University of Dayton

Lab 7

CPS 563 – Data Visualization

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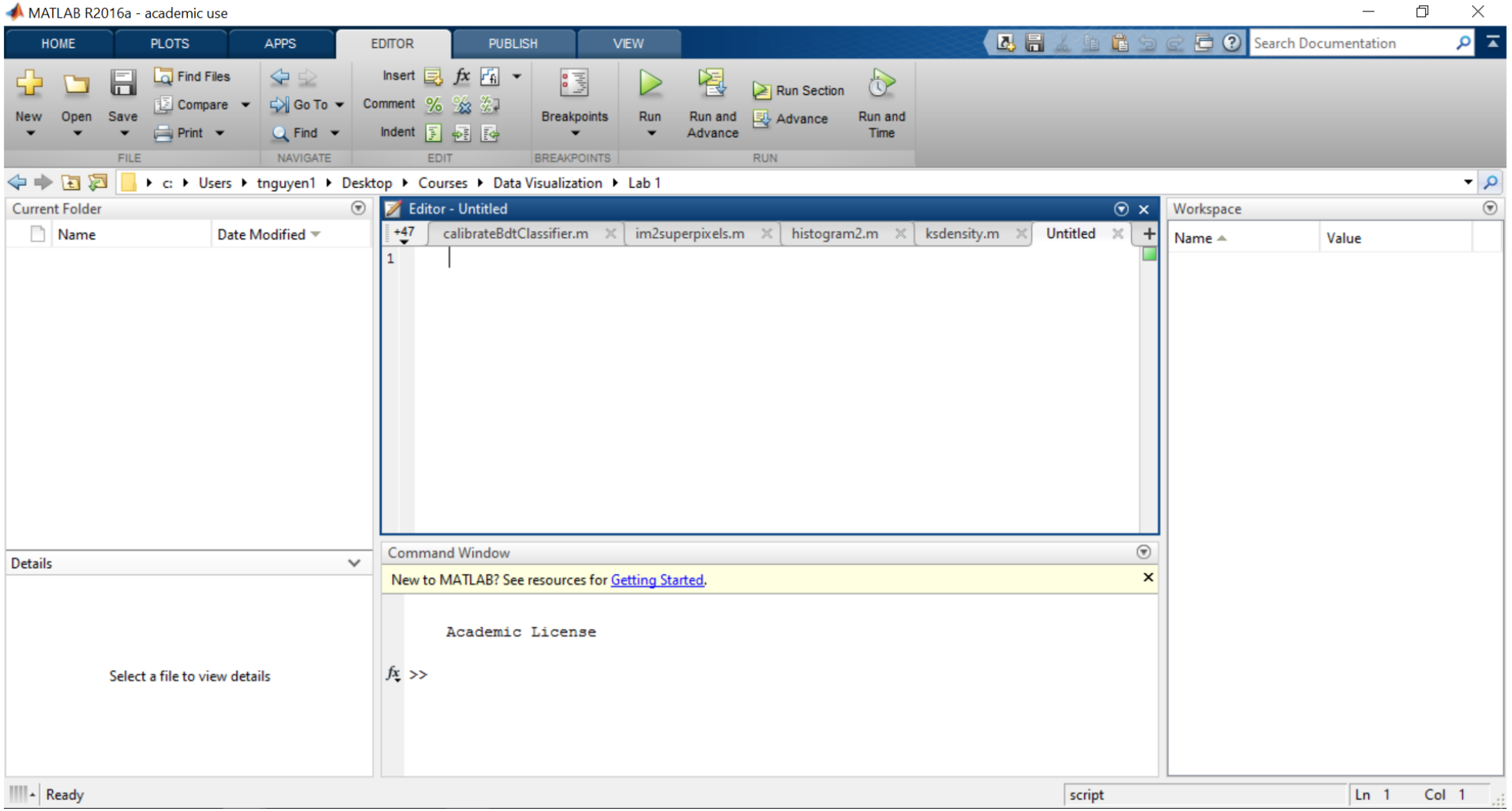
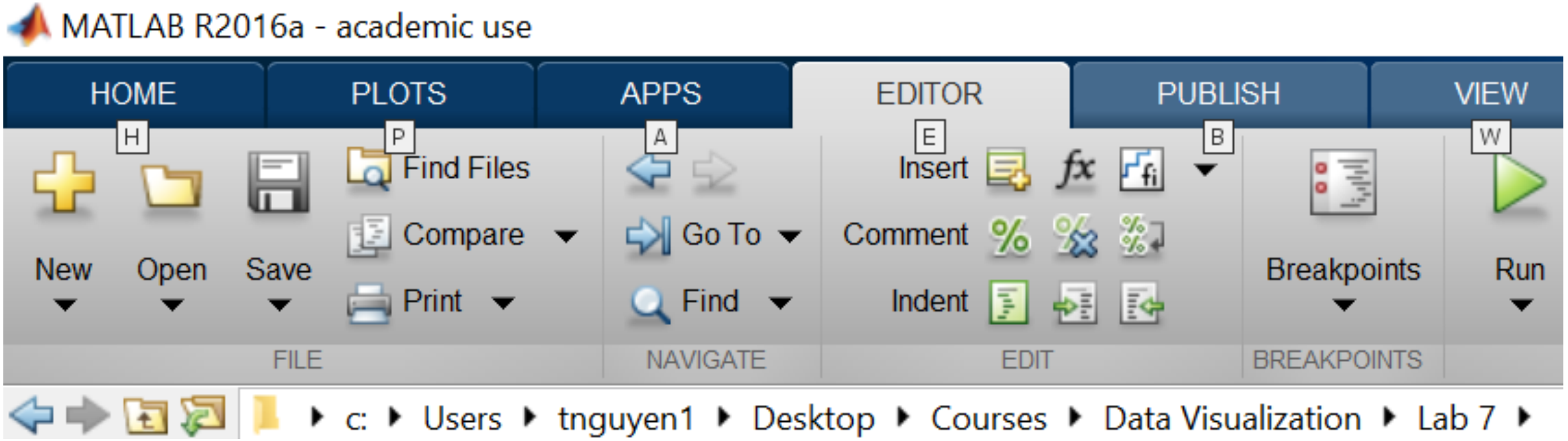
Outline

