Computer II (MATLAB)

الحاسوب 2

2025-2024

Lecture 9

by

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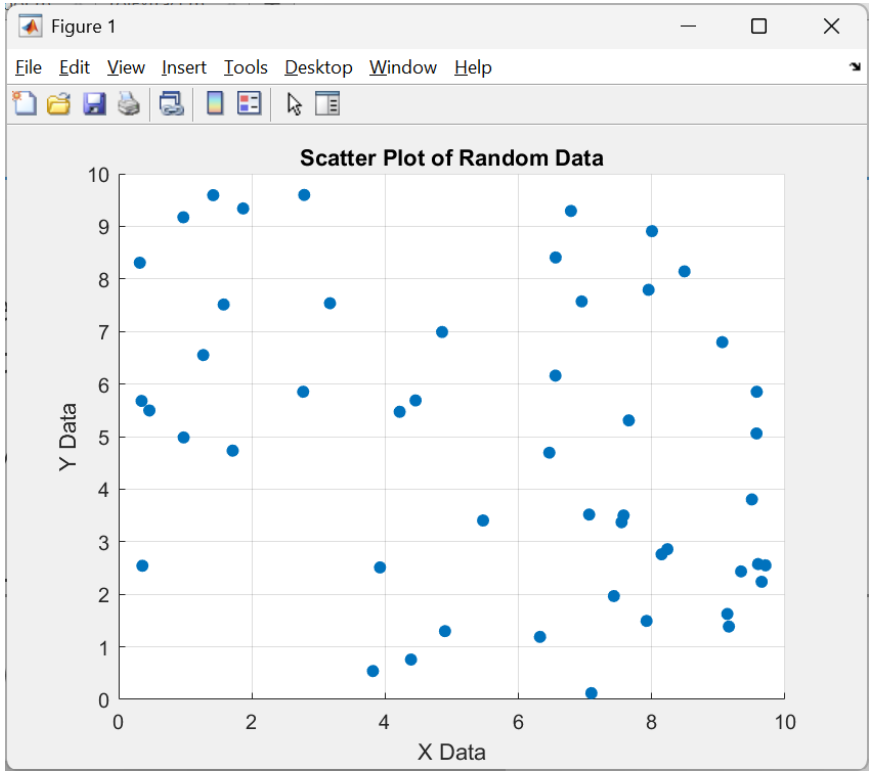
Introduction to Data Plotting

- MATLAB provides powerful functions to visualize data effectively.
- Different types of plots: Line plots, scatter plots, bar charts, histograms, and 3D plots.
- Customizing plots for better readability and presentation.

Scatter Plots for Data Visualisation

- Code Example:

```
x = rand(1, 50) * 10;
y = rand(1, 50) * 10;
scatter(x, y, 'filled');
xlabel('X Data');
ylabel('Y Data');
title('Scatter Plot of Random Data');
grid on;
```



- Notes:
  - scatter(x, y, 'filled') creates a scatter plot with filled markers.
  - Useful for analyzing relationships between variables.

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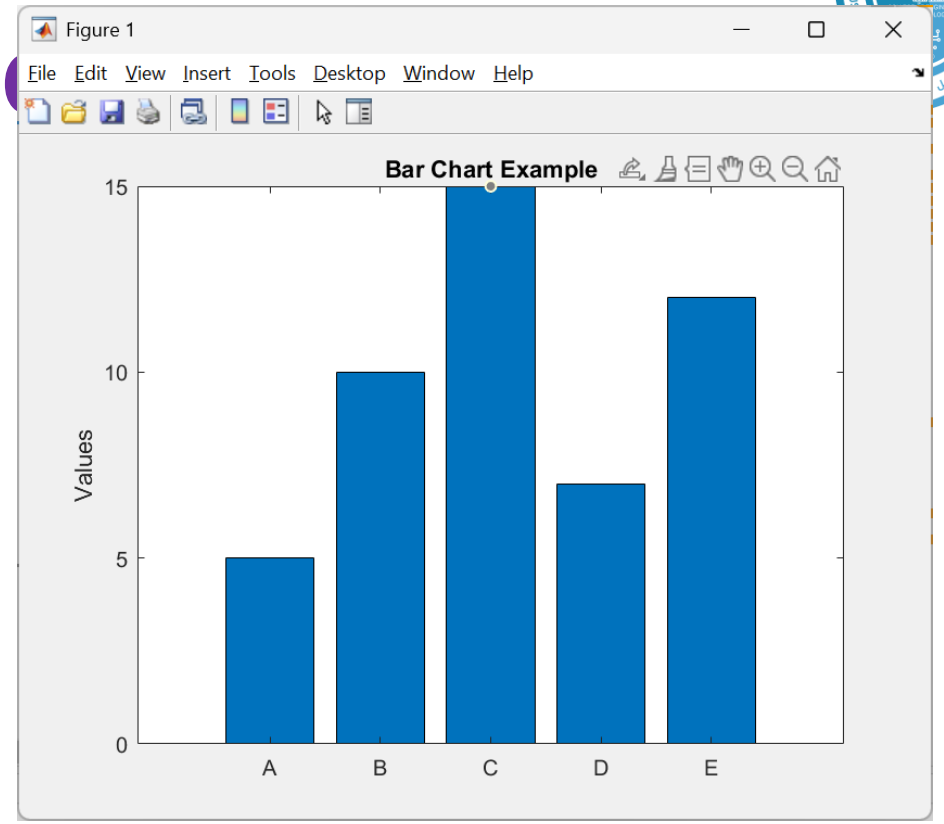
Bar Charts for Categori

