



University of
Dayton

Lab 7

CPS 563 – Data Visualization

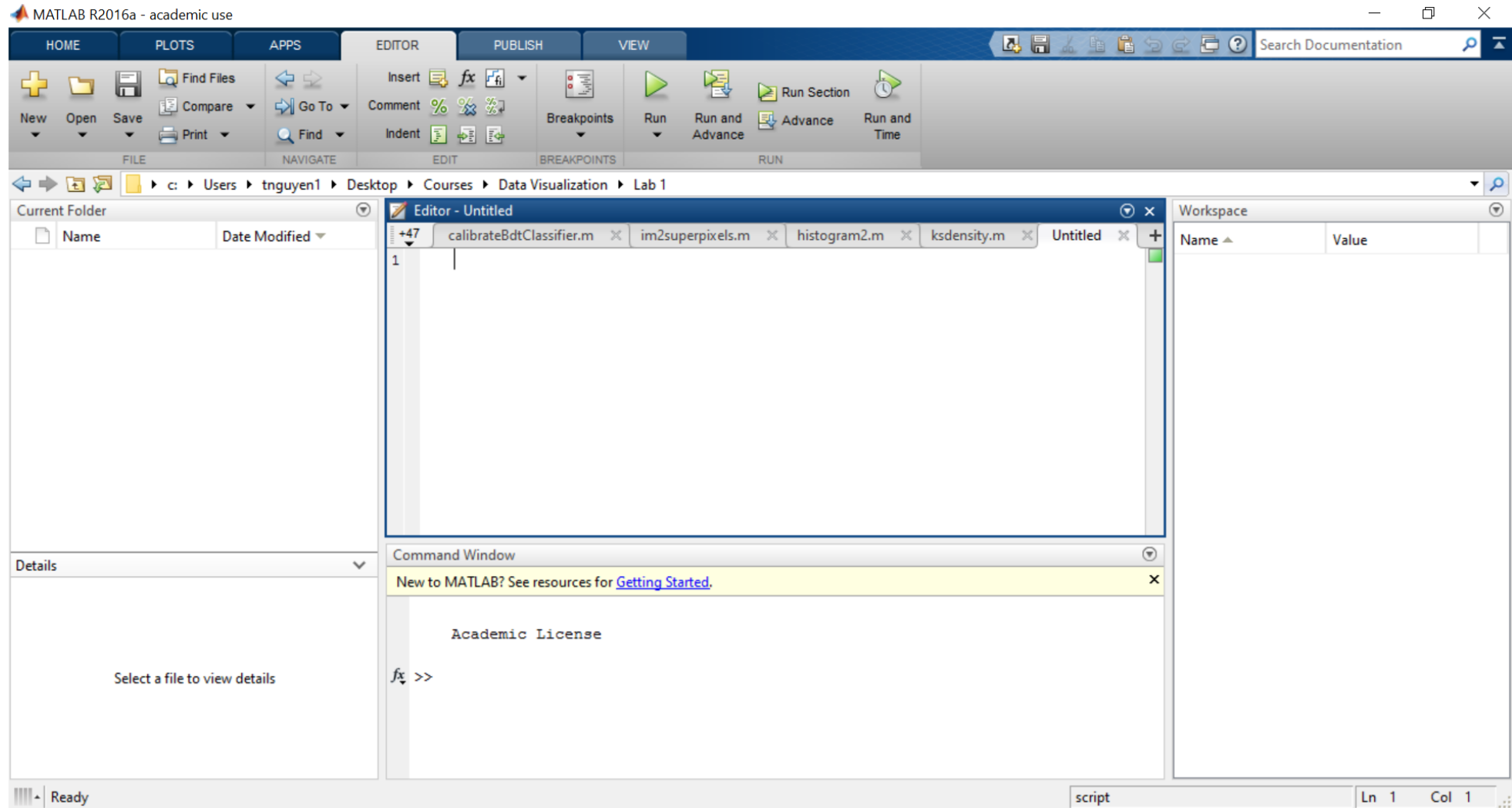
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Outline

