MATLAB EXPO

How To Optimize the User Experience of Your MATLAB Apps

Dr. Gianluca Carnielli, MathWorks

MathWorks


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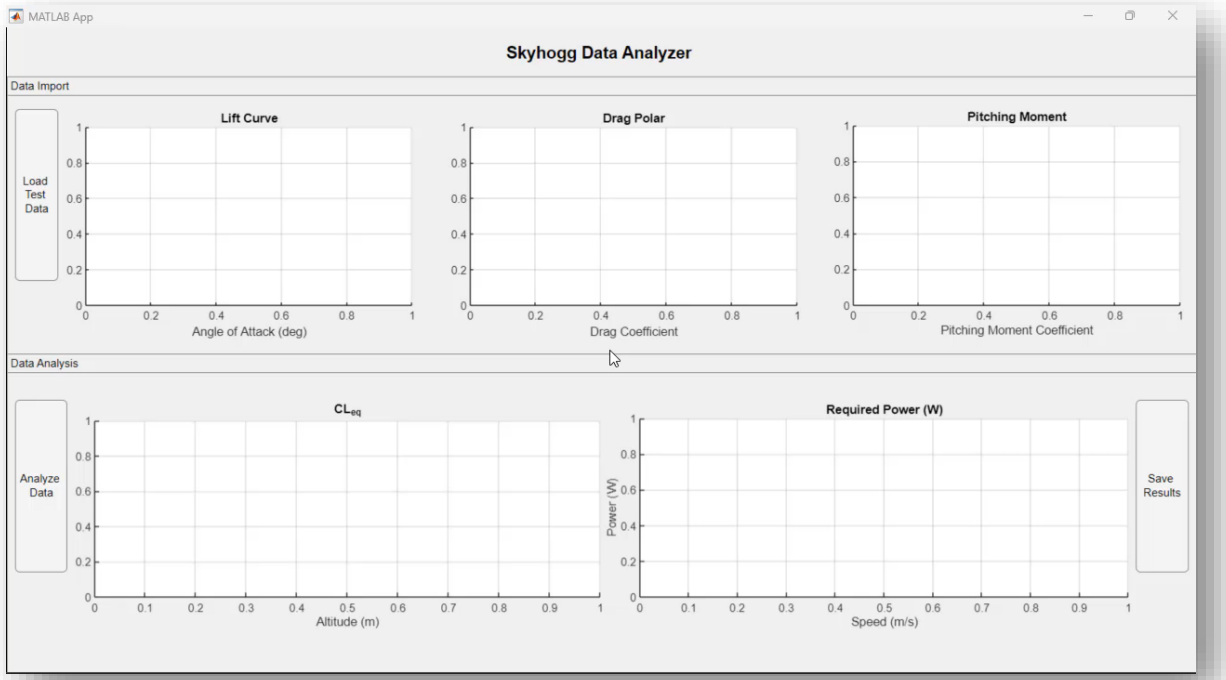
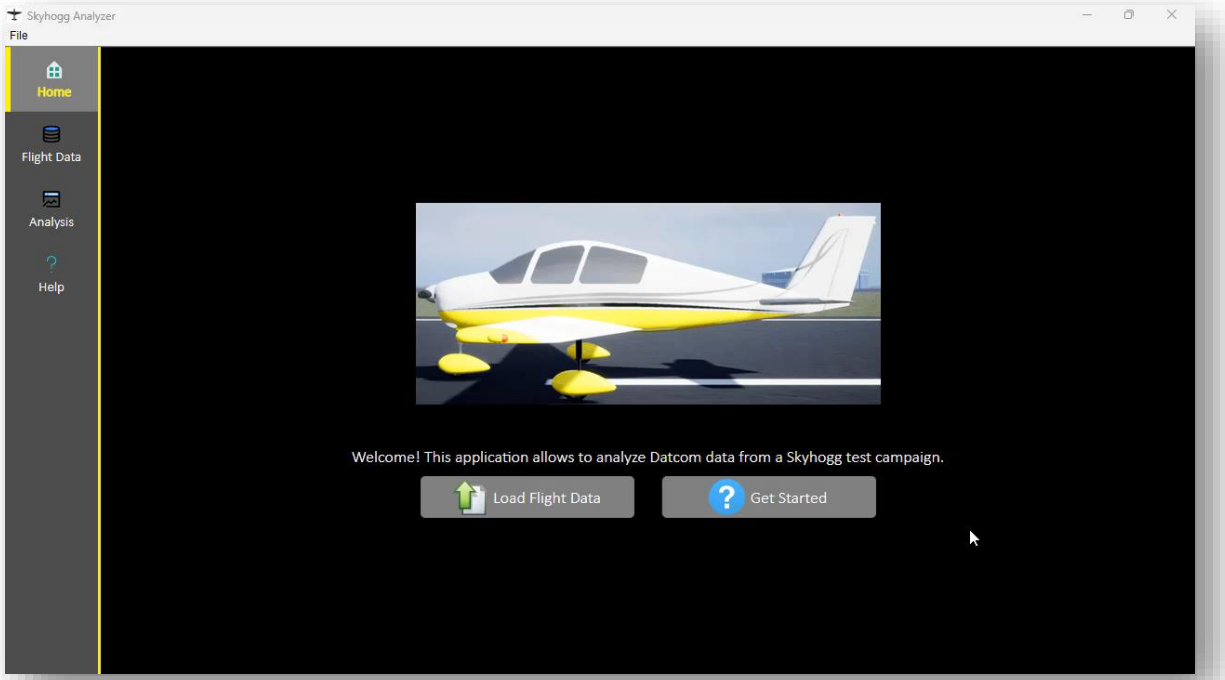
Share the EXPO experience
#MATLABEXPO
MATLAB
EXPO
WELCOME


MATLAB App
Skyhogg Data Analyzer
Data Import
Load Test Data
Lift Curve
Angle of Attack (deg)
Drag Polar
Drag Coefficient
Pitching Moment
Pitching Moment Coefficient
Data Analysis
Analyze Data
CLeq
Altitude (m)
Required Power (W)
Power (W)
Speed (m/s)
Save Results

