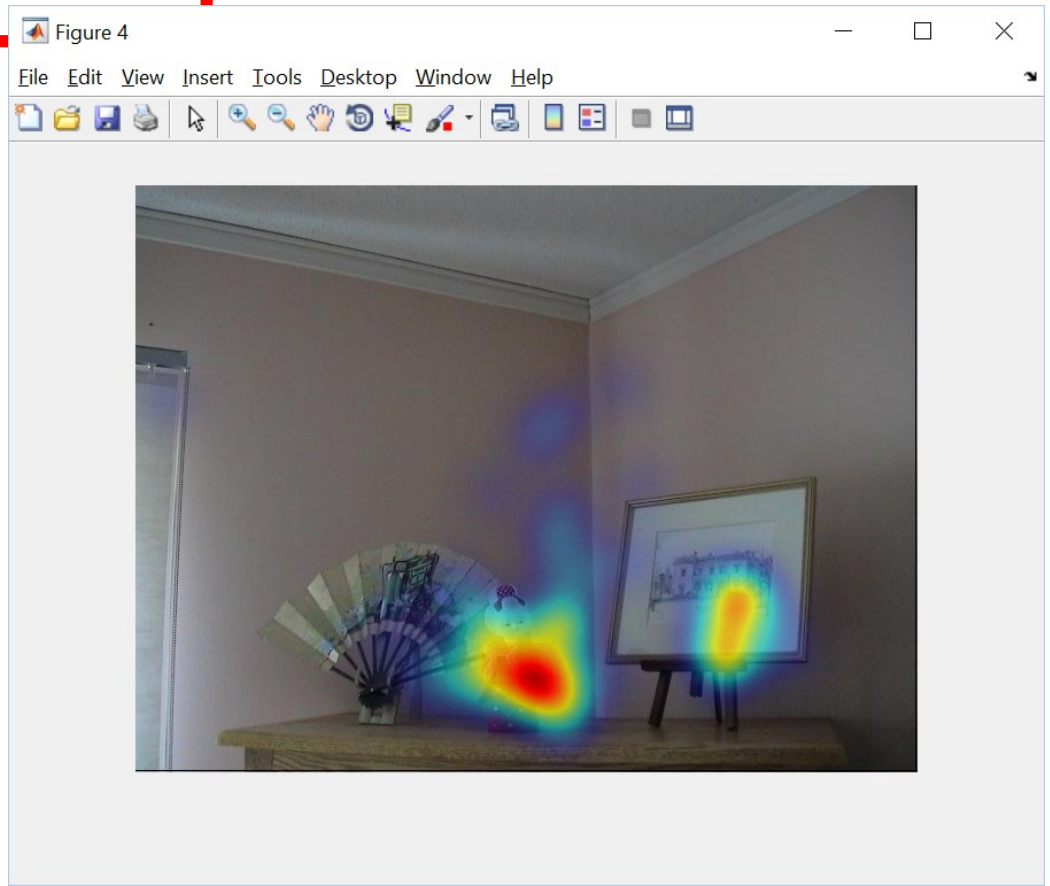
Apply Gaussian filter on fixation data

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



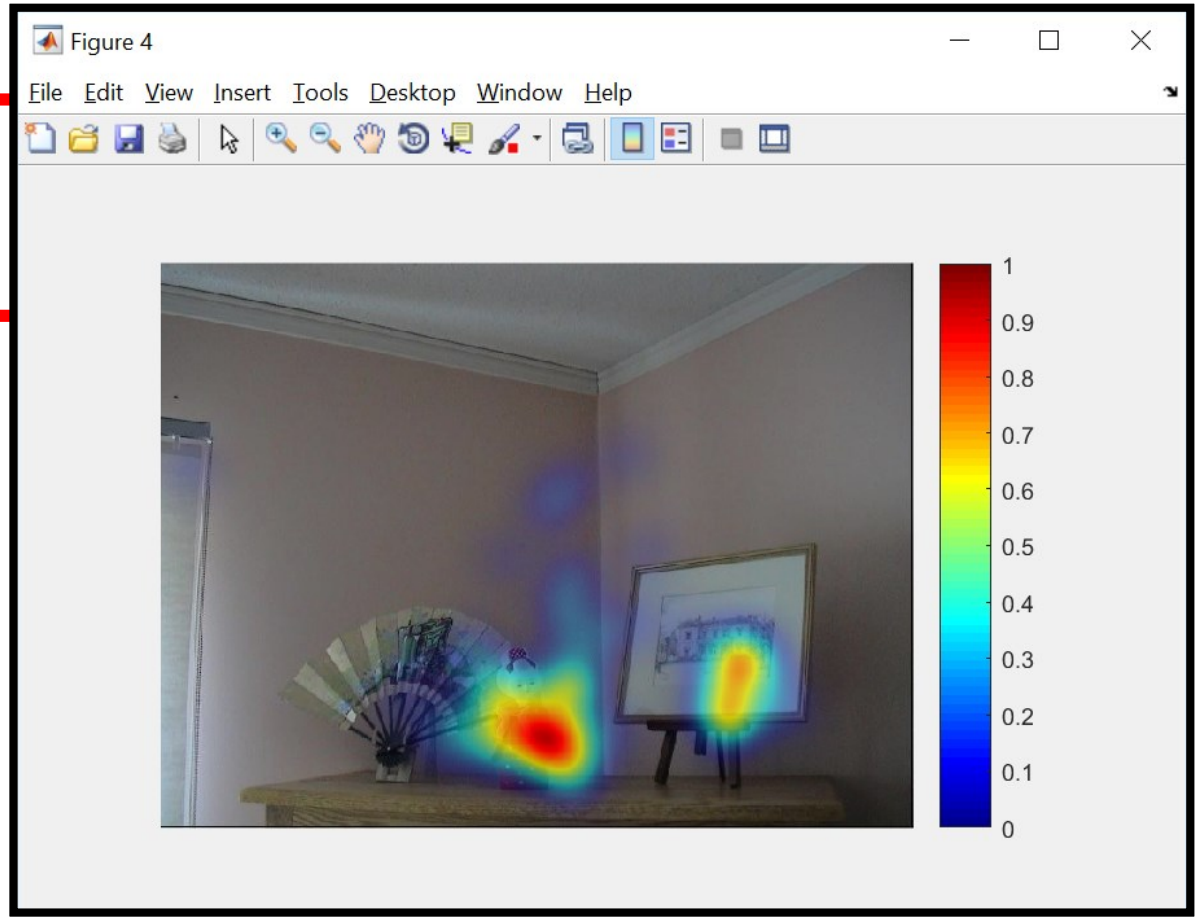
Overlay the density map on the image