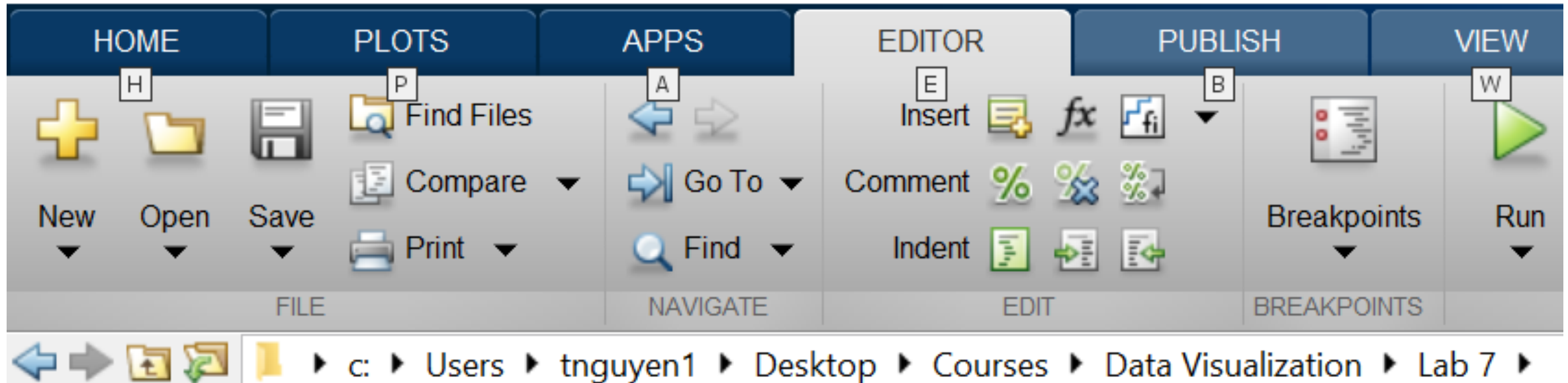
- Create tree maps

Start MATLAB




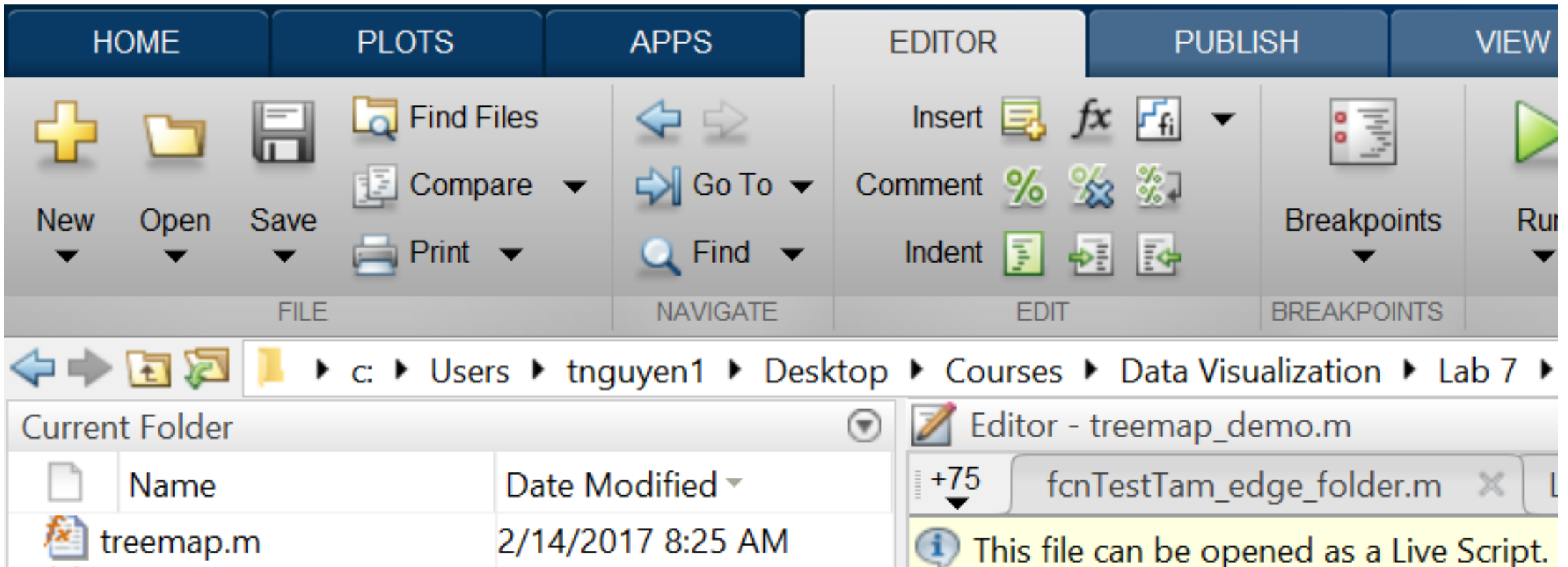
Create Lab 7 folder

 MATLAB R2016a - academic use



Copy treemap.m from isidore to Lab 7 folder

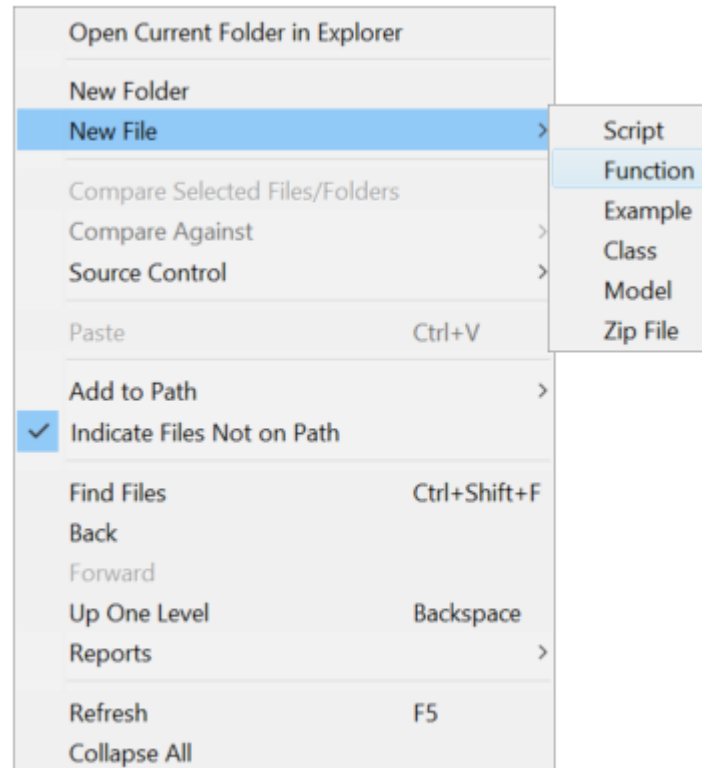
 MATLAB R2016a - academic use



The screenshot shows the MATLAB R2016a interface. The top menu bar includes HOME, PLOTS, APPS, EDITOR, PUBLISH, and VIEW. The HOME tab is active, displaying icons for New, Open, Save, Find Files, Compare, Print, Go To, and Find. The current folder is set to `c:\Users\tnguyen1\Desktop\Courses\Data Visualization\Lab 7`. The current folder list shows a file named `treemap.m` with a date modified of 2/14/2017 8:25 AM. The editor window is open, showing the file `treemap_demo.m` with a zoom level of +75. A message at the bottom indicates that the file can be opened as a Live Script.

Name	Date Modified
treemap.m	2/14/2017 8:25 AM

Create new function file: plotRectangles.m



plotRectangles.m

```
function [ output_args ] = plotRectangles( input_args )  
%PLOTRECTANGLES Summary of this function goes here  
% Detailed explanation goes here  
  
end
```

plotRectangles.m

```
function plotRectangles(rectangles,labels,colors)
%PLOTRECTANGLES Summary of this function goes here