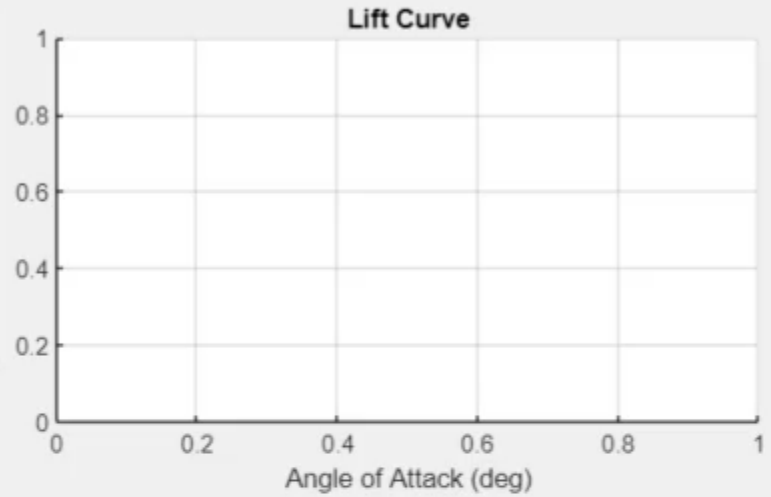

Skyhogg Analyzer
File
Home
Flight Data
Analysis
Help
Welcome! This application allows to analyze Datcom data from a Skyhogg test campaign.
Load Flight Data
Get Started