- Code Example:

```
data = [5, 10, 15, 7, 12];
categories = {'A', 'B', 'C', 'D', 'E'};
bar(data);
set(gca, 'XTickLabel', categories);
ylabel('Values');title('Bar Chart Example');
```



- Notes:
  - bar(data) creates a bar chart.
  - set(gca, 'XTickLabel', categories) assigns custom labels to x-axis.
  - Ideal for representing categorical data.

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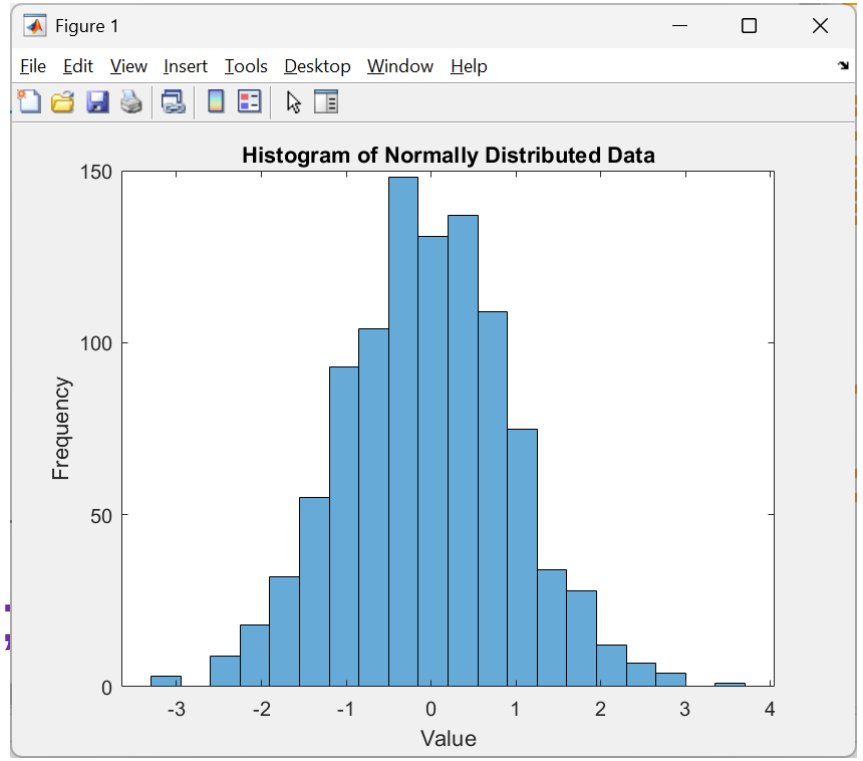
Histograms for Data Distribution

- Code Example:

```
data = randn(1, 1000);
histogram(data, 20);
xlabel('Value');
ylabel('Frequency');
title('Histogram of Normally Distributed Data');
```



- Notes:
  - histogram(data, 20) creates a histogram with 20 bins.
  - Useful for understanding data distribution and patterns.