- Create tree maps

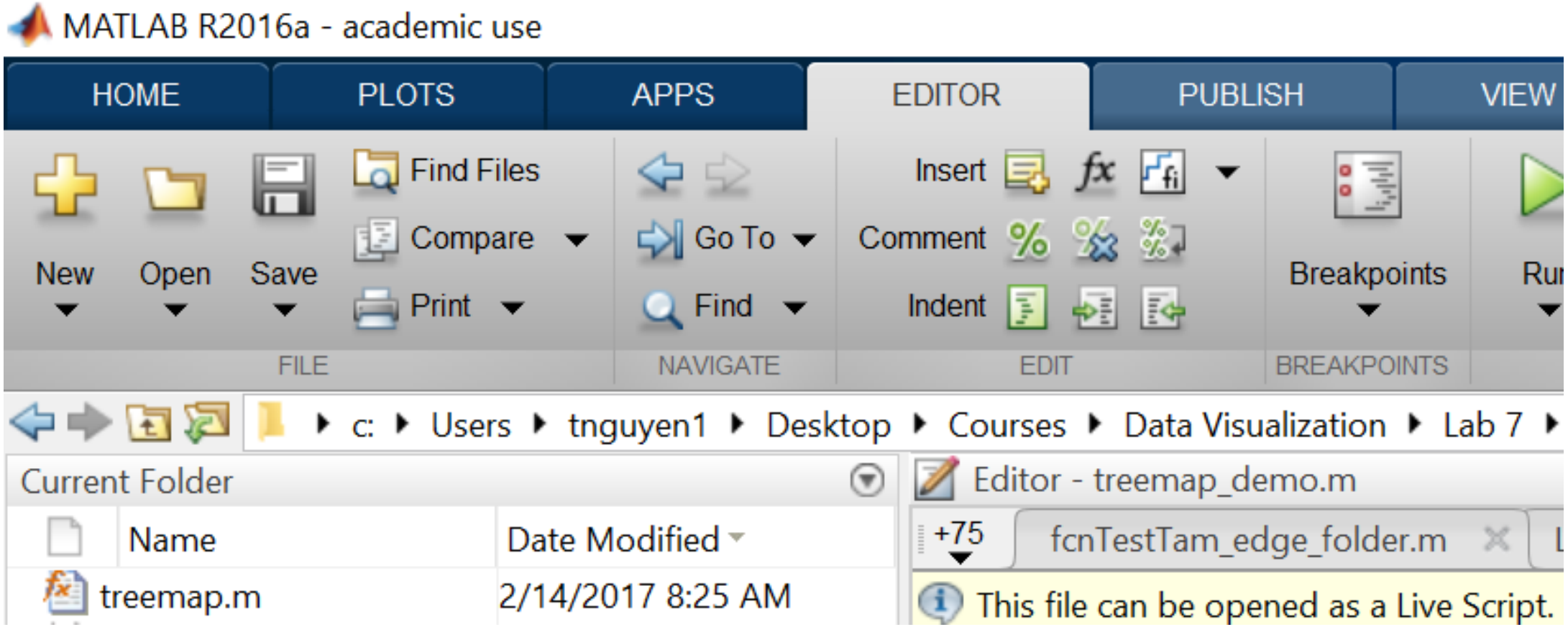
Start MATLAB



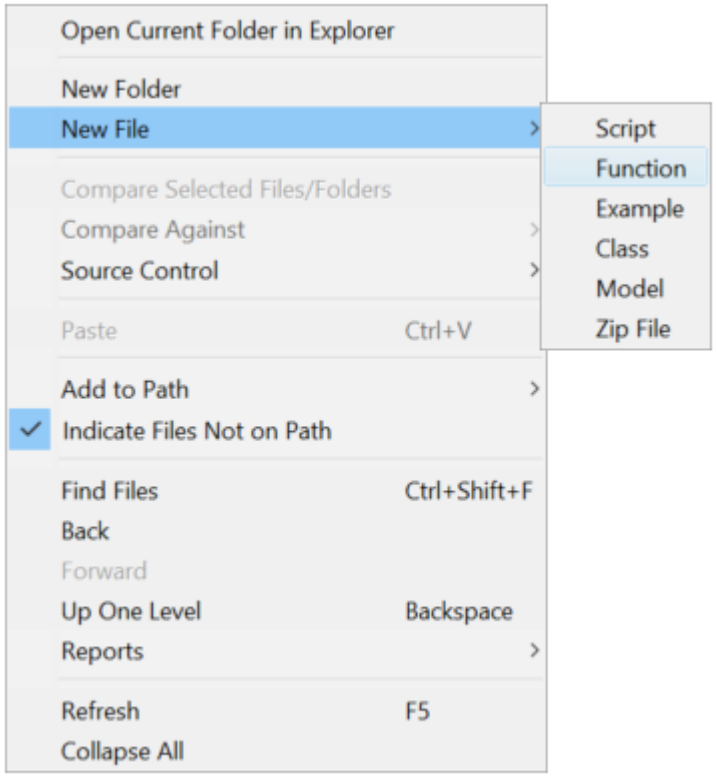
Create Lab 7 folder