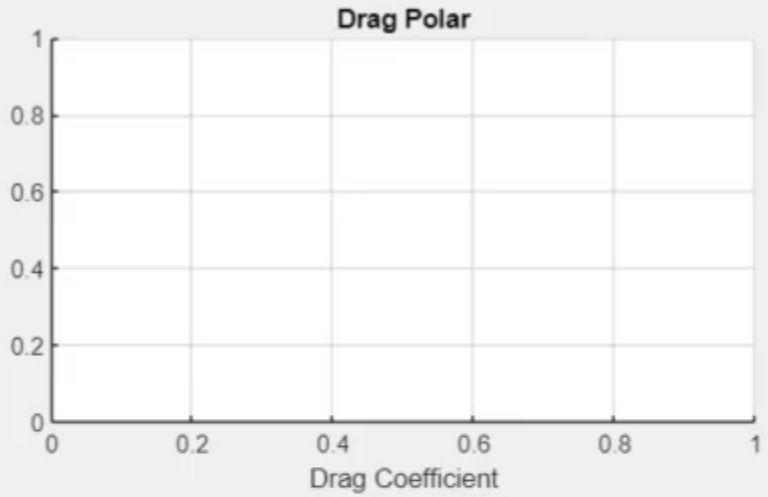
MATLAB App

Skyhogg Data Analyzer

Data Import

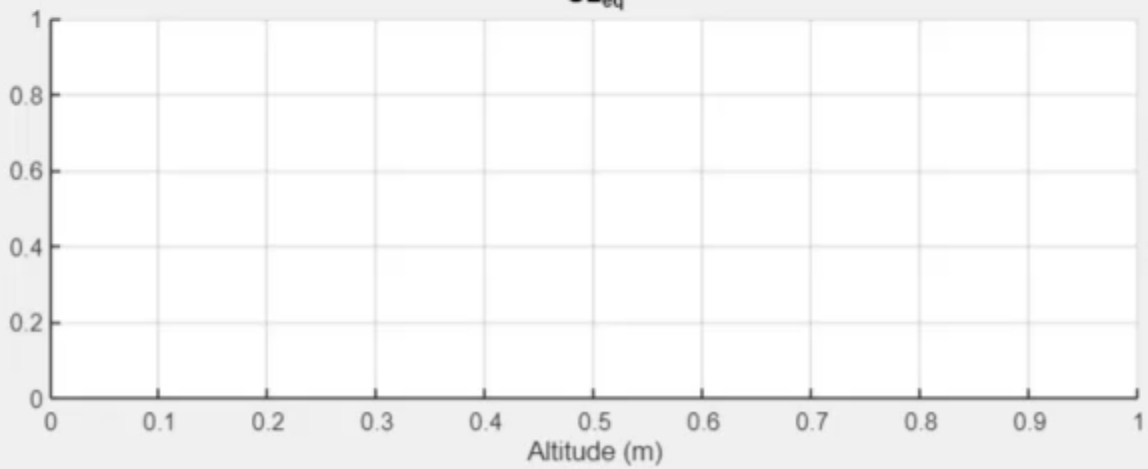
Load Test Data

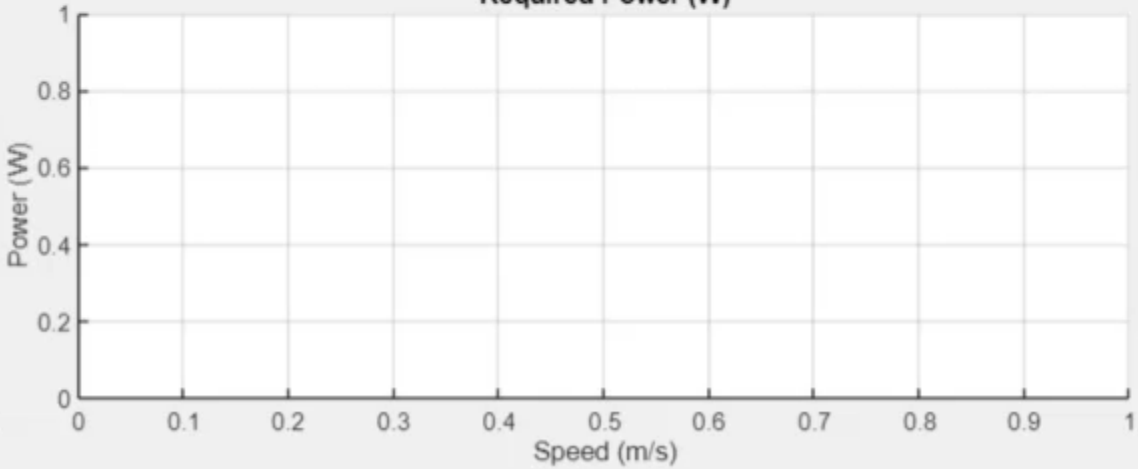




Data Analysis

Analyze Data





Save Results

Skyhogg Analyzer

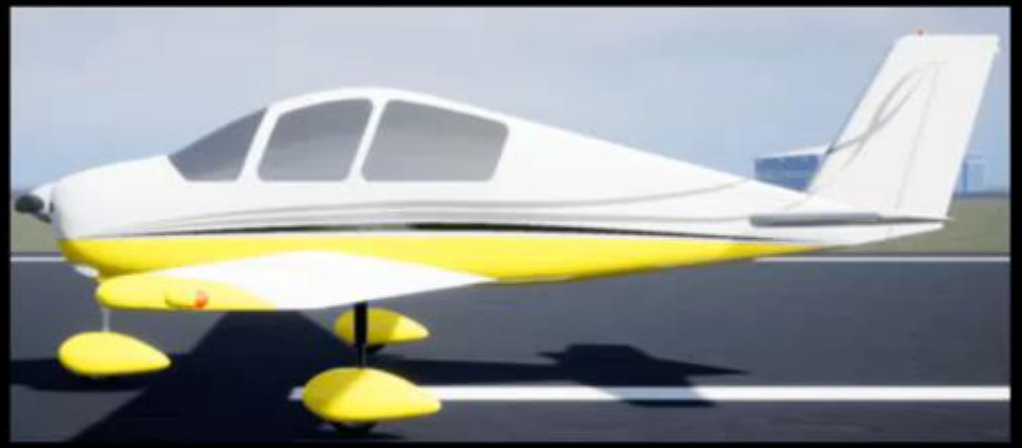
File

Home

Flight Data

Analysis

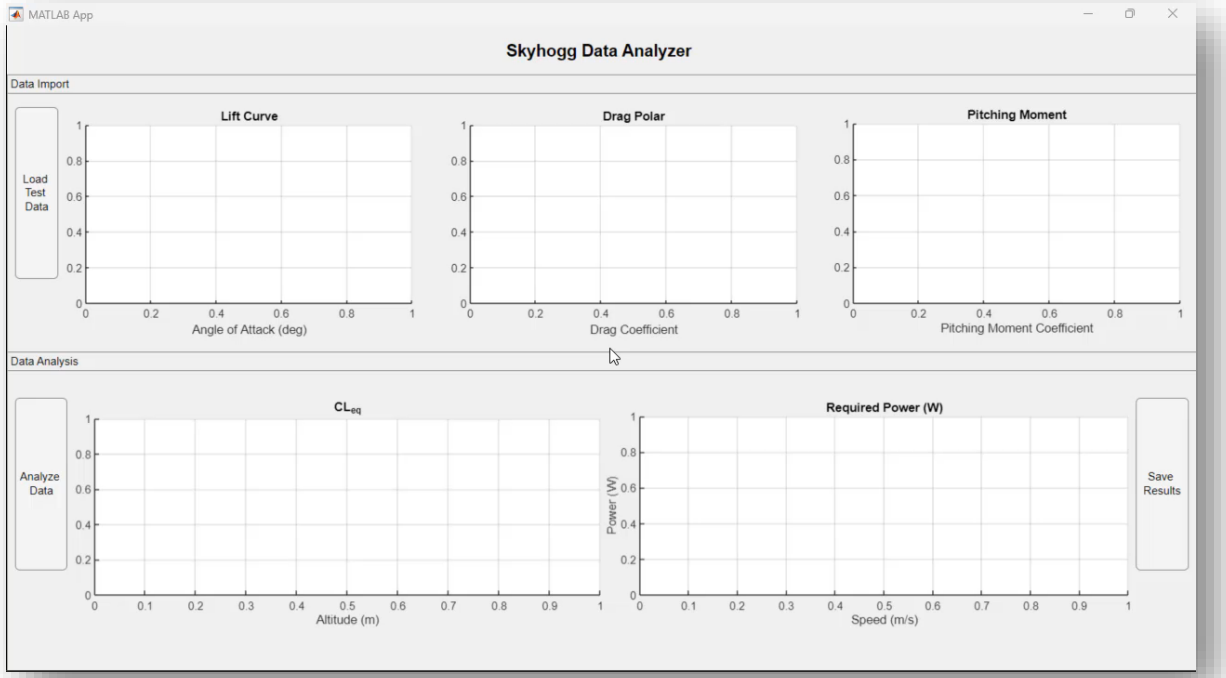
Help



Welcome! This application allows to analyze Datcom data from a Skyhogg test campaign.