% Detailed explanation goes here

end
```


plotRectangles.m

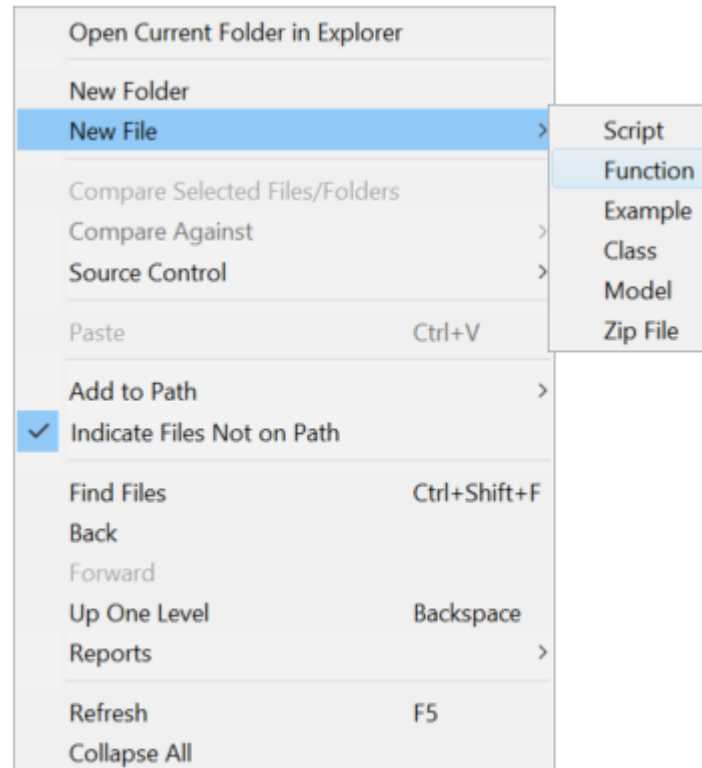
```
function plotRectangles(rectangles,labels,colors)
    for i = 1:size(rectangles,2)
        r = rectangles(:,i);
        xPoints = [r(1), r(1), r(1) + r(3),r(1) + r(3)];
        yPoints = [r(2), r(2)+ r(4), r(2)+ r(4),r(2)];
        patch(xPoints,yPoints,colors(i,:), 'EdgeColor','none');
        if(~isempty(labels))
            text(r(1) + r(3)/2,r(2) + r(4)/2, 1, labels{i}, 'VerticalAlignment','middle','HorizontalAlignment','center')
        end
    end
    axis equal
    axis tight
    axis off
end
```

plotRectangles.m

```
function plotRectangles(rectangles,labels,colors)
    if(nargin < 2)
        labels = [];
    end
    if(nargin < 3)
        colors = rand(size(rectangles,2),3).^0.5;
    end
    for i = 1:size(rectangles,2)
        r = rectangles(:,i);
        xPoints = [r(1), r(1), r(1) + r(3),r(1) + r(3)];
        yPoints = [r(2), r(2)+ r(4), r(2)+ r(4),r(2)];
        patch(xPoints,yPoints,colors(i,:), 'EdgeColor','none');
        if(~isempty(labels))
            text(r(1) + r(3)/2,r(2) + r(4)/2, 1, labels{i}, 'VerticalAlignment','middle','HorizontalAlignment','center')
        end
    end

    axis equal
    axis tight
    axis off
end
```