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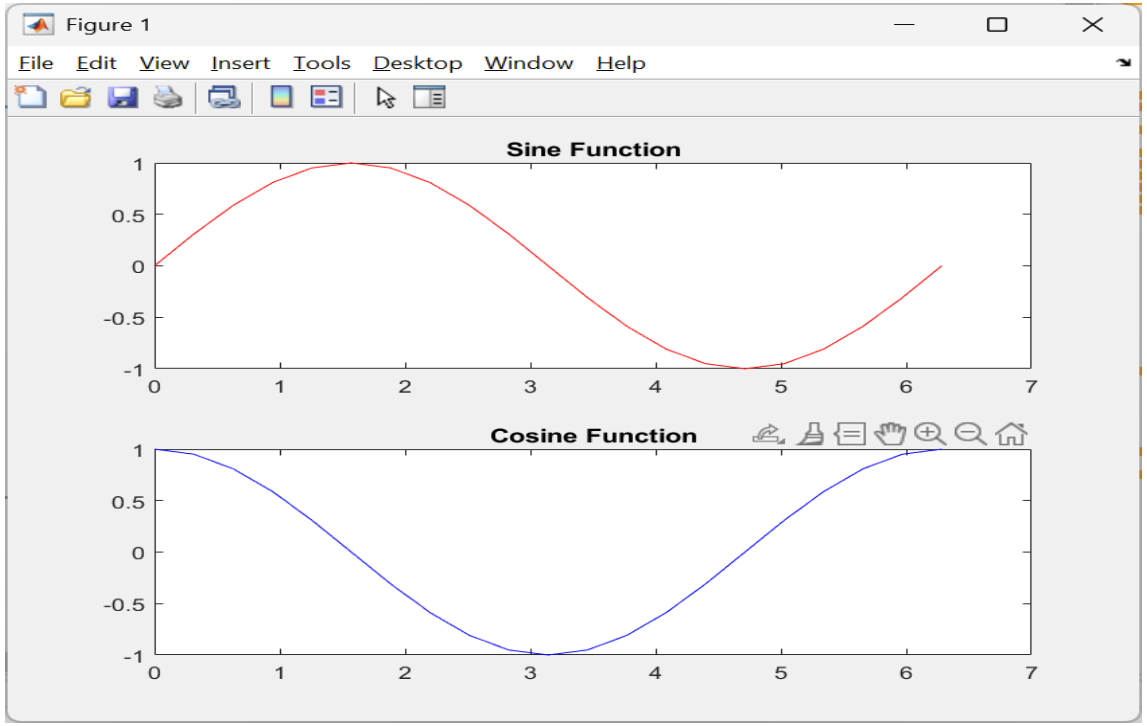
Multiple Plots in One Figure

- Code Example:

```
t = 0:pi/10:2*pi;
y1 = sin(t);
y2 = cos(t);
subplot(2,1,1);plot(t, y1, 'r');
title('Sine Function');
subplot(2,1,2);plot(t, y2, 'b');
title('Cosine Function');
```



- Notes:
  - subplot(m, n, p) divides the figure into m rows and n columns.
  - The p value selects which subplot to activate.
  - Useful for comparing multiple datasets.

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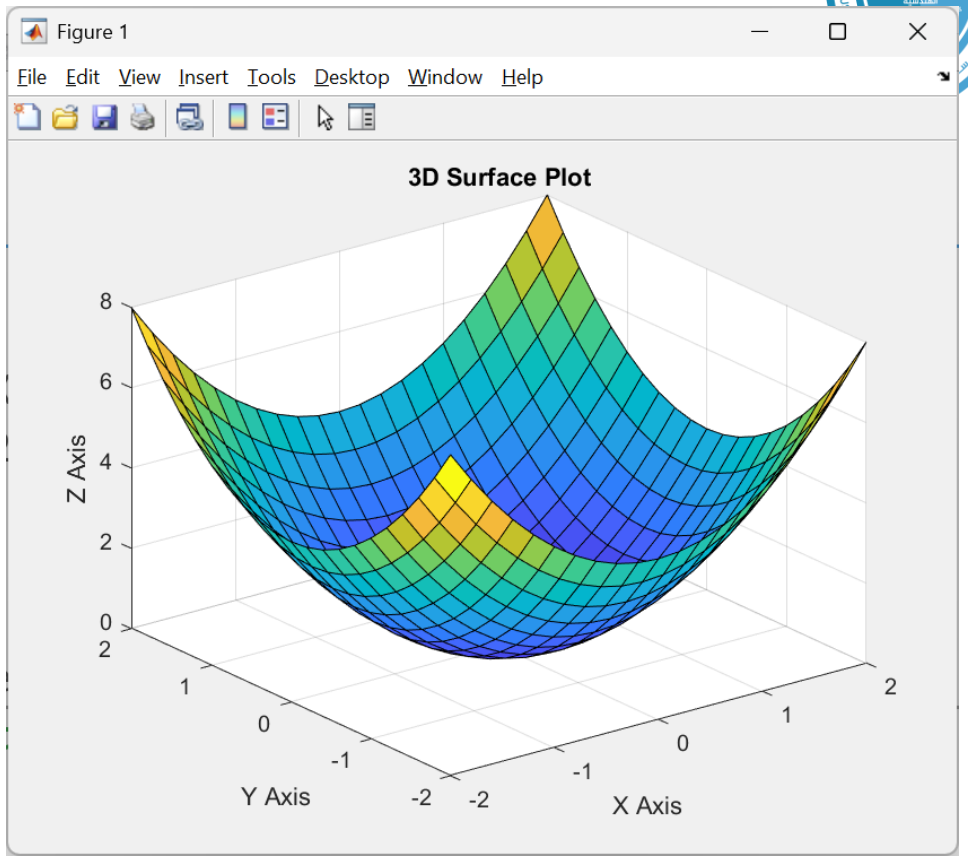
3D Plotting Basics

- Code Example:

```
[x, y] = meshgrid(-2:0.2:2, -2:0.2:2);
z = x.^2 + y.^2;
surf(x, y, z);
xlabel('X Axis');ylabel('Y Axis');
zlabel('Z Axis');title('3D Surface Plot');
```



- Notes:
  - meshgrid generates a grid of x and y values.
  - surf(x, y, z) creates a 3D surface plot.
  - Useful for visualizing mathematical functions in 3D.