Copy treemap.m from isidore to Lab 7 folder



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
```

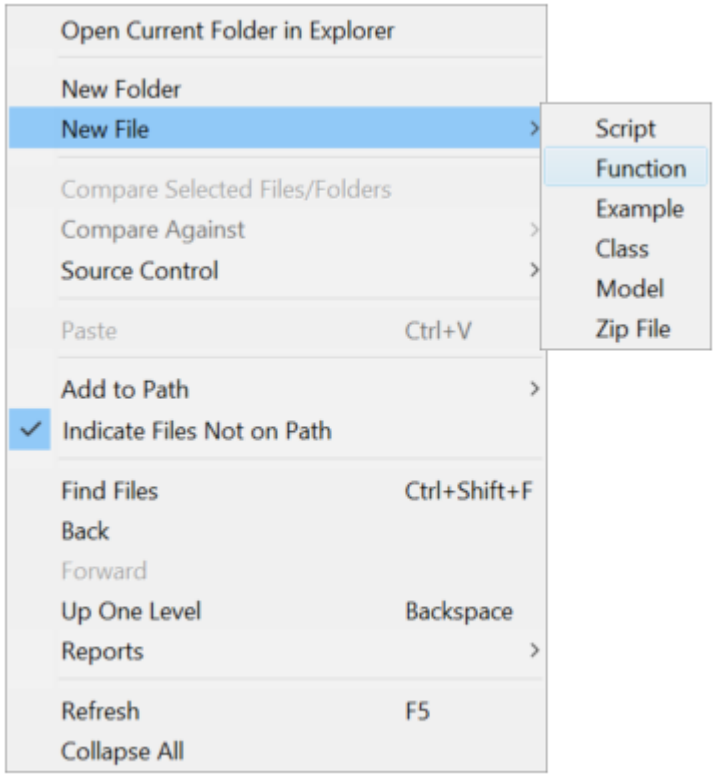
plotRectangles.m