Create new function file: outline.m



outline.m

```
function [ output_args ] = outline( input_args )  
%OUTLINE Summary of this function goes here  
% Detailed explanation goes here  
  
end
```

outline.m

```
function outline(rectangles)
```

```
%OUTLINE Summary of this function goes here
```

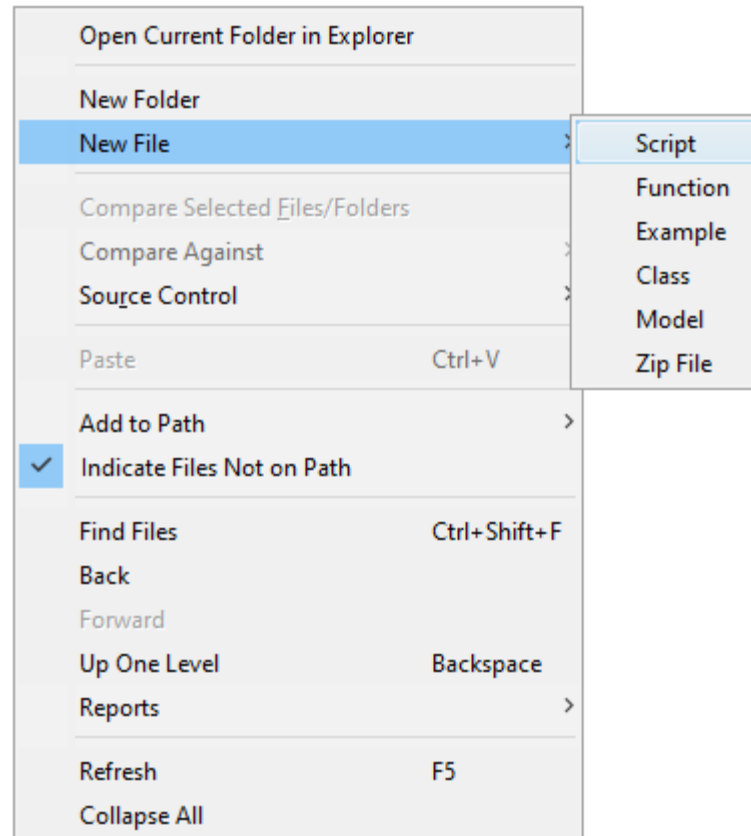
```
% Detailed explanation goes here
```

```
end
```

outline.m

```
function outline(rectangles)
    for i = 1:size(rectangles,2)
        r = rectangles(:,i);
        xPoints = [r(1),    r(1), r(1)+r(3), r(1)+r(3)];
        yPoints = [r(2), r(2)+r(4), r(2)+r(4), r(2)    ];
        patch(xPoints,yPoints,[0 0 0],'FaceColor','none')
    end
end
```

Create new script file: Lab7.m



Lab7.m

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


Lab7.m: Set up data

```
close all;
```

```
clear all;
```

```
clc;
```

```
% Create random data
```

```
n = 15;
```

```
data = rand(1,n);
```

Lab7.m: Set colors

```
close all;
```

```
clear all;
```

```
clc;
```

```
% Create random data
```

```
n = 15;
```

```
data = rand(1,n);
```

```
% Set colors
```

```
colors = (jet(n)+1)/2;
```

Lab7.m: Add labels

```
% Set colors
```

```
colors = (jet(n)+1)/2;
```

```
% Add labels
```

```
labels = {};
```

```
for i = 1:n
```

```
    labels{i} = sprintf('%2.1f%%',100*data(i)/sum(data));
```

```
end
```

Lab7.m: Partition the data to blocks

`% Add labels`

```
labels = {};
```

```
for i = 1:n
```

```
    labels{i} = sprintf('%2.1f%%',100*data(i)/sum(data));
```

```
end
```