Load Flight Data

Get Started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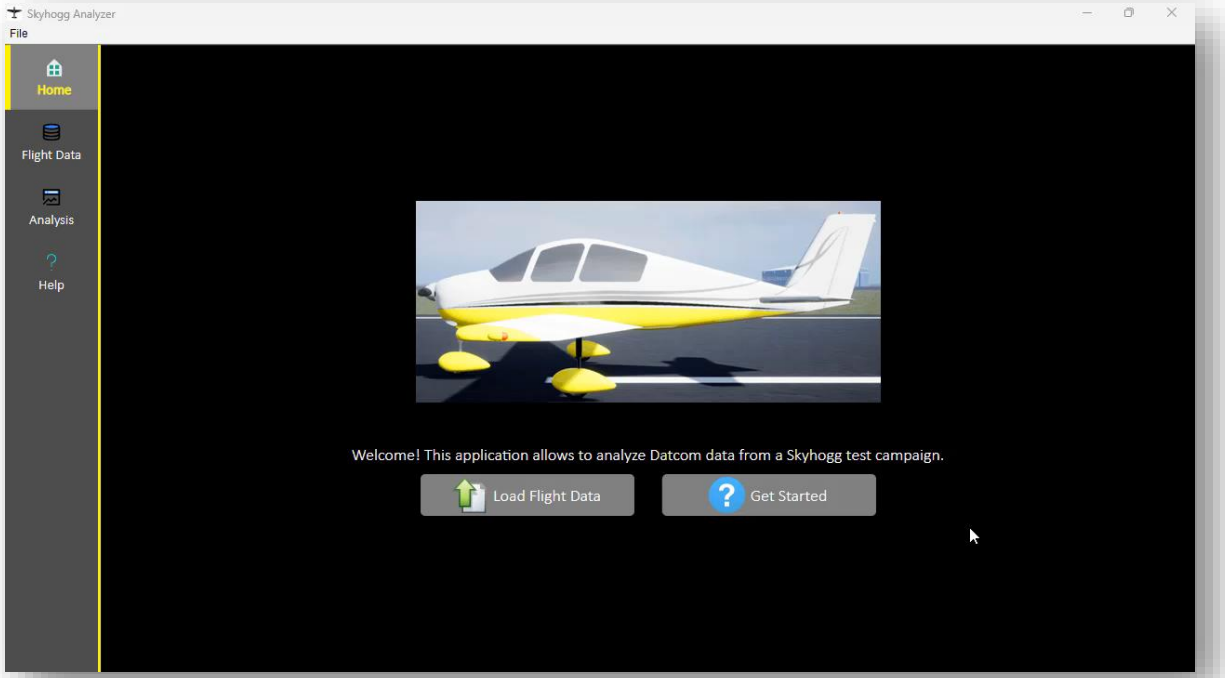
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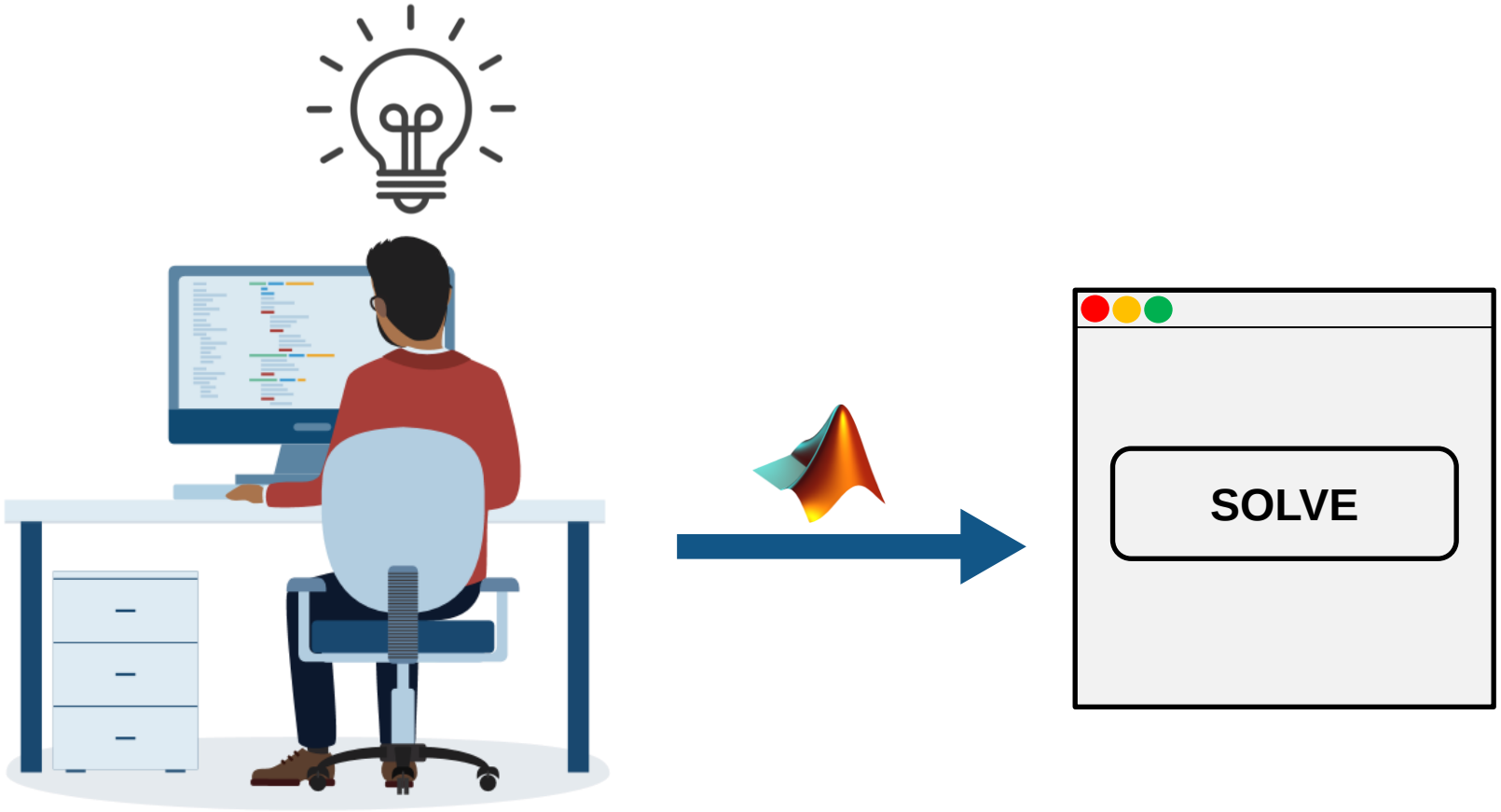
By the End of This Presentation...