```
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
```

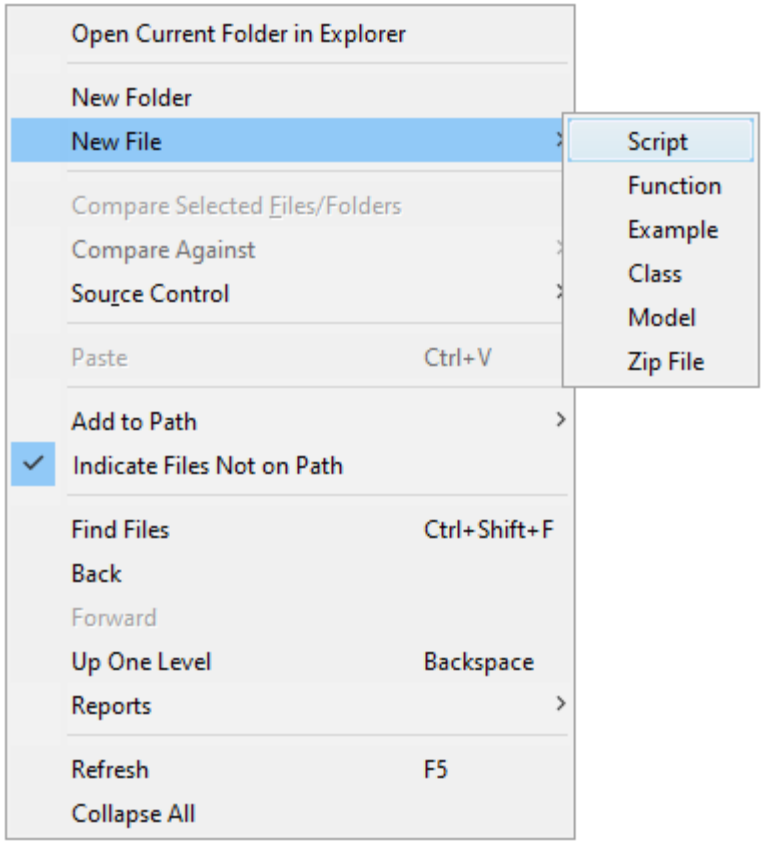
outline.m