`% Partition the data to blocks`

```
rectangles = treemap(data);
```

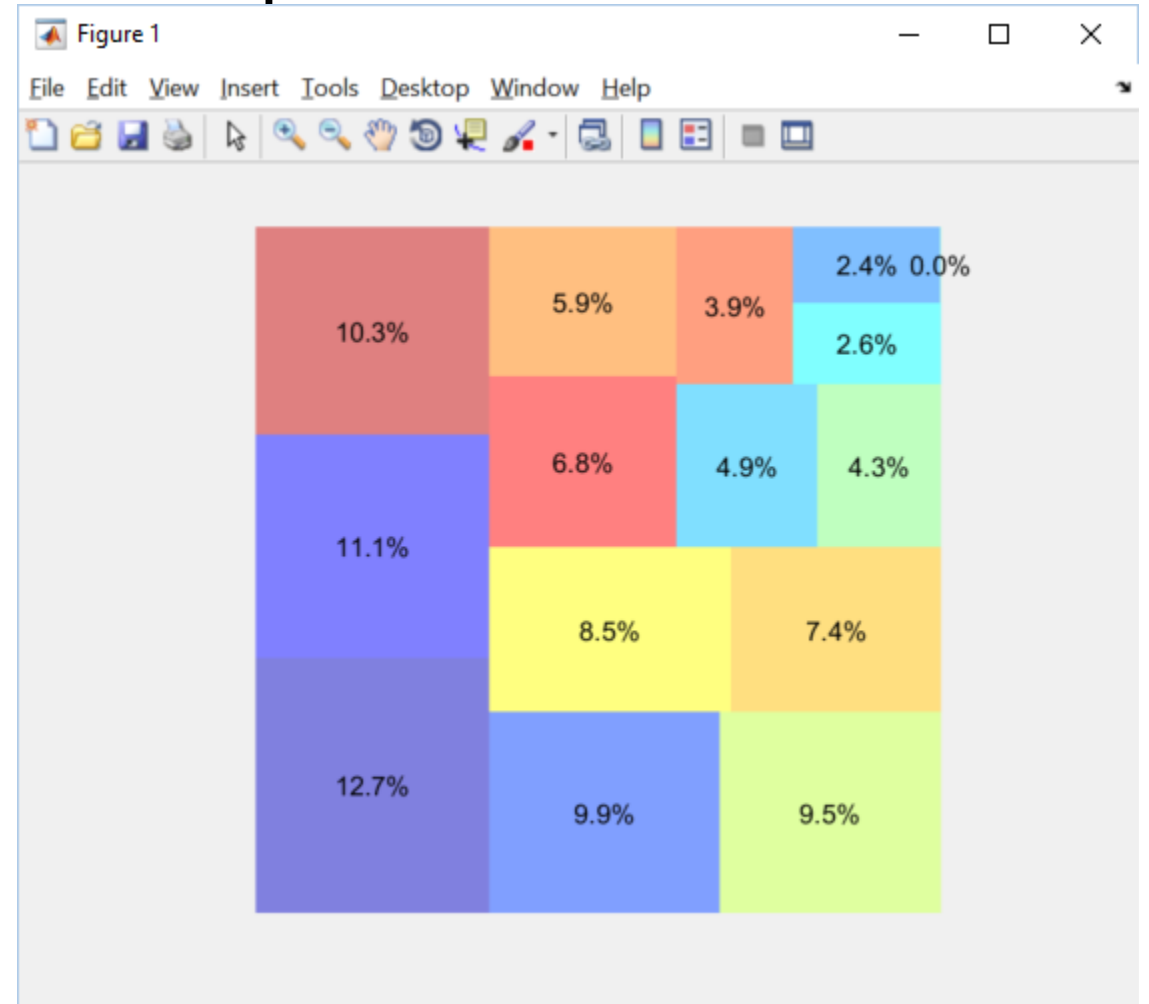
Lab7.m: Display the treemap

% Partition the data to blocks

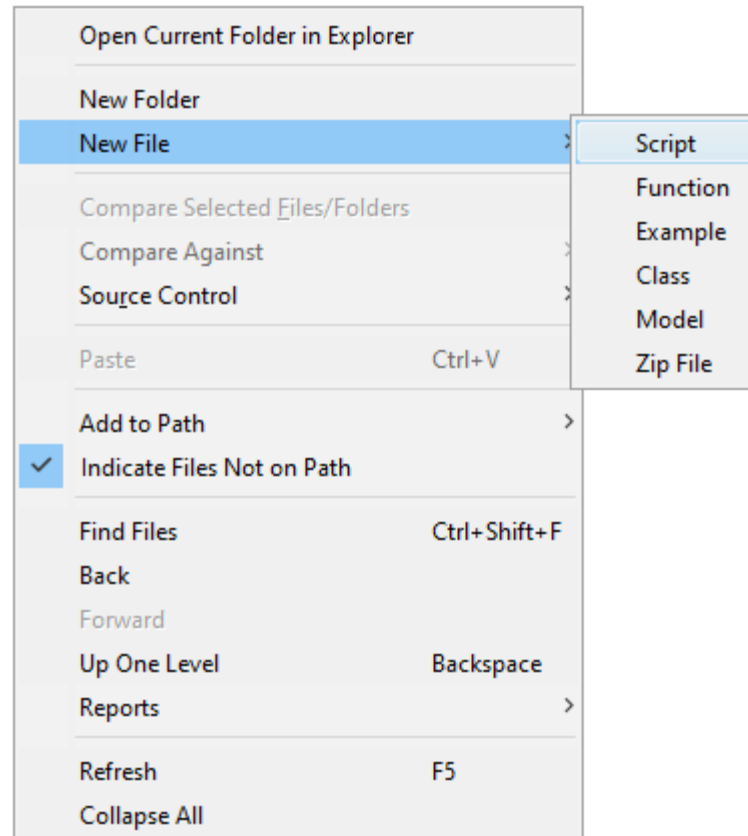
```
rectangles = treemap(data);
```

% Plot the tree map

```
plotRectangles(rectangles, labels, colors);
```



Create new script file: Lab7b.m



Lab7b.m

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

Lab7b.m: Set up data

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

```
data = {'Alaska',571951;  
        'Texas' 261797;  
        'California',155959;  
        'Montana',145552;  
        'New Mexico',121356;  
        'Arizona',113635;  
        'Nevada',109826;  
        'Colorado',103718;  
        'Oregon',95997};
```


