MATLAB PLOT FUNCTIONS

Line Plot 2D

```
x  = 0: .1 : 2*pi;
y1 = cos(x);
y2 = sin(x);
% Plot y1 vs. x (blue, solid) and y2 vs. x (red, dashed)
figure
plot(x, y1, 'b', x, y2, 'r-.', 'LineWidth', 2)
% Turn on the grid
grid on
% Set the axis limits
axis([0 2*pi -1.5 1.5])
% Add title and axis labels
title('Trigonometric Functions')
xlabel('angle')
ylabel('sin(x) and cos(x)')
```

Date Time Plot

```
if verLessThan('matlab','9.1')
    error('heatmap is available in R2016b or newer.')
end
% Load bike ride summary data
load RideSummary byDate
% Plot the mean bike ride duration versus date
plot(byDate.Date, byDate.MeanDuration)
% Change limits and date format
limits = [datetime(2012,7,1) datetime(2012,8,31)];
xlim(limits)
ax = gca;
ax.XAxis.TickLabelFormat = 'MMMM dd';
ax.XAxis.TickLabelRotation = 40;
% Add labels and title
xlabel('Date')
ylabel('Mean Ride Duration')
title('Mean Ride Duration between July and August 2012')
```

Note:

```
T = table({'M';'M';'F';'F';'F'},[38;43;38;40;49],...
  [71;69;64;67;64],[176;163;131;133;119])
T.Properties.VariableNames = {'Gender' 'Age' 'Height' 'Weight'}
```

Function Plot

```
% Create the plot using the lemniscate function f(x,y) = (x^2 + y^2)^2 - x^2 + y^2
figure
fimplicit(@(x,y) (x.^2 + y.^2).^2 - x.^2 + y.^2, [-1.1 1.1 -1.1 1.1])
% Adjust the colormap to plot the function in blue
colormap([0 0 1])
% Add a multi-line title
```

```
title({'Lemniscate Function', '(x^2 + y^2)^2 - x^2 + y^2'})
```

Line Plot 3D

```
load spectraData masscharge time spectra
% Create the 3D plot
figure
plot3(masscharge, time, spectra)
box on
% Set the viewing angle and the axis limits
view(26, 42)
axis([500 900 0 22 0 4e8])
% Add title and axis labels
xlabel('Mass/Charge (M/Z)')
ylabel('Time')
zlabel('Ion Spectra')
title('Extracted Spectra Subset')
```

Note: A mass spectrum is an intensity vs. m/z (mass-to-charge ratio) plot representing a chemical analysis

Vertical Bar Plot

```
% Create data for childhood disease cases
measles = [38556 24472 14556 18060 19549 8122 28541 7880 3283 4135 7953 1884];
mumps = [20178 23536 34561 37395 36072 32237 18597 9408 6005 6268 8963 13882];
chickenPox = [37140 32169 37533 39103 33244 23269 16737 5411 3435 6052 12825 23332];
% Create a vertical bar chart using the bar function
figure
bar(1:12, [measles' mumps' chickenPox'], 1)
% Set the axis limits
axis([0 13 0 40000])
set(gca, 'XTick', 1:12)
% Add title and axis labels
title('Childhood diseases by month')
xlabel('Month')
ylabel('Cases (in thousands)')
% Add a legend
legend('Measles', 'Mumps', 'Chicken pox')
```

Stacked Bar Plot

```
measles = [38556 24472 14556 18060 19549 8122 28541 7880 3283 4135 7953 1884]';
mumps = [20178 23536 34561 37395 36072 32237 18597 9408 6005 6268 8963 13882]';
chickenPox = [37140 32169 37533 39103 33244 23269 16737 5411 3435 6052 12825 23332]';
% Create a stacked bar chart using the bar function
figure
bar(1:12, [measles mumps chickenPox], 0.5, 'stack')
% Adjust the axis limits
```

```
axis([0 13 0 100000])
set(gca, 'XTick', 1:12)
% Add title and axis labels
title('Childhood diseases by month')
xlabel('Month')
ylabel('Cases (in thousands)')
% Add a legend
legend('Measles', 'Mumps', 'Chicken pox')
```

Horizontal Bar Plot

```
temperatures = [40.5 48.3 56.2 65.3 73.9 69.9 71.1 59.5 48.7 35.3 31.7 30.0];
months = {'Dec', 'Nov', 'Oct', 'Sep', 'Aug', 'Jul', 'Jun', 'May', 'Apr', 'Mar', 'Feb',
'Jan'};
% Plot the temperatures on a horizontal bar chart
figure
barh(temperatures)
% Set the axis limits
axis([0 80 0 13])
% Add a title
title('Boston Monthly Average Temperature - 2001')
% Change the Y axis tick labels to use the months
set(gca, 'YTick', 1:12)
set(gca, 'YTickLabel', months)
```