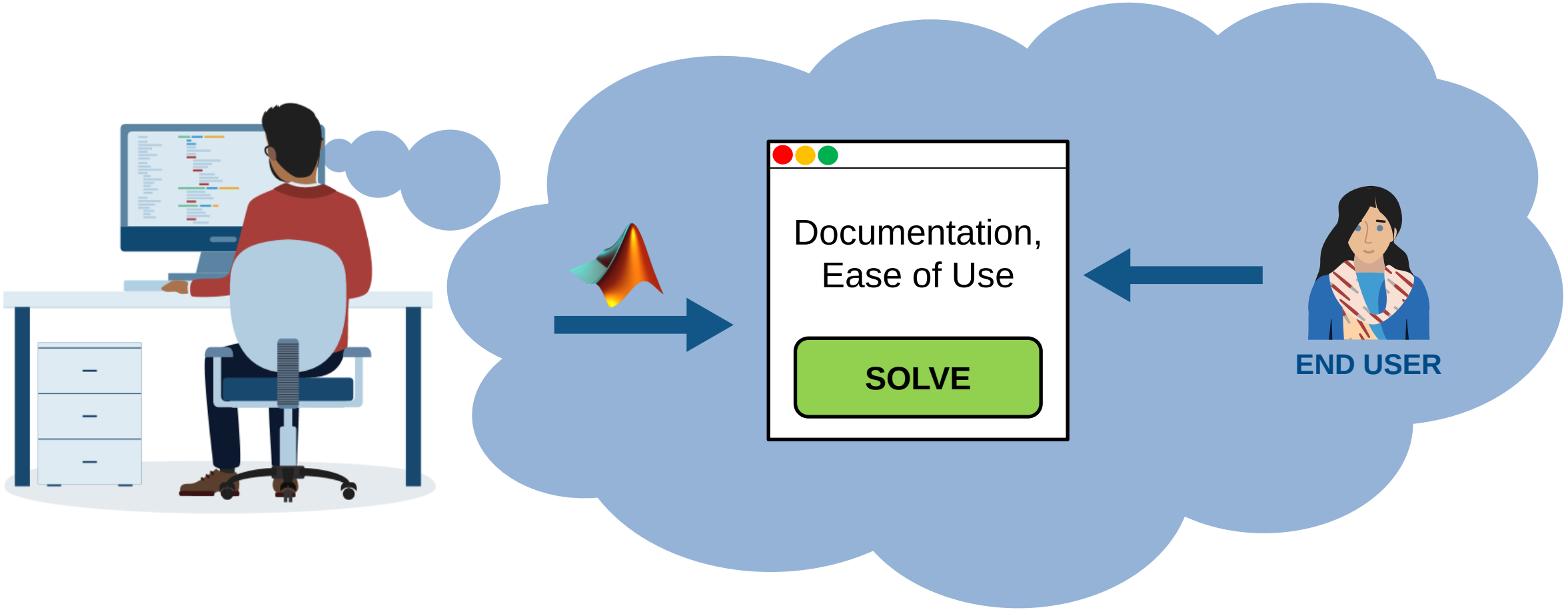
Learn:

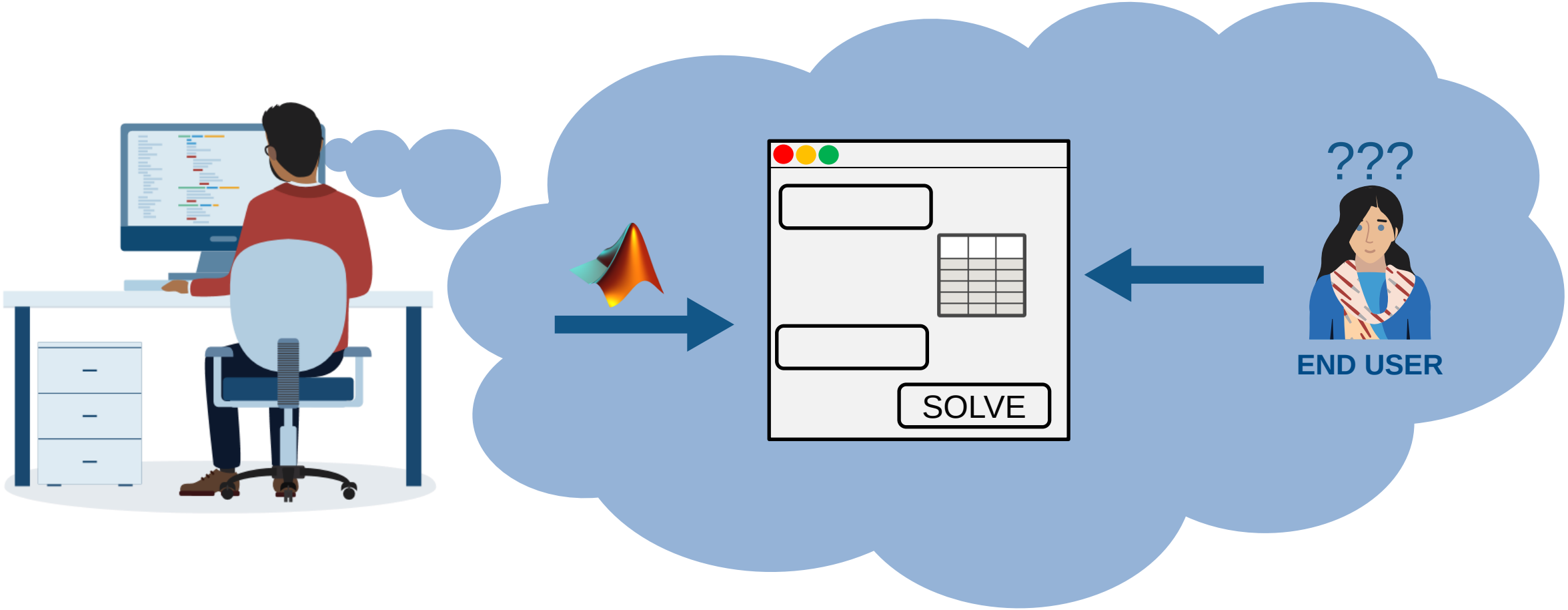
- Tools and techniques to create user friendly apps in MATLAB