Lab7b.m: Set the color

```
data = {'Alaska',571951;  
        'Texas' 261797;  
        'California',155959;  
        'Montana',145552;  
        'New Mexico',121356;  
        'Arizona',113635;  
        'Nevada',109826;  
        'Colorado',103718;  
        'Oregon',95997};
```

```
colors = ones(10,3);
```

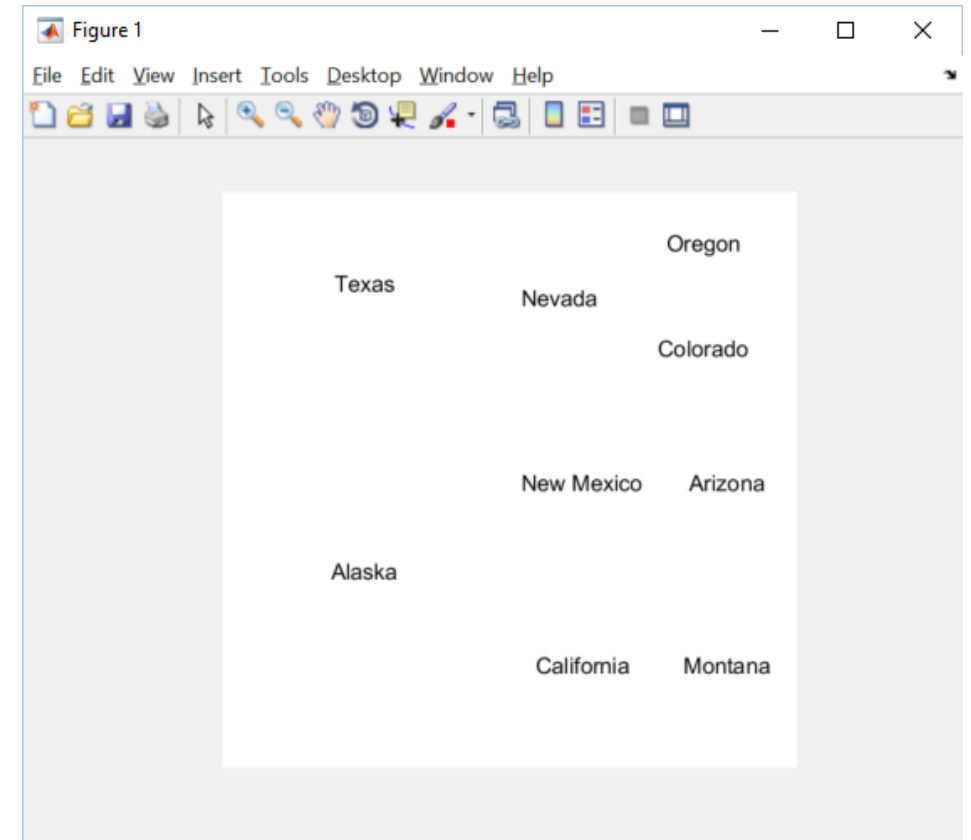
Lab7b.m: Display the treemap without outline

```
colors = ones(10,3);
```

```
rectangles = treemap([data{:,2}]);
```

```
labels = data(:,1);
```

```
plotRectangles(rectangles,labels,colors);
```