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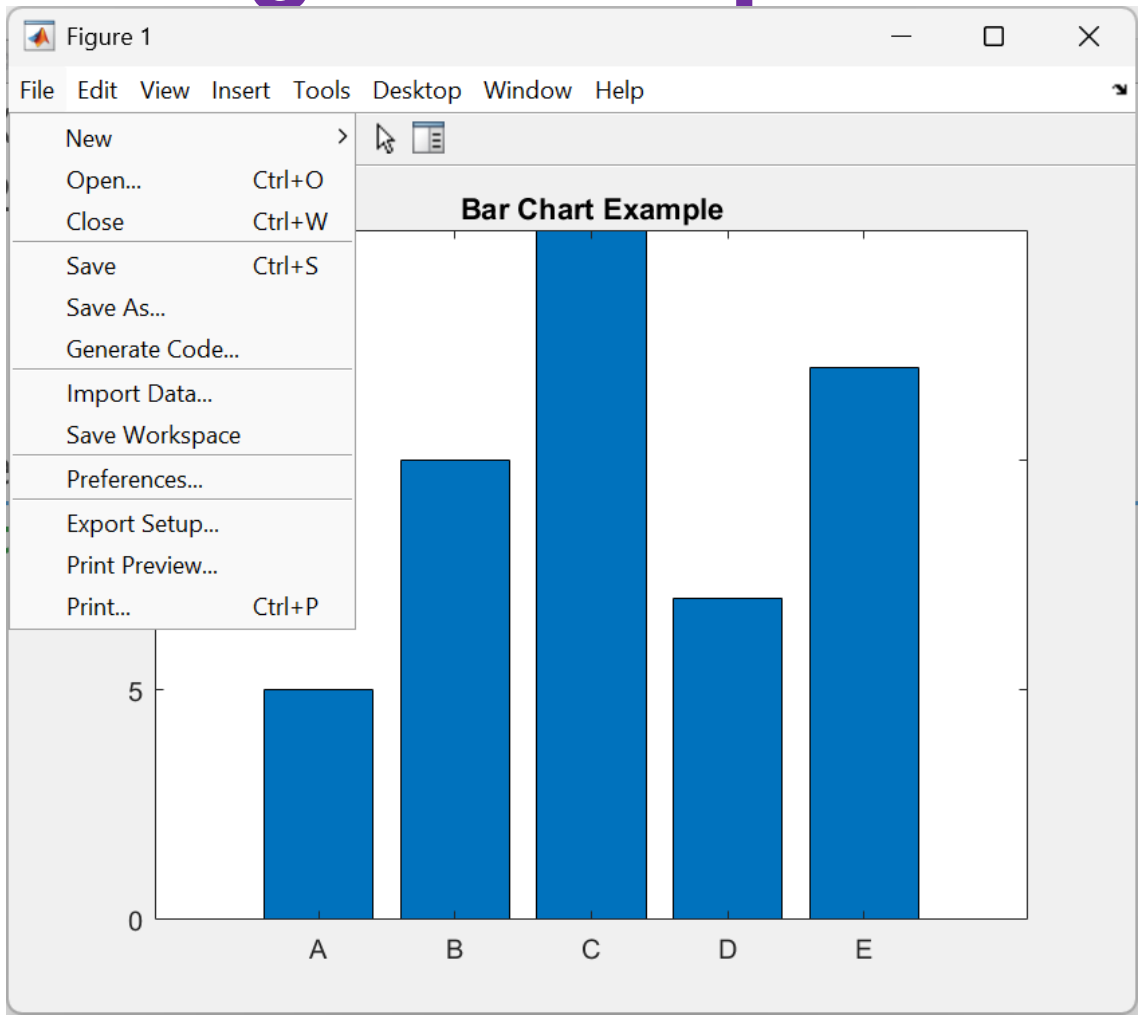
Customizing Plot Styles

- Key Functions:
  - plot(x, y, 'r--') (Red dashed line)
  - scatter(x, y, 'bo') (Blue circle markers)
  - bar(data, 'g') (Green bar chart)
  - grid on/off (Enable/Disable grid)
  - legend('Line 1', 'Line 2') (Adds a legend)