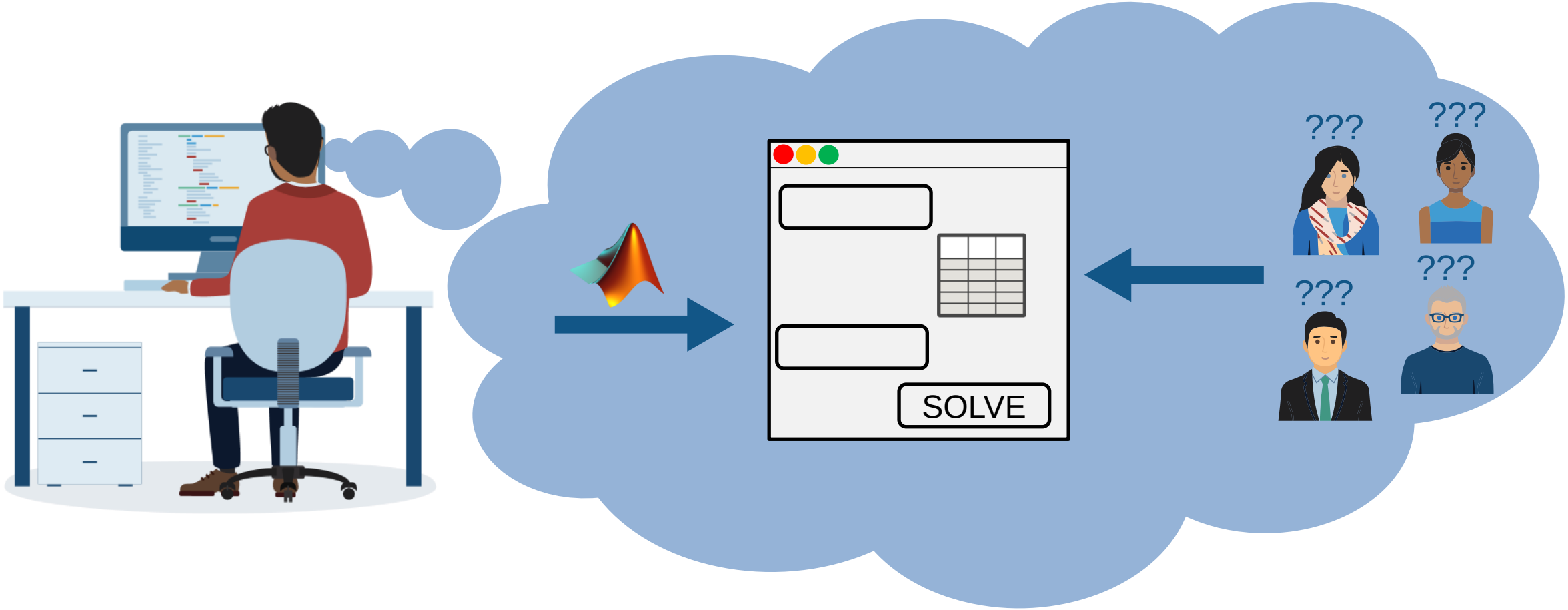
Remember:

- Great apps come from a great user experience **(BUT NOT ONLY, see handout)**


SOLVE


Documentation,
Ease of Use
SOLVE
END USER


???
SOLVE
END USER

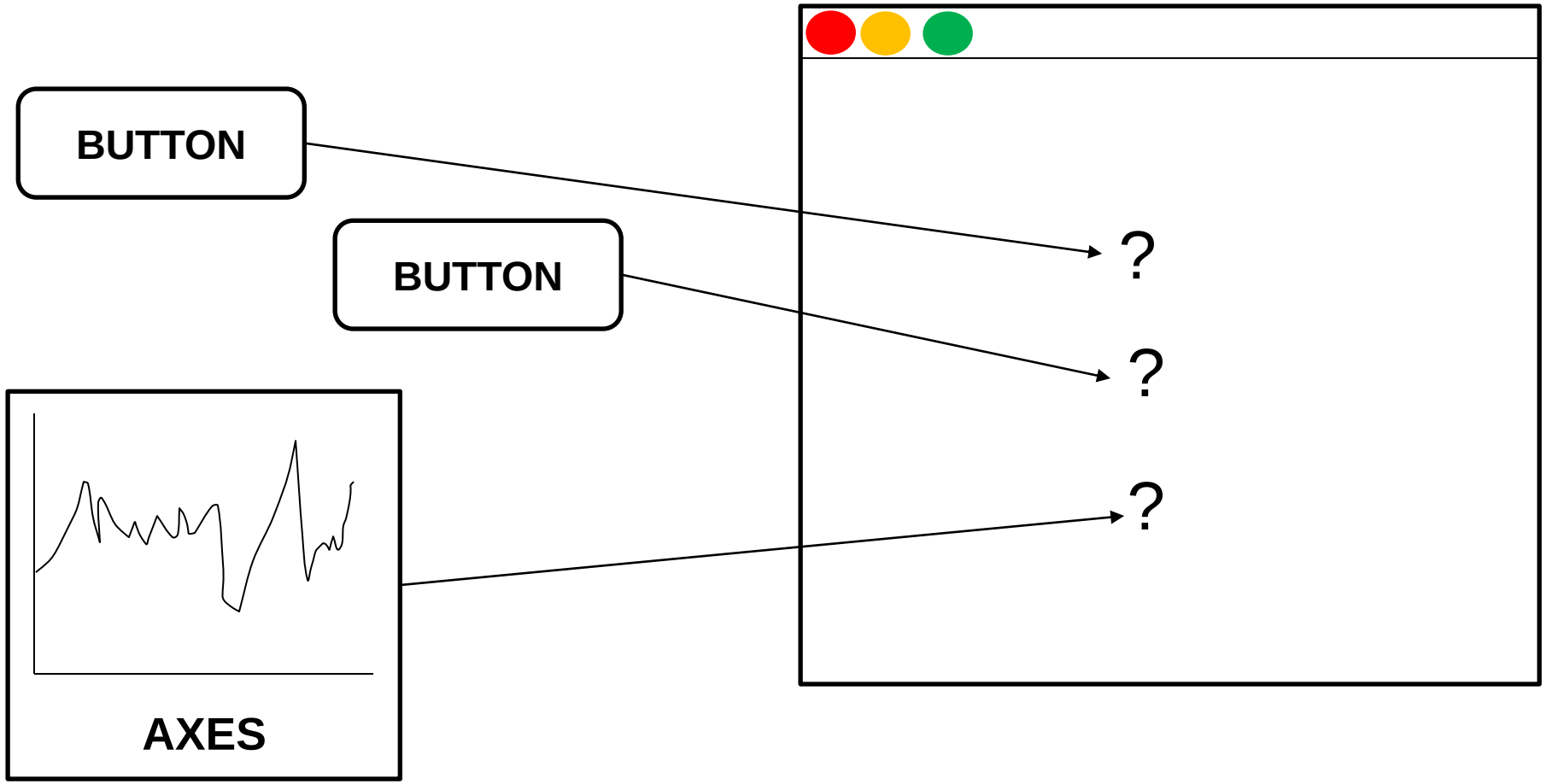

???
???
???
???
SOLVE

How Can You Optimize the User Experience of Your MATLAB Apps?

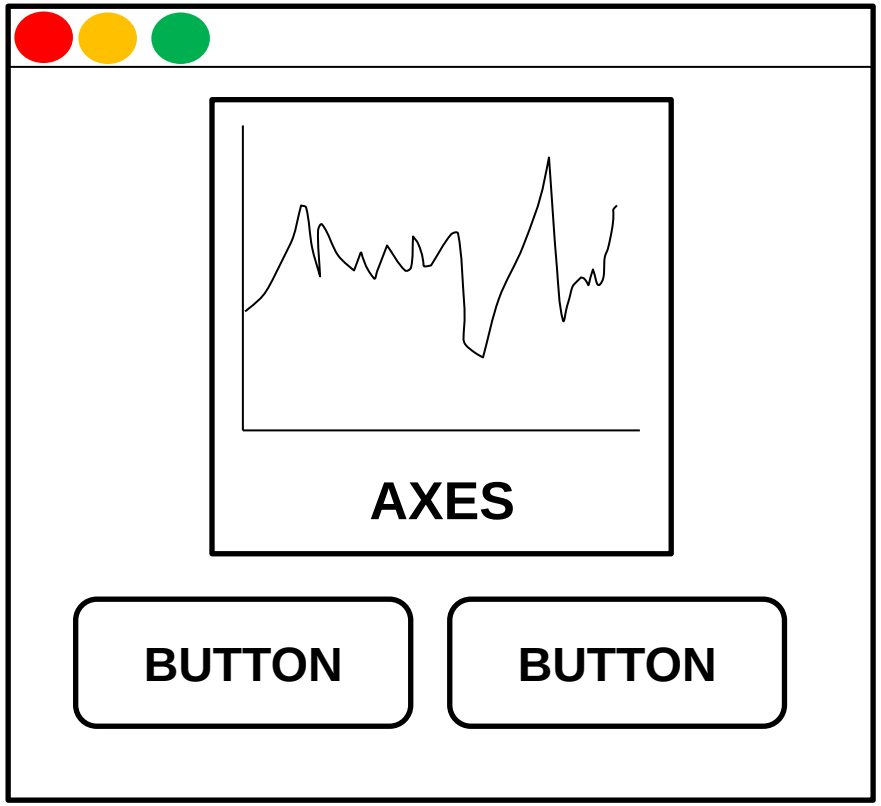
In a Nutshell...

1. **Choose the correct position and size**
2. Set the expectations
3. Provide feedback to the user
4. Anticipate user errors
5. Provide documentation
6. Enhance the appearance

