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Second Stage

Lec7

Graphic User Interface

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Graphic User Interface (GUI)

The problem that MATLAB users faced was its weak ability to display and highlight work,

Therefore, many programmers relied on it to calculate, implement and solve mathematical problems,

For example, and then used its results in other programs such as Basic Visual.

In modern versions of MATLAB, the idea of introducing the process of building interfaces in MATLAB appeared strongly

1. What is a GUI?

- A **Graphical User Interface (GUI)** allows users to interact with a program through graphical elements like buttons, sliders, and text boxes, rather than typing commands.
- MATLAB provides powerful tools to create GUIs for visualizing and interacting with data, models, or applications.

2. Why Use GUIs in MATLAB?

- Simplifies user interaction for non-programmers.
- Enhances user experience in scientific and engineering applications.
- Useful for building tools that require user inputs, visualizations, or interactive simulations.

MATLAB provides tools and functions to create Graphical User Interfaces (GUIs) that allow users to interact with programs visually. GUIs in MATLAB can be

created using App Designer, GUIDE (legacy tool), or programmatically using uifigure and UI components. Here's an overview:

1. App Designer

App Designer is the recommended environment for creating modern MATLAB GUIs. It features:

- A drag-and-drop interface to place UI components.
- An integrated code editor to program interactions.
- Rich UI component library.

Steps to Create a GUI with App Designer:

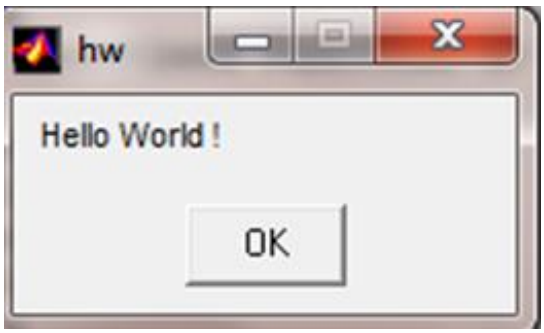
1. Open App Designer:
2. Drag UI components (e.g., buttons, sliders, axes) onto the canvas.
3. Use the Component Browser to set properties like Name, Text, or Value.
4. Write callbacks in the code editor to define behavior when components are used.

Example:

A simple app with a button that displays "Hello, World!" when clicked:

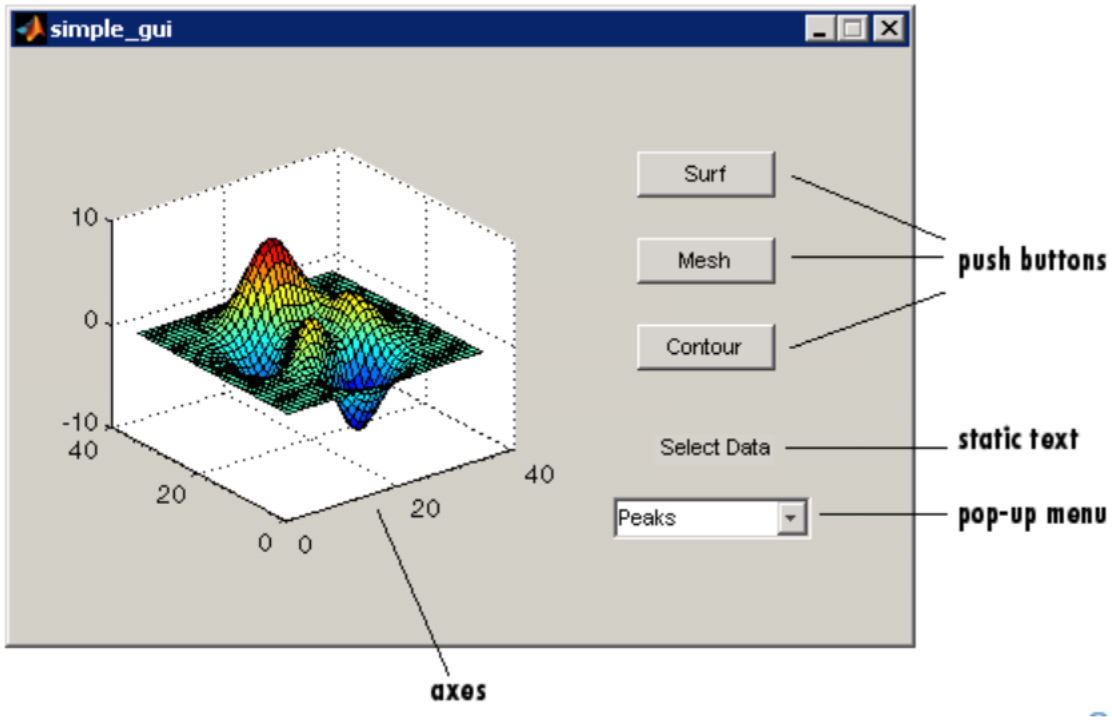
matlab

```
% Code is auto-generated in App Designer
function ButtonPushed(app, event)
    app.Label.Text = 'Hello, World!';
end
```



2. Programmatically Creating GUIs

For more control or dynamic GUI creation, MATLAB provides a procedural approach using uifigure and UI components.



Common Components:

- Figures: Main container (uifigure).
- UI Controls: Buttons, sliders, text boxes (uibutton, uislider).
- Axes: Plots and charts (uiaxes).

3. GUIDE (Legacy Tool)

GUIDE (Graphical User Interface Development Environment) is MATLAB's older GUI development tool. It has been replaced by App Designer but is still supported in existing projects.

Steps with GUIDE:

- Open GUIDE:
- Use the design area to drag and drop UI components.
- Double-click components to edit properties.
- Use the auto-generated .m file to define behavior.

4. Key UI Components

MATLAB offers many UI components to build interactive applications:

1. Buttons (uibutton): Perform actions when clicked.
2. Sliders (uislider): Allow value selection from a range.
3. Text Boxes (uitextarea, uieditfield): Accept user input.
4. Labels (uilabel): Display text.
5. Drop-downs (uidropdown): Let users select options.
6. Tables (uitable): Display tabular data.
7. Axes (uiaxes): Plot data or visualize charts.

5. Advanced GUI Features

- Callback Functions: Define what happens when users interact with components.
- Data Sharing: Use guidata or app.UserData to share data between components.
- Dynamic Components: Add or modify components during runtime.
- Event Listeners: Respond to specific user actions or component changes.

6. Deployment

You can deploy GUIs as standalone applications or share them as .mlapp files. For standalone deployment:

*Use MATLAB Compiler to create .exe or .app files.


THANK YOU