Figure Props



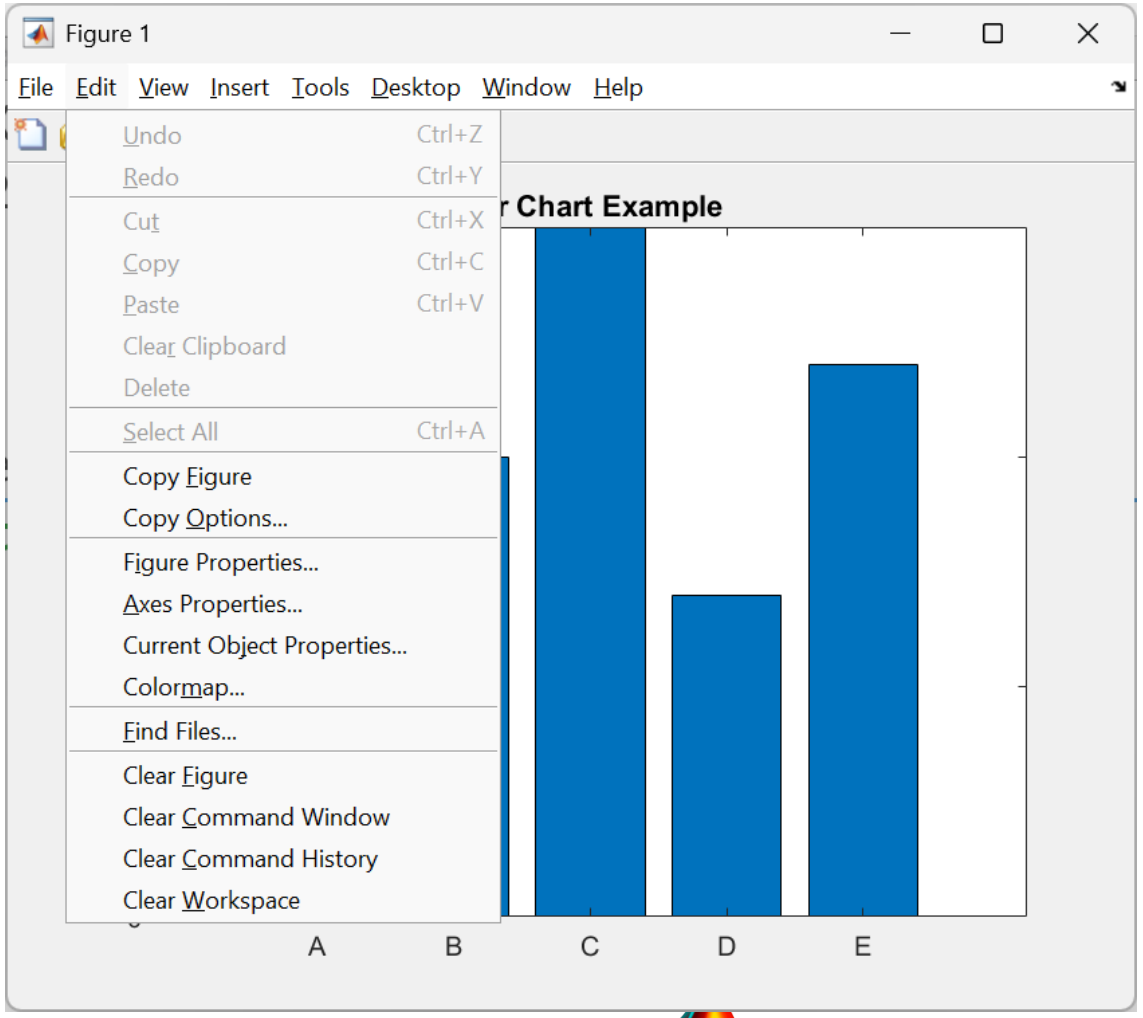


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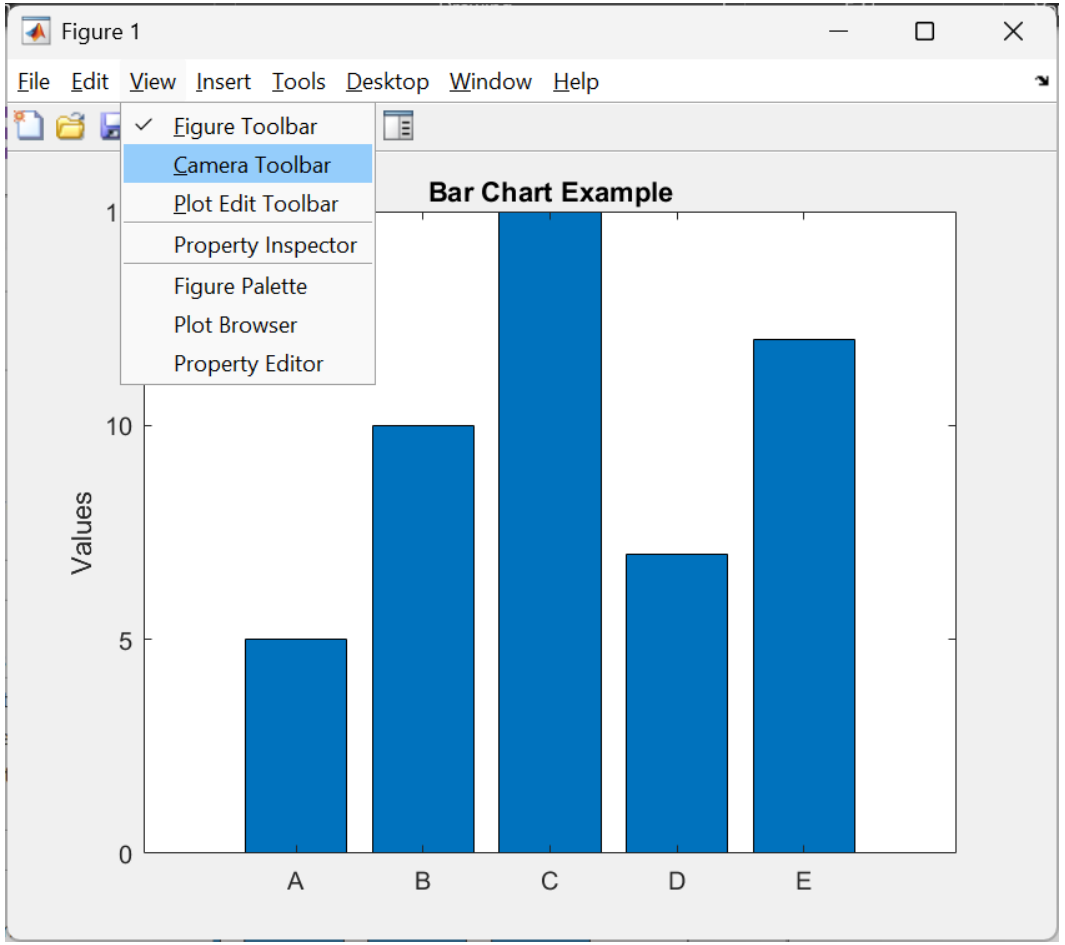
Figure Props