```
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

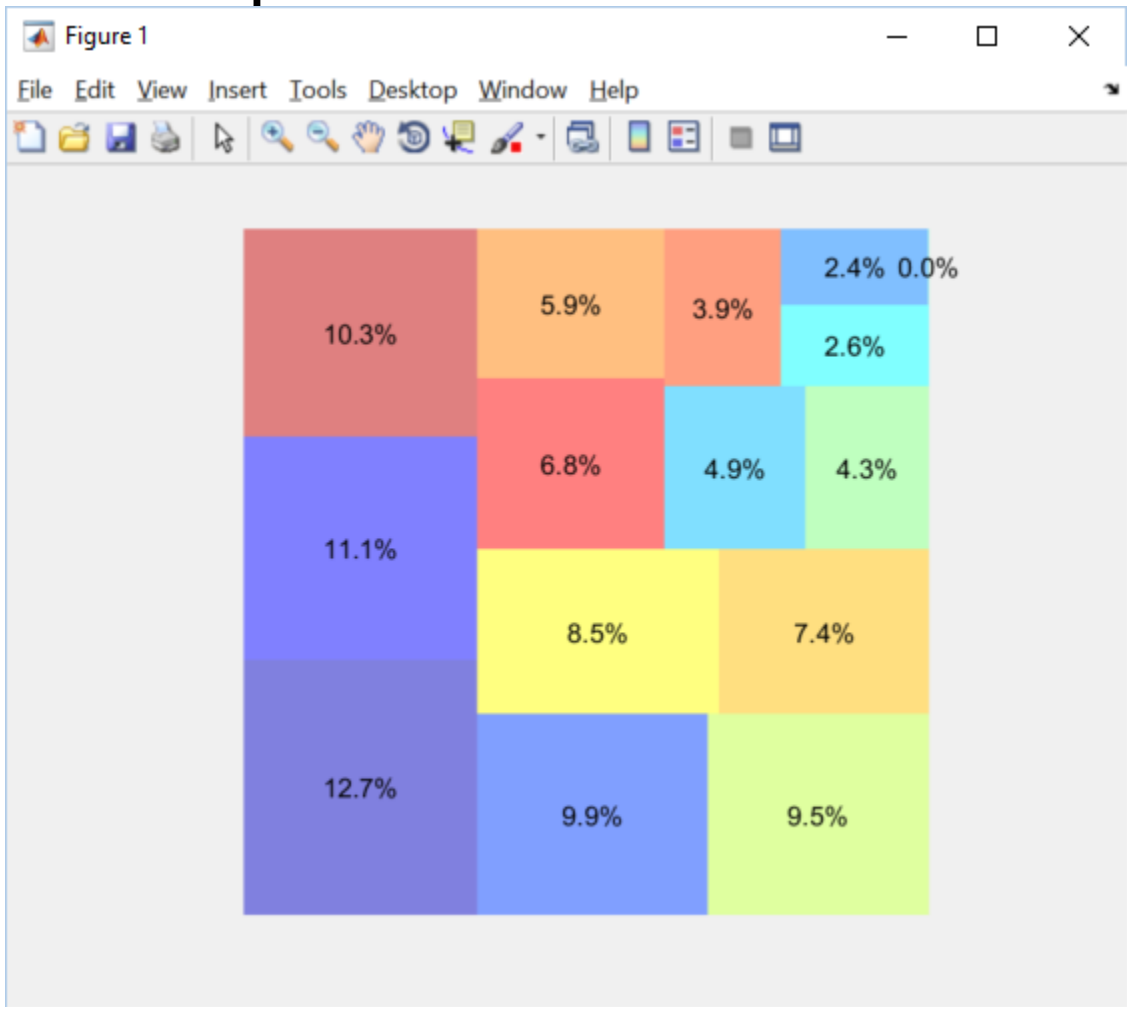
```
% Set colors
colors = (jet(n)+1)/2;

% 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

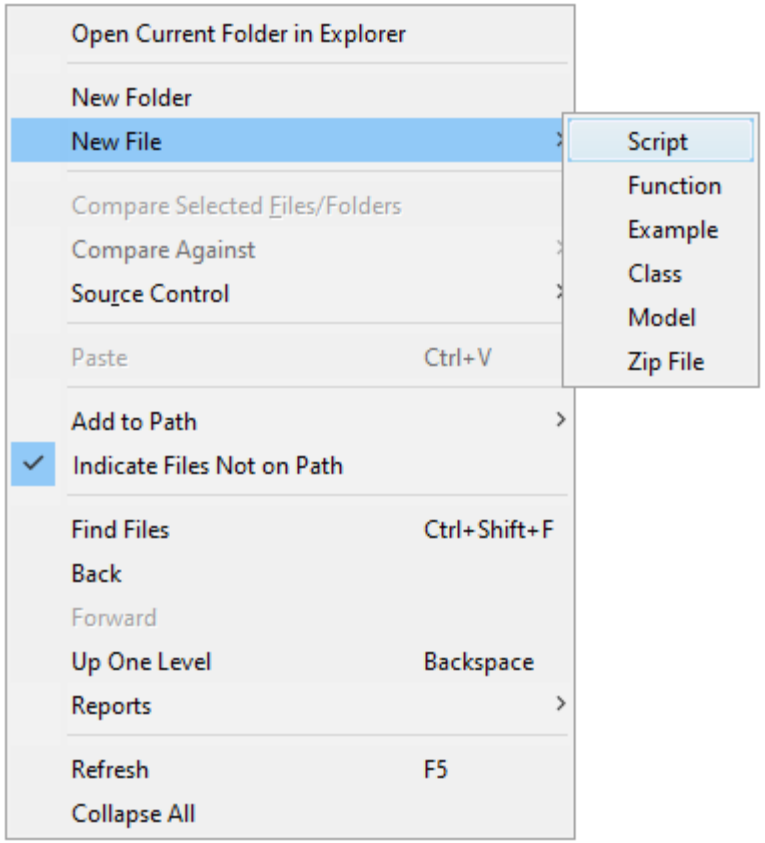
```
% Add labels
labels = {};
for i = 1:n
    labels{i} = sprintf('%2.1f%%',100*data(i)/sum(data));
end