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



Add colormap

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

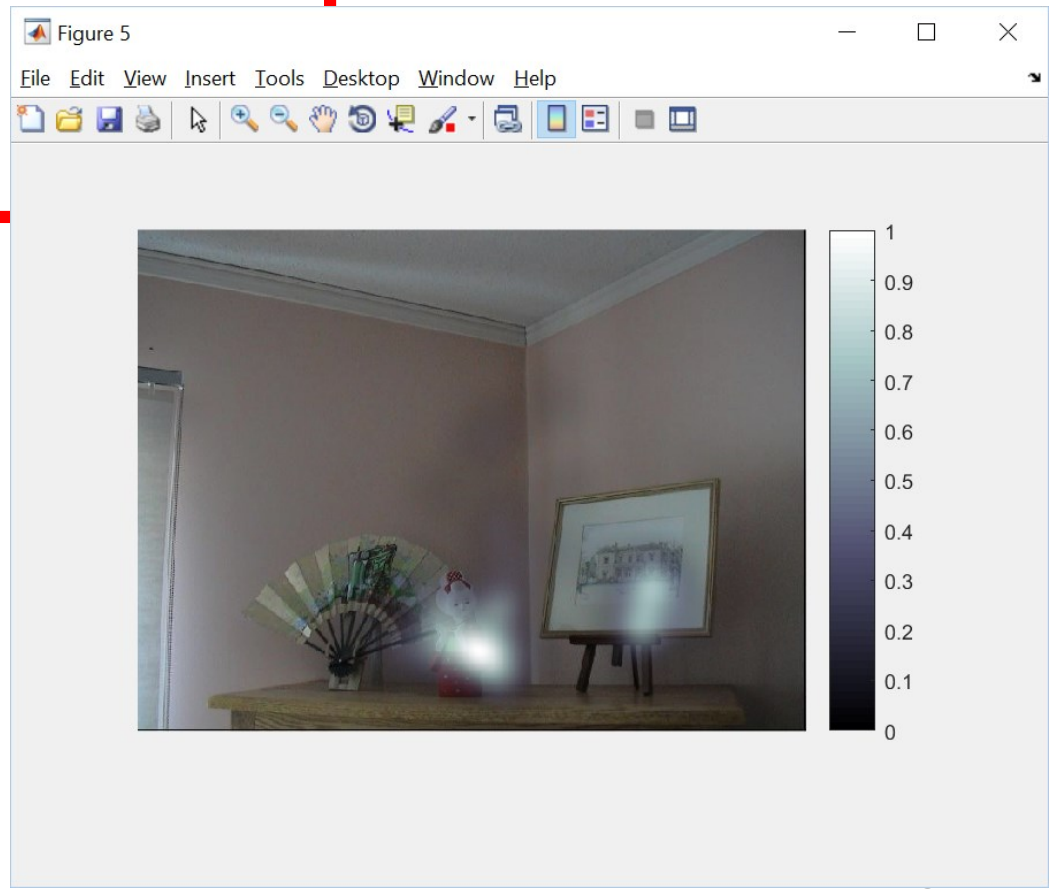


Colormaps in MATLAB