Choose the Correct Position and Size



Choose the Correct Position and Size



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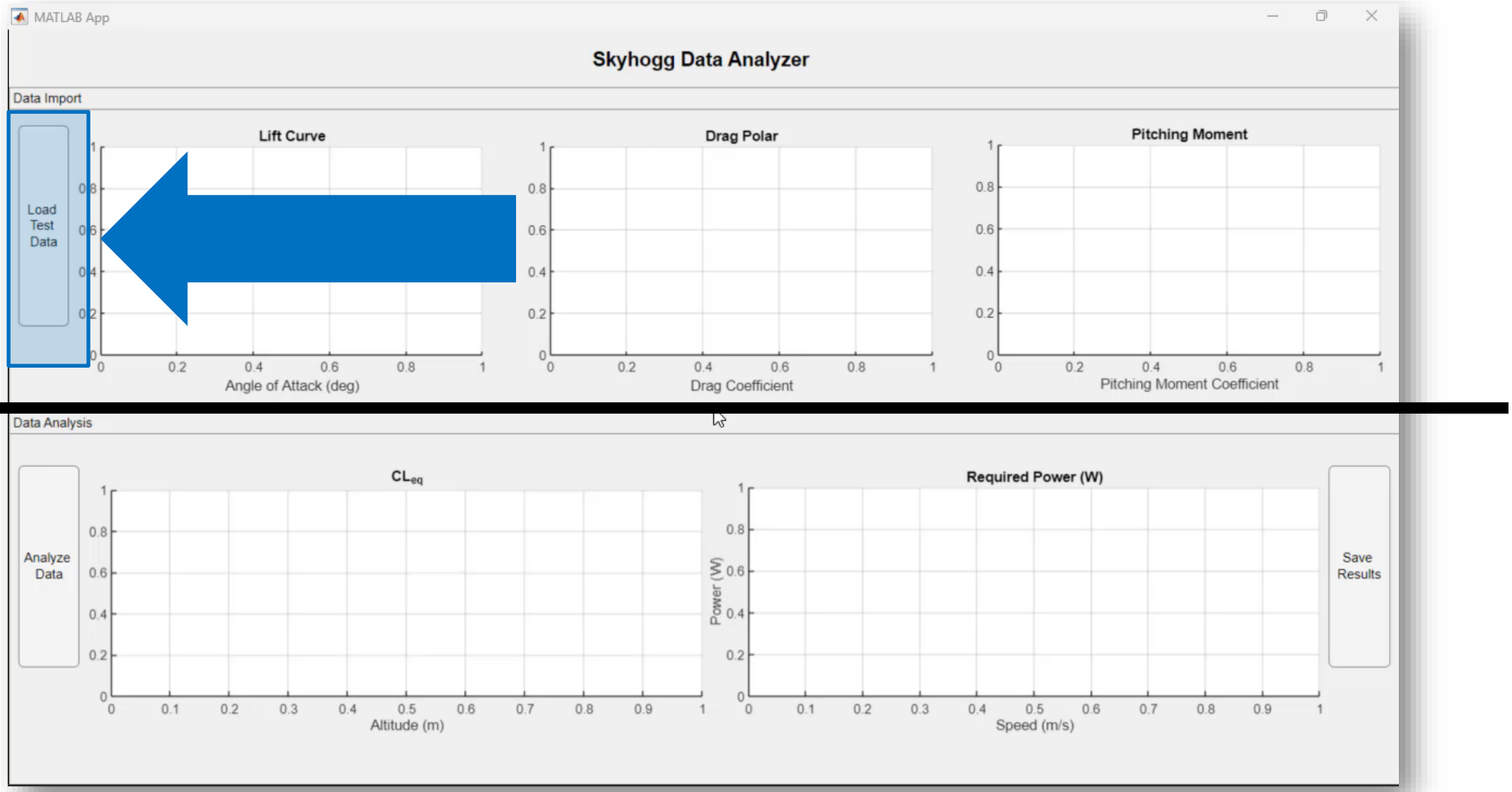

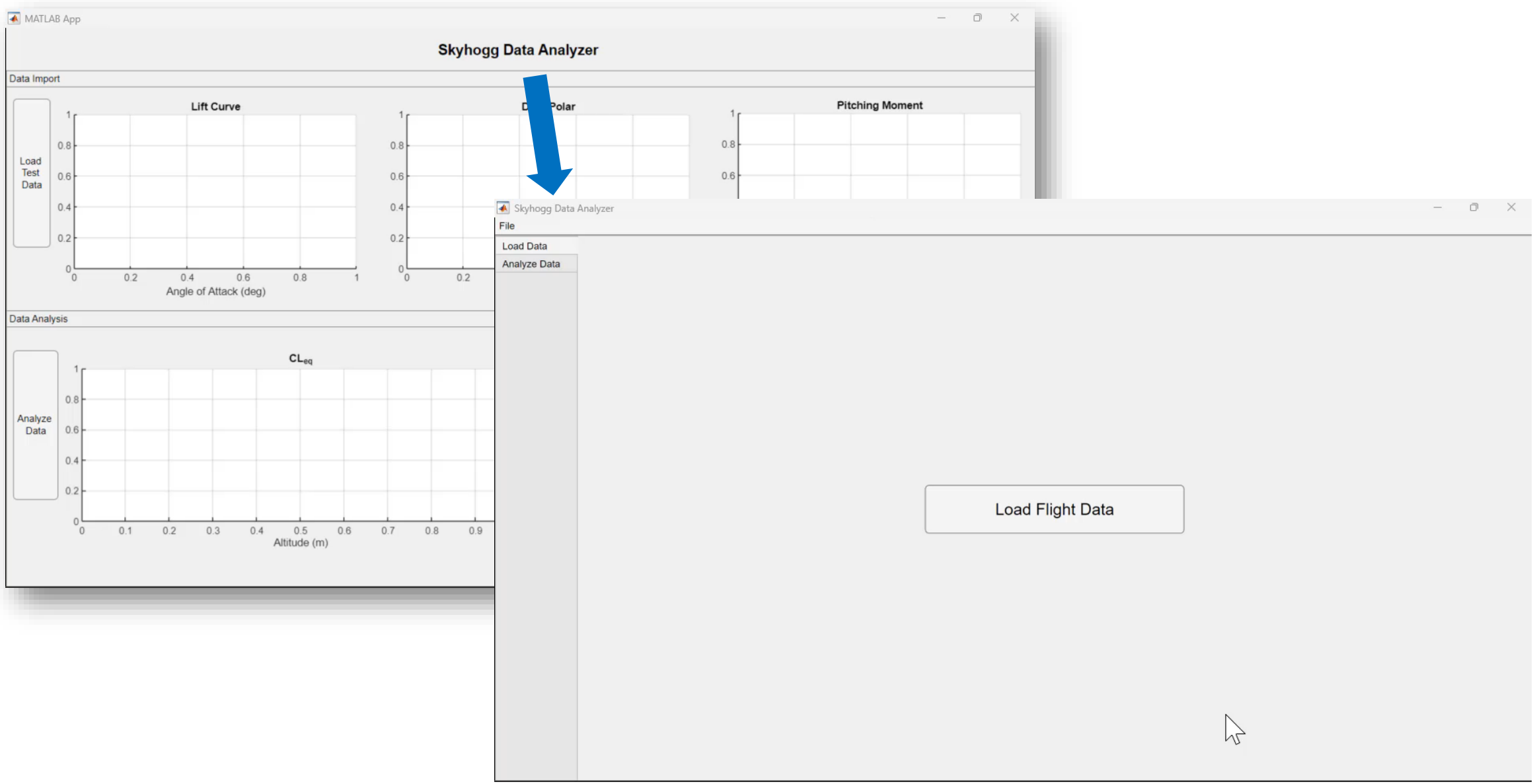
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