% 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

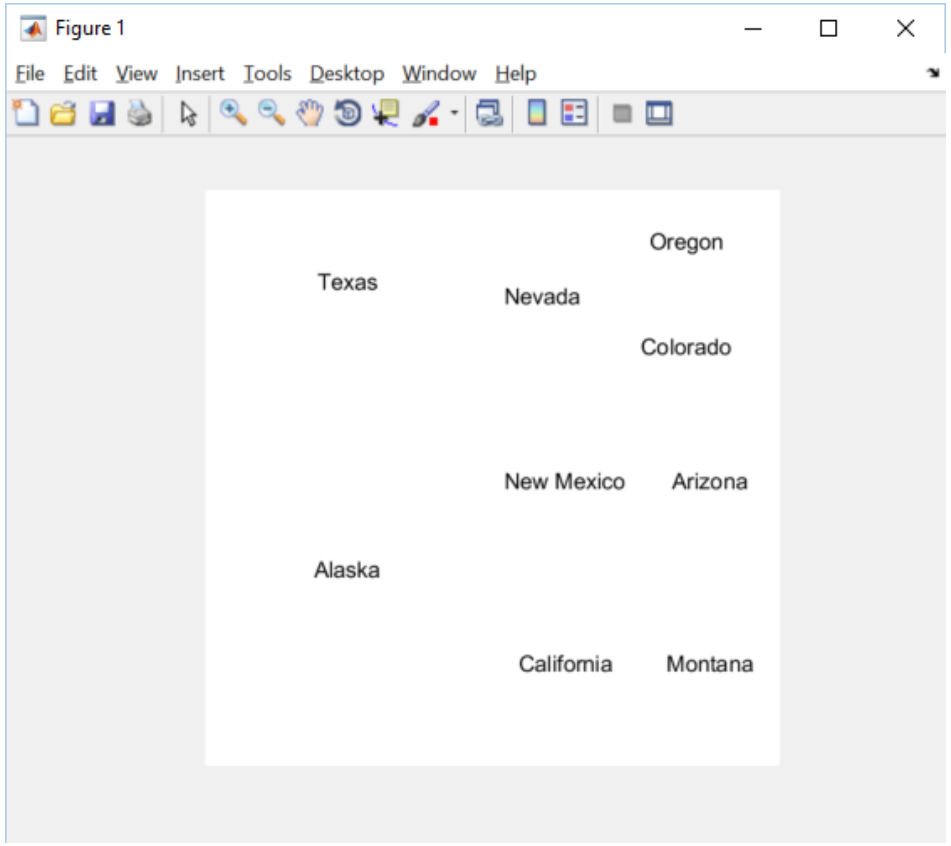
```
close all;
clear all;
clc;

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);
```

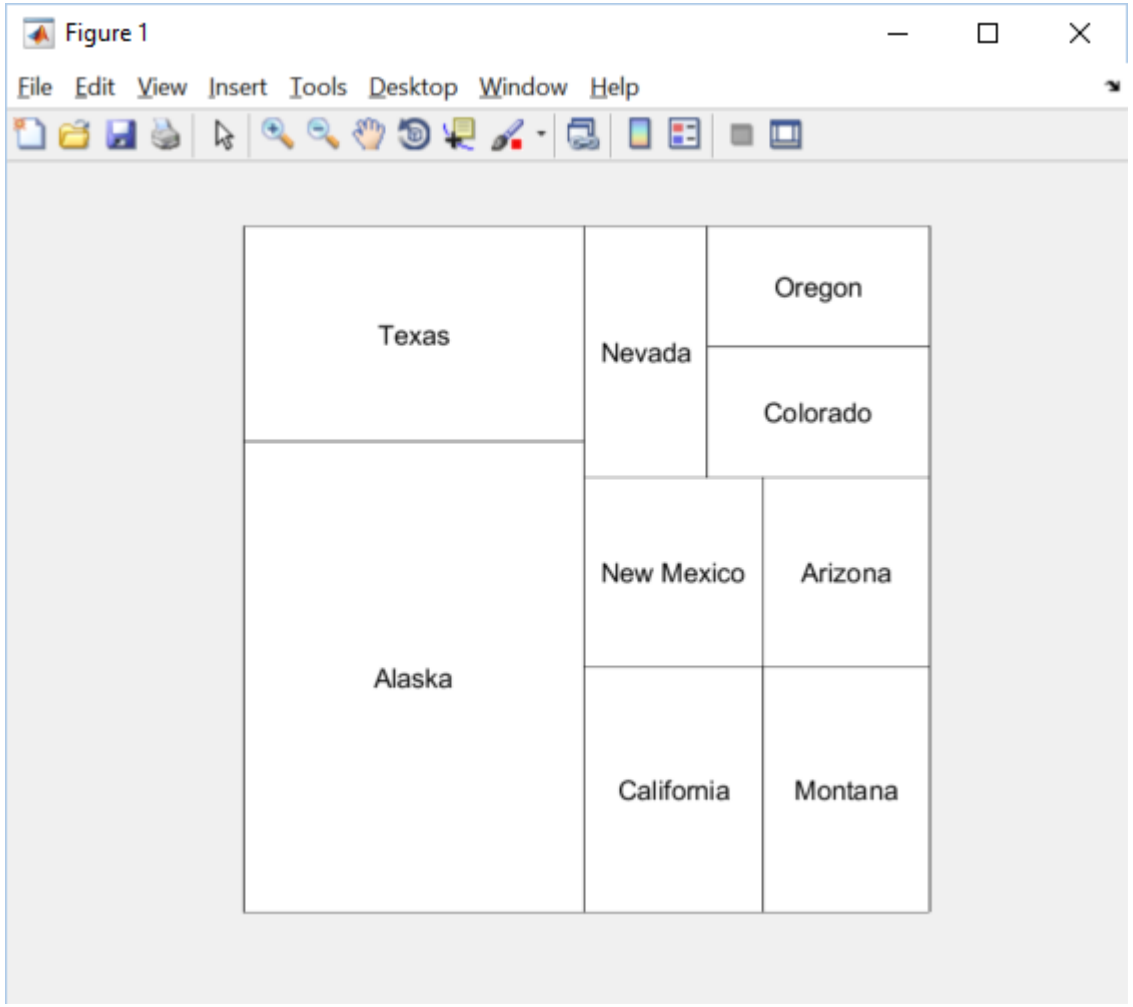
Lab7b.m: Display the treemap without outline