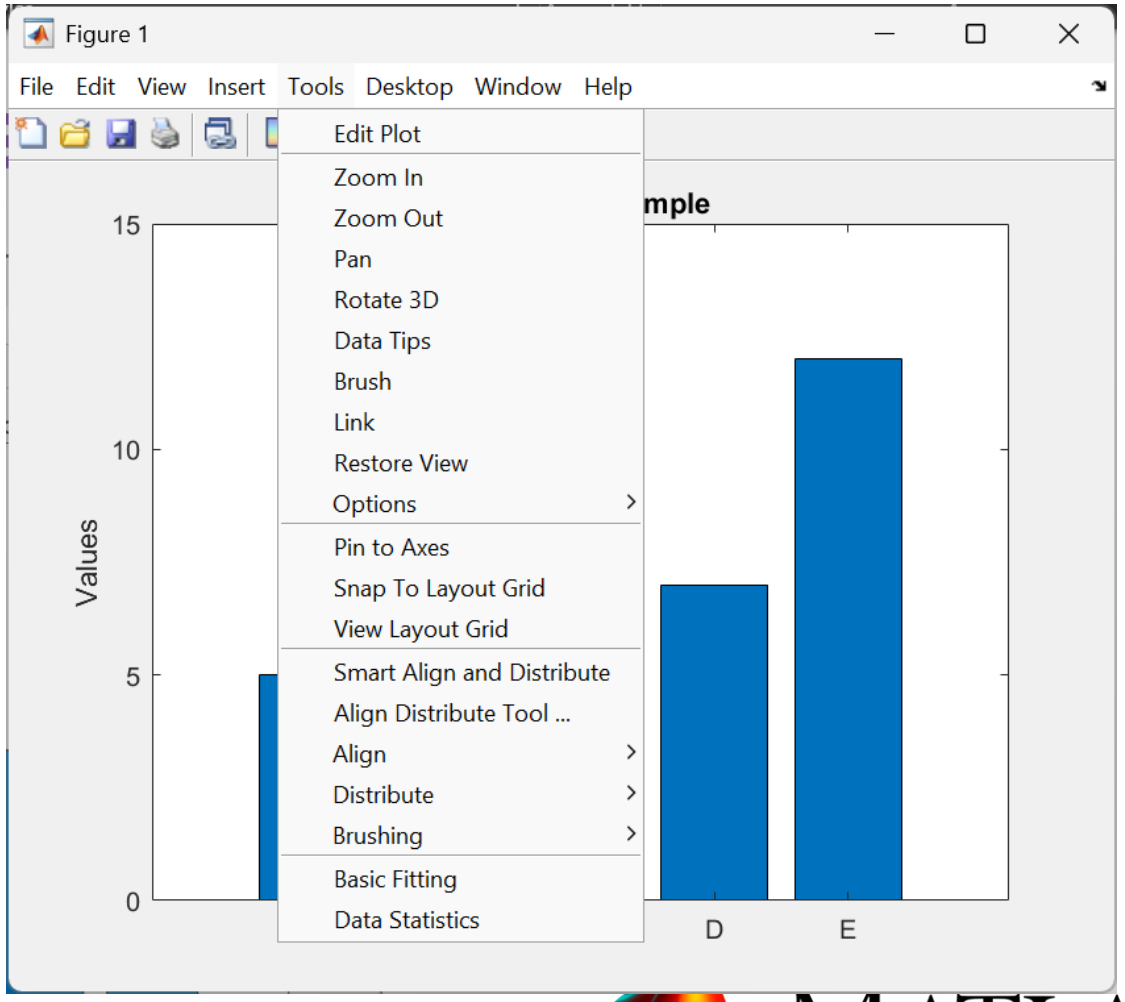


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Figure Props

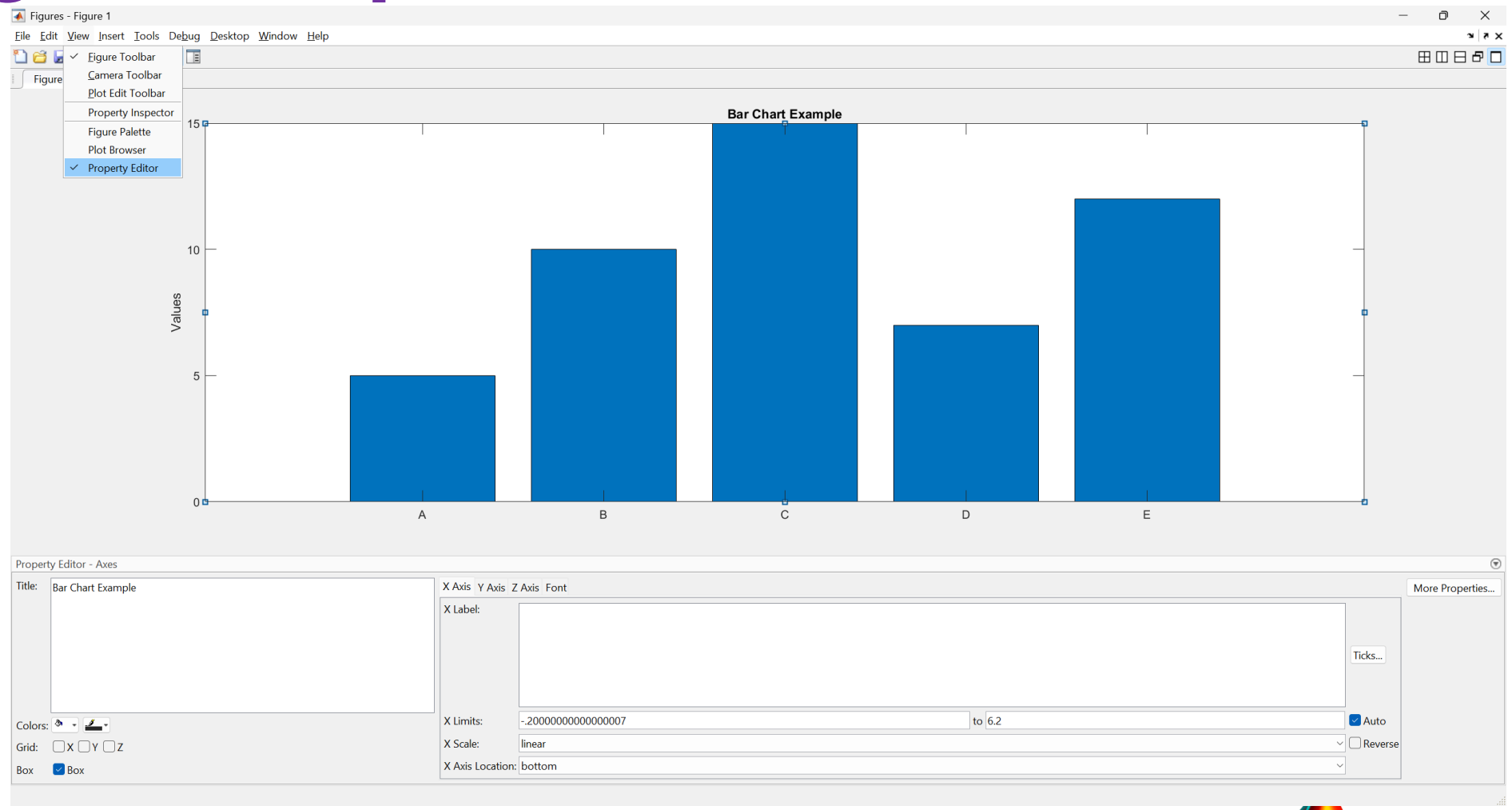

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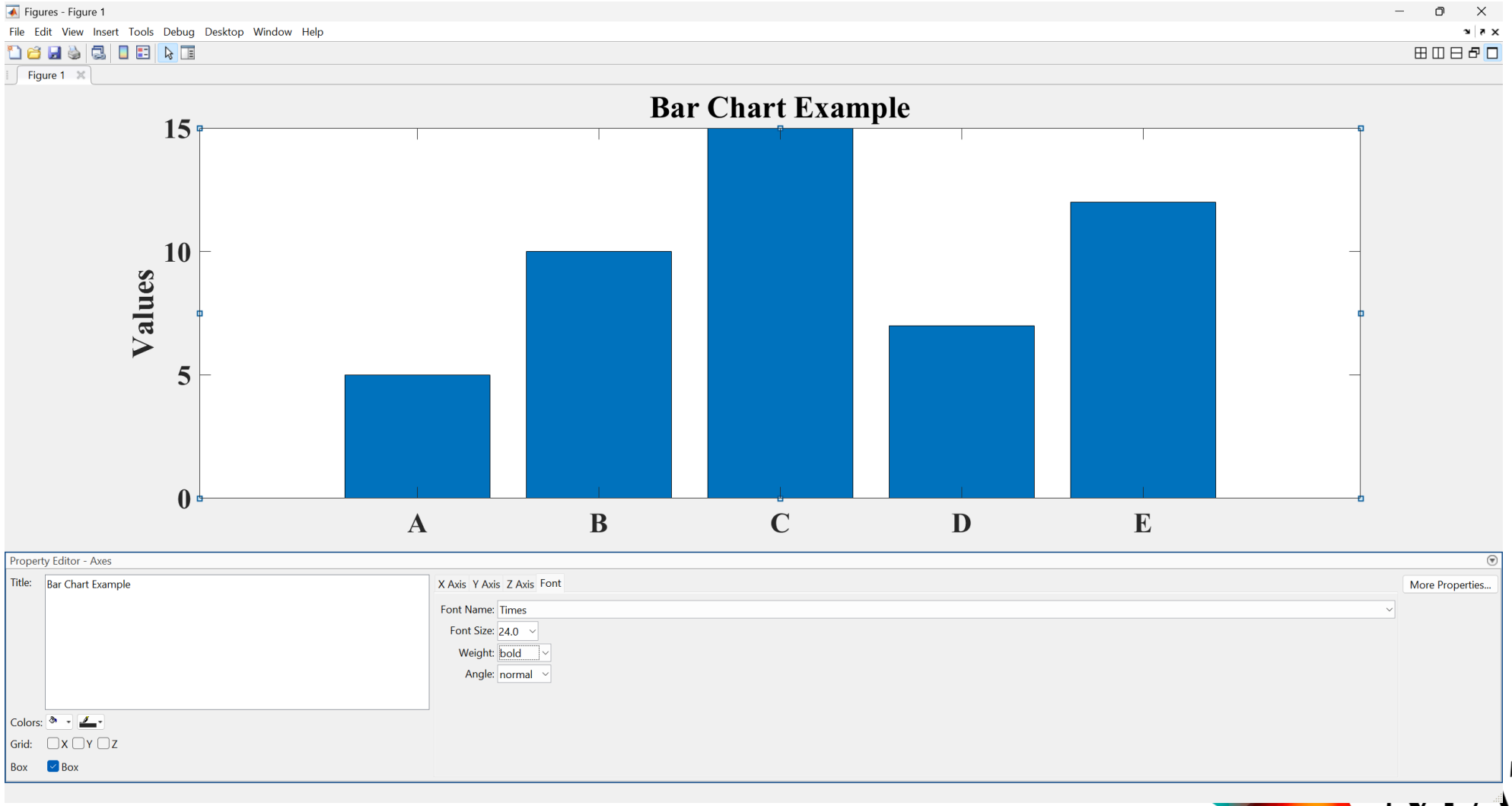
Figure Props



Summary

- Creating line plots, scatter plots, bar charts, histograms, and 3D plots.
- Using subplot for multiple plots.
- Customizing plots with styles, colours, and legends.

Mini Assignment: MATLAB Plotting for Biomedical Engineering

Objective

Use MATLAB to create simple plots related to biomedical engineering.

Tasks

1.Heart Rate Signal (Line Plot)

- Create a simple sine wave to represent a heart rate signal.
- Label the x-axis as "Time (s)" and the y-axis as "Heart Rate Signal".

2.Patient Heart Rate Data (Scatter Plot)

- Generate random heart rate values for 10 patients.
- Create a scatter plot with labeled axes ("Patient ID" and "Heart Rate (bpm)").

3.Blood Pressure Levels (Bar Chart)

- Assume blood pressure readings for 5 patients.
- Create a bar chart with labeled axes ("Patient" and "Blood Pressure (mmHg)").

4.Glucose Level Distribution (Histogram)

- Generate 50 random glucose level values.
- Plot a histogram to show the data distribution.

Submission

- ✓ MATLAB script (.m file) containing all plots.
- ✓ Screenshot of each generated plot.
- ✓ Brief explanation of each plot.
- ✓ Deadline: 24/03/2025 11:59 PM

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