Lab7b.m: Outline the treemap

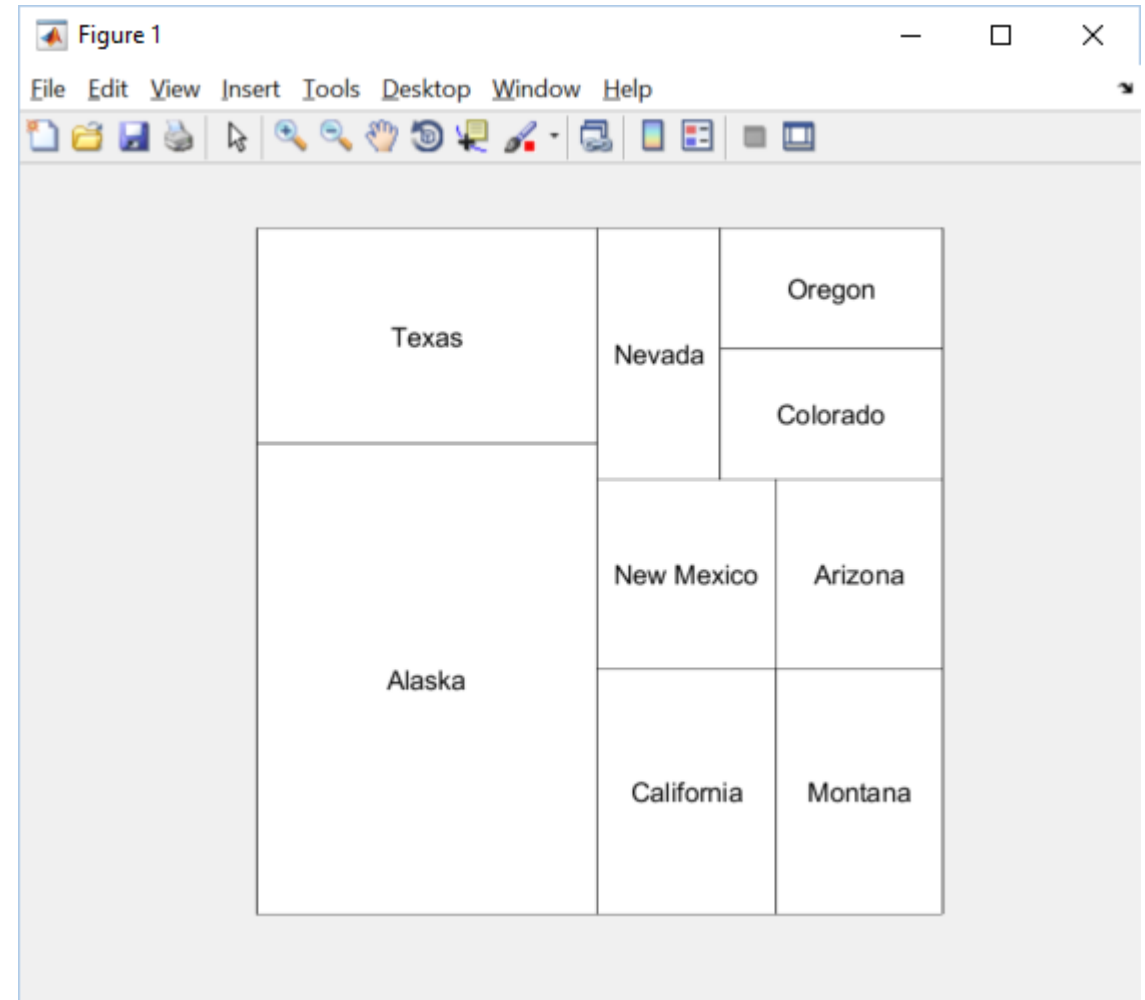
```
colors = ones(10,3);
```

```
rectangles = treemap([data{:,2}]);
```

```
labels = data(:,1);
```

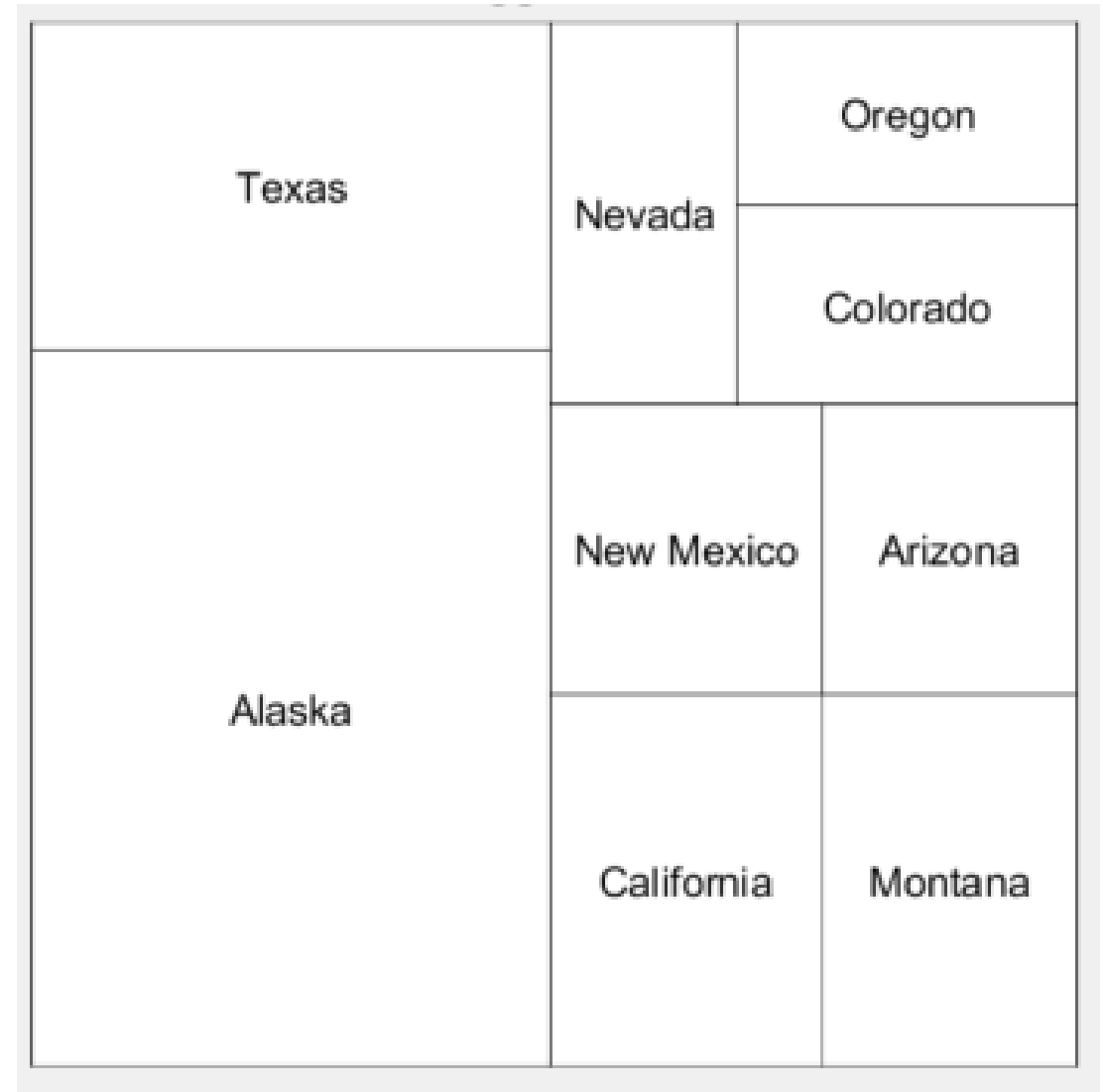
```
plotRectangles(rectangles,labels,colors);
```

```
outline(rectangles);
```