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

rectangles = treemap([data{:,2}]);
labels = data(:,1);
plotRectangles(rectangles,labels,colors);
```



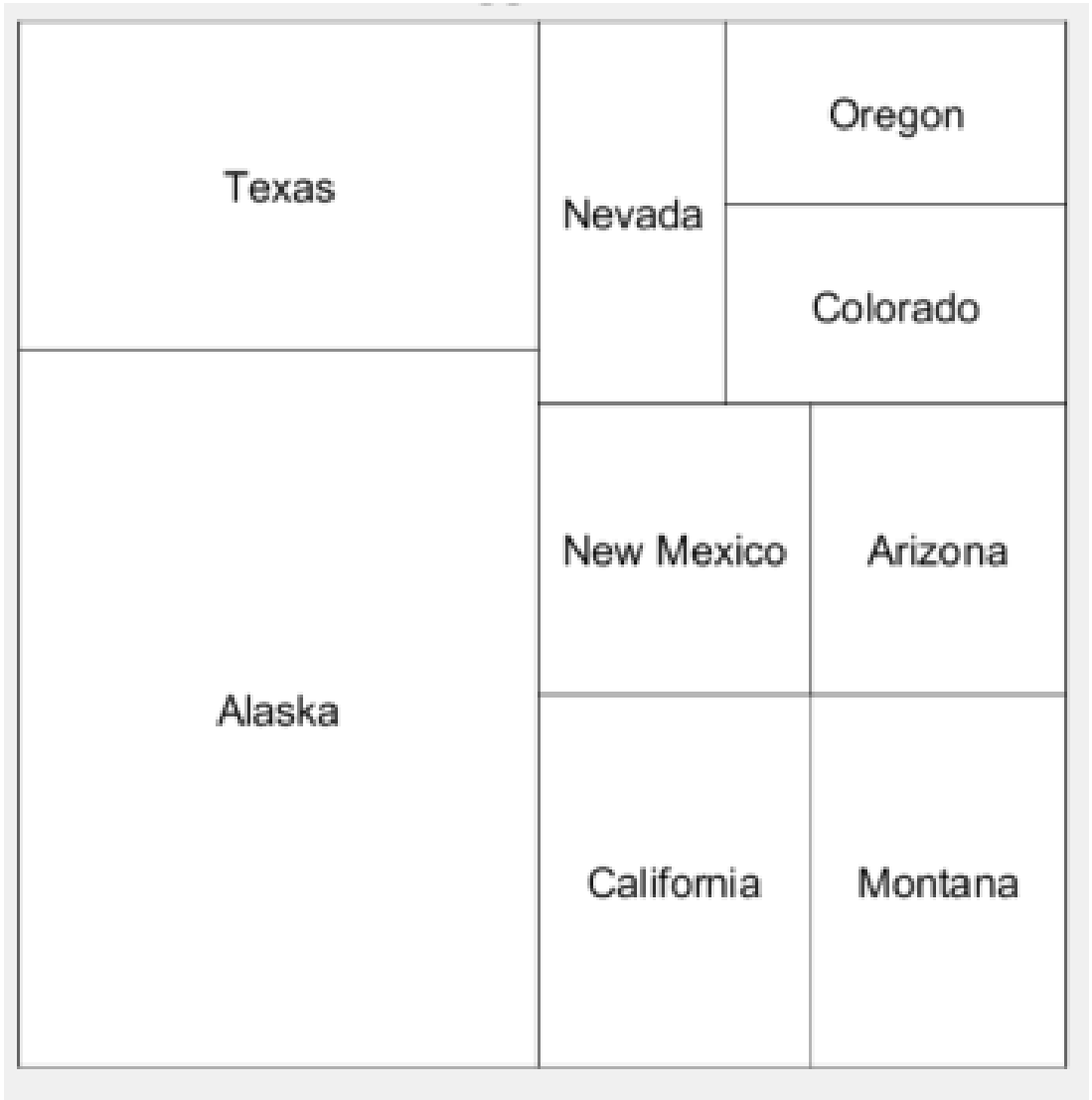
Lab7b.m: Outline the treemap

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