Bar Graph 3D

```
load MonthlyTemps temperatures months years
% Create the 3D bar chart
figure
bar3(temperatures)
axis([0 13 0 12 0 80])
% Add title and axis labels
title('Boston Monthly Temperatures 1900-2000')
xlabel('Month')
ylabel('Year')
zlabel('Temperature')
% Change the x and y axis tick labels
set(gca, 'XTickLabel', months)
set(gca, 'YTickLabel', years)
```

Histogram Plot

```
% Load nucleotide data
load nucleotideData ncount
% Create the histogram using the histogram function
figure
h1 = histogram(ncount(:,1));
hold on
histogram(ncount(:,2))
```

```
histogram(ncount(:,3))
histogram(ncount(:,4))
hold off
% Add a legend
legend('A', 'C', 'G', 'T')
% Add title and axis labels
title('Histogram of nucleotide type distribution')
xlabel('Occurrences')
ylabel('Number of sequence reads')
```

Note: A **nucleotide** is one of the structural components, or building blocks, of DNA and RNA. A **nucleotide** consists of a base (one of four chemicals: adenine, thymine, guanine, and cytosine)

Heat Map Count Plot

```
% Load ride data from Boston's bike sharing program
load CambridgeData cambridge
% Create a heatmap of DayOfWeek vs. AgeGroup, with color representing count
hm = heatmap(cambridge,'AgeGroup','DayOfWeek');
% Change the color to represent average Duration
hm.ColorVariable = 'Duration';
hm.ColorMethod = 'mean';
```

Pie Chart 2D

```
% Load the data for US population by age 1860-2000
load populationAge population groups
% Get the population for each age group for the year 2000
age2000 = population(15, :);
% Create a pie chart using the pie function -- use age groups as labels
figure
pie(age2000, groups)
% Add title
title('US population by age for the year 2000')
```

Pie Chart 3D

```
x = [1 3 0.5 2.5 2];
% Create a 3D pie chart using the pie3 function
figure
explode = [0 1 0 0 0];
pie3(x, explode)
% Add a title
title('Pie3 Chart')
```

Scatter Plot 2D

```
load seamount x y z
% Create a scatter plot using the scatter function
```

```
figure
scatter(x, y, 10, z)
% Add title and axis labels
title('Undersea Elevation')
xlabel('Longitude')
ylabel('Latitude')
```

Scatter Plot 3D

```
figure
[X,Y,Z] = sphere(16);
x = [0.5*X(:); 0.75*X(:); X(:)];
y = [0.5*Y(:); 0.75*Y(:); Y(:)];
z = [0.5*Z(:); 0.75*Z(:); Z(:)];
scatter3(x,y,z)
```

Subplot

```
subplot(2,2,1)
x = linspace(0,10);
y1 = sin(x);
plot(x,y1)
title('Subplot 1: sin(x)')

subplot(2,2,2)
y2 = sin(2*x);
plot(x,y2)
title('Subplot 2: sin(2x)')

subplot(2,2,3)
y3 = sin(4*x);
plot(x,y3)
title('Subplot 3: sin(4x)')

subplot(2,2,4)
y4 = sin(8*x);
plot(x,y4)
title('Subplot 4: sin(8x)')
```

Mesh Plot

```
% Create the mesh plot using the function f(x,y) = y^2 - x^2
figure
fmesh(@(x,y) y.^2 - x.^2, [-3 3 -3 3])
% Add labels and title
xlabel('x')
ylabel('y')
zlabel('z')
title('f(x,y) = y^2 - x^2')
```

Surface Plot

```
points = linspace(-2, 2, 40);
[X, Y] = meshgrid(points, points);
% Define the function Z = f(X,Y)
Z = 2./exp((X-.5).^2+Y.^2)-2./exp((X+.5).^2+Y.^2);
% Create the surface plot using the surf command
figure
surf(X, Y, Z)
```

Note:

```
x = 1:3;
y = 1:5;
[X,Y] = meshgrid(x,y)
```

Directed Graphs Plot

```
A = magic(4);
A(A>10) = 0
names = {'alpha' 'beta' 'gamma' 'delta'};
G = digraph(A,names,'OmitSelfLoops')
G.Edges
G.Nodes
```

```
load BikeRideData byCities
% Create a directed graph object using the digraph function
G = digraph(byCities{:,2:5},byCities.Properties.VariableNames(2:5),'OmitSelfLoops');
% Visualize the graph
figure
plot(G,'EdgeLabel',G.Edges.Weight,'layout','layered')
% Remove axes ticks
set(gca,'XTick',[],'YTick',[])
% Add title
title('Number of bike rides between cities')
```