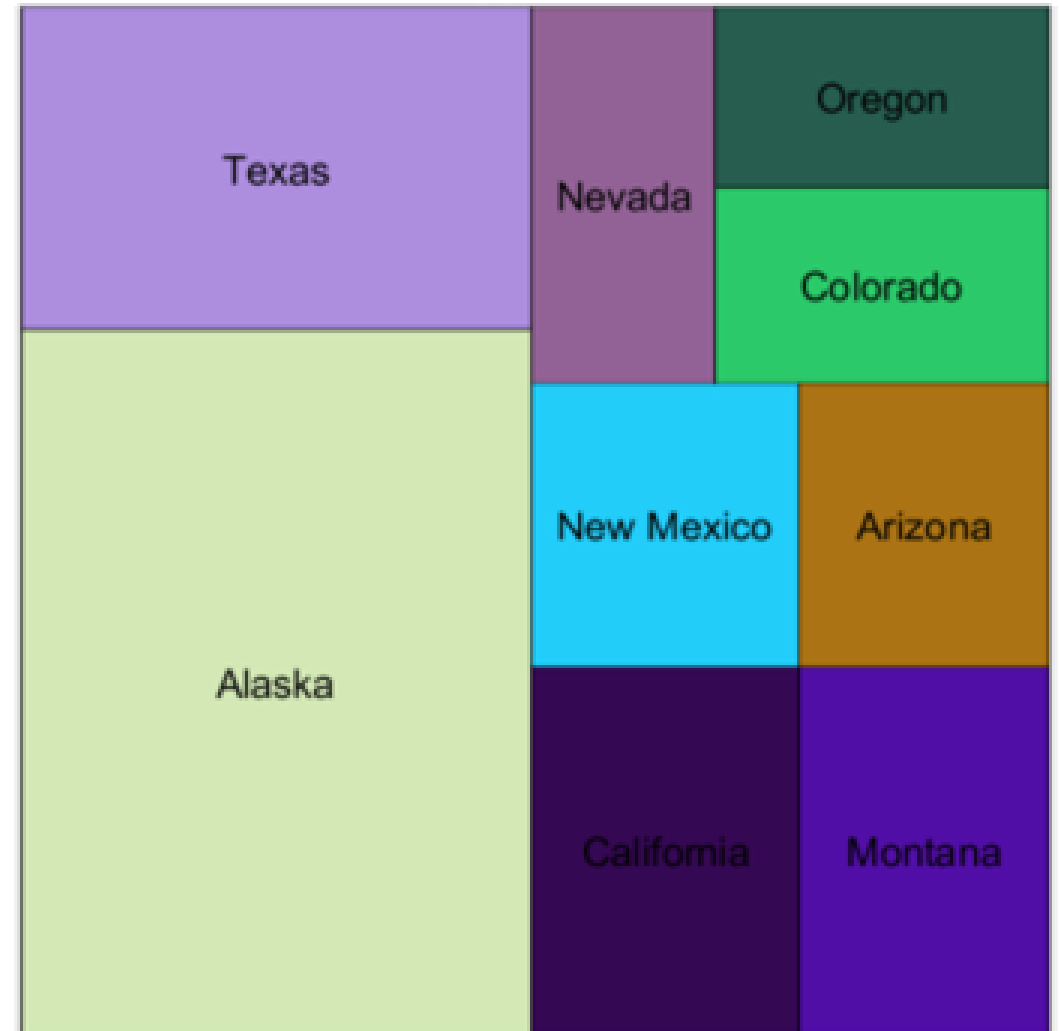
Lab7b.m: Display the title

```
plotRectangles(rectangles,labels,colors);  
outline(rectangles);  
title('The Nine Biggest U.S. States');
```



Lab7b.m: Change the color

```
colors = rand(10,3);  
  
rectangles = treemap([data{:,2}]);  
  
labels = data(:,1);  
  
plotRectangles(rectangles,labels,colors)  
outline(rectangles);  
title('The Nine Biggest U.S. States');
```



Q&A