rectangles = treemap([data{:,2}]);
labels = data(:,1);

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



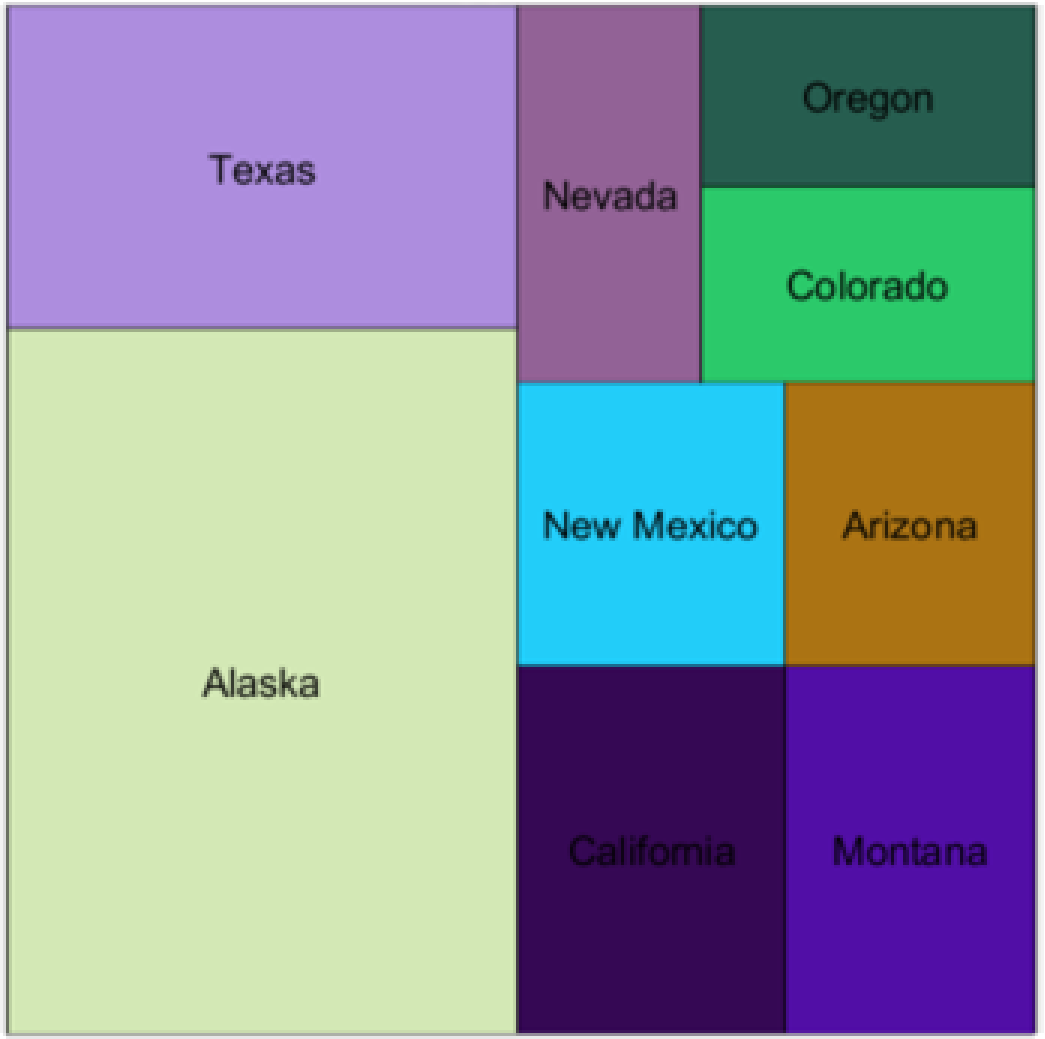
Lab7b.m: Display the title

```
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