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

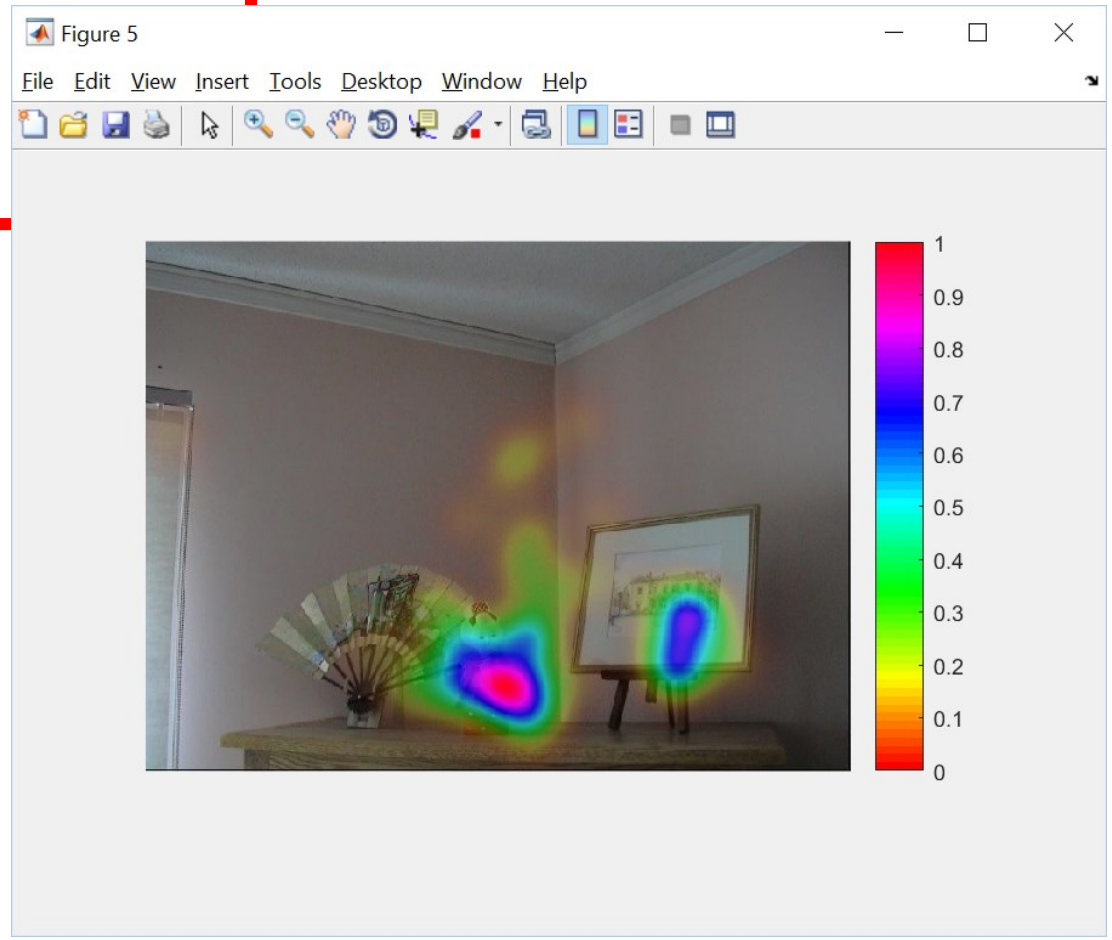
Try different colormap

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



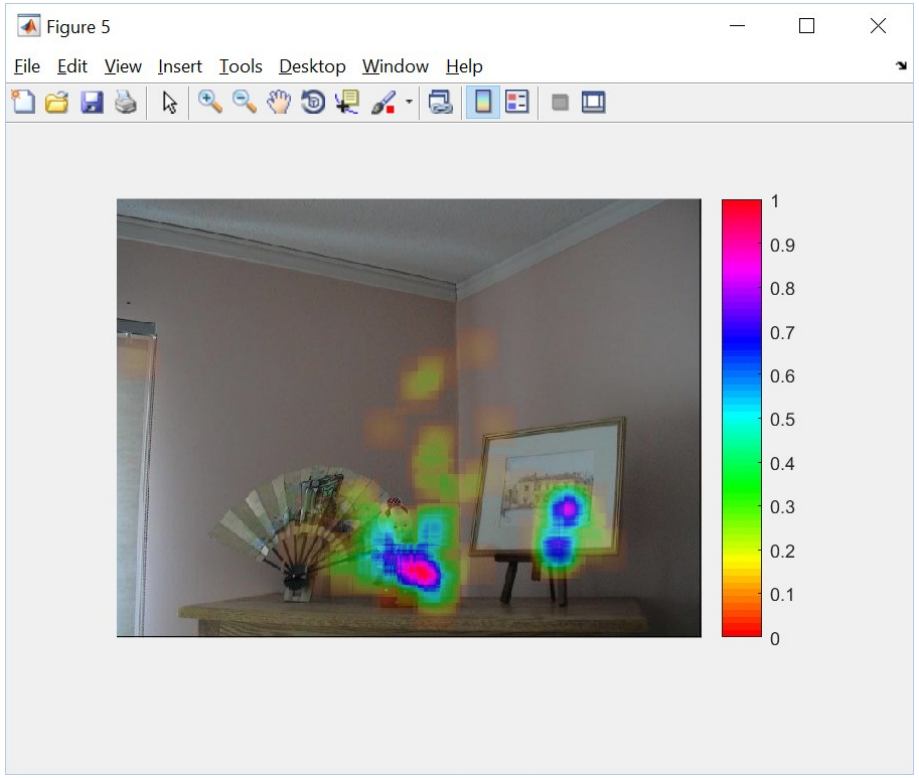
Try different colormap

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



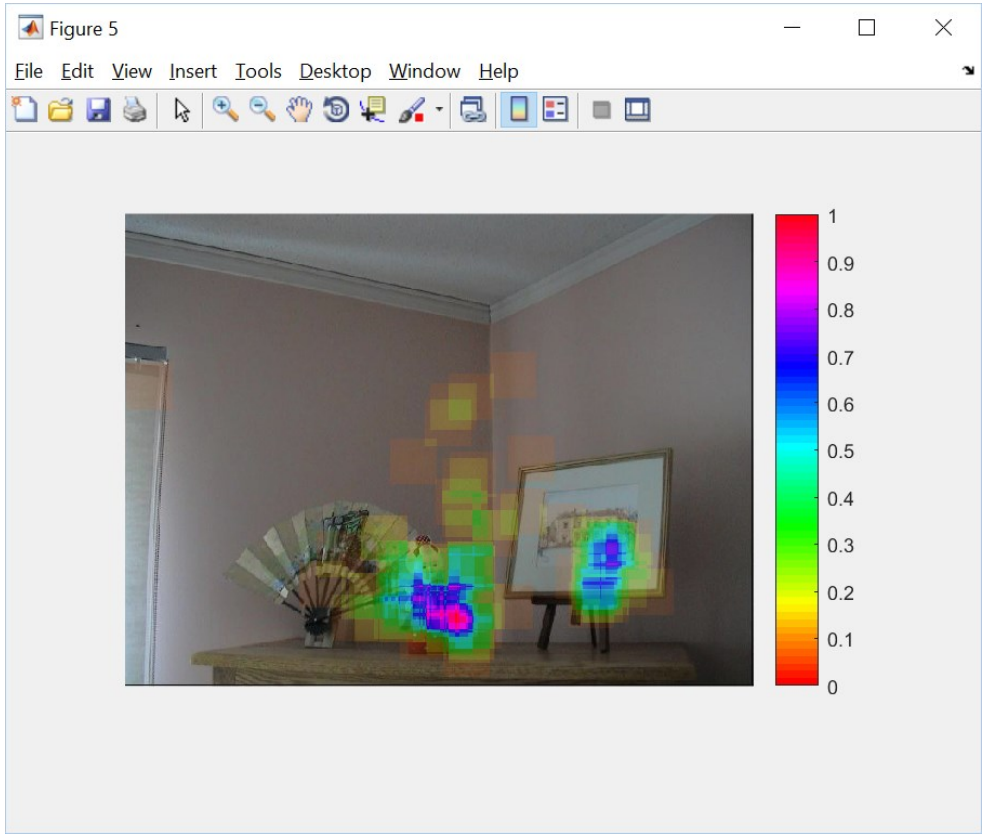
Change parameters of Gaussian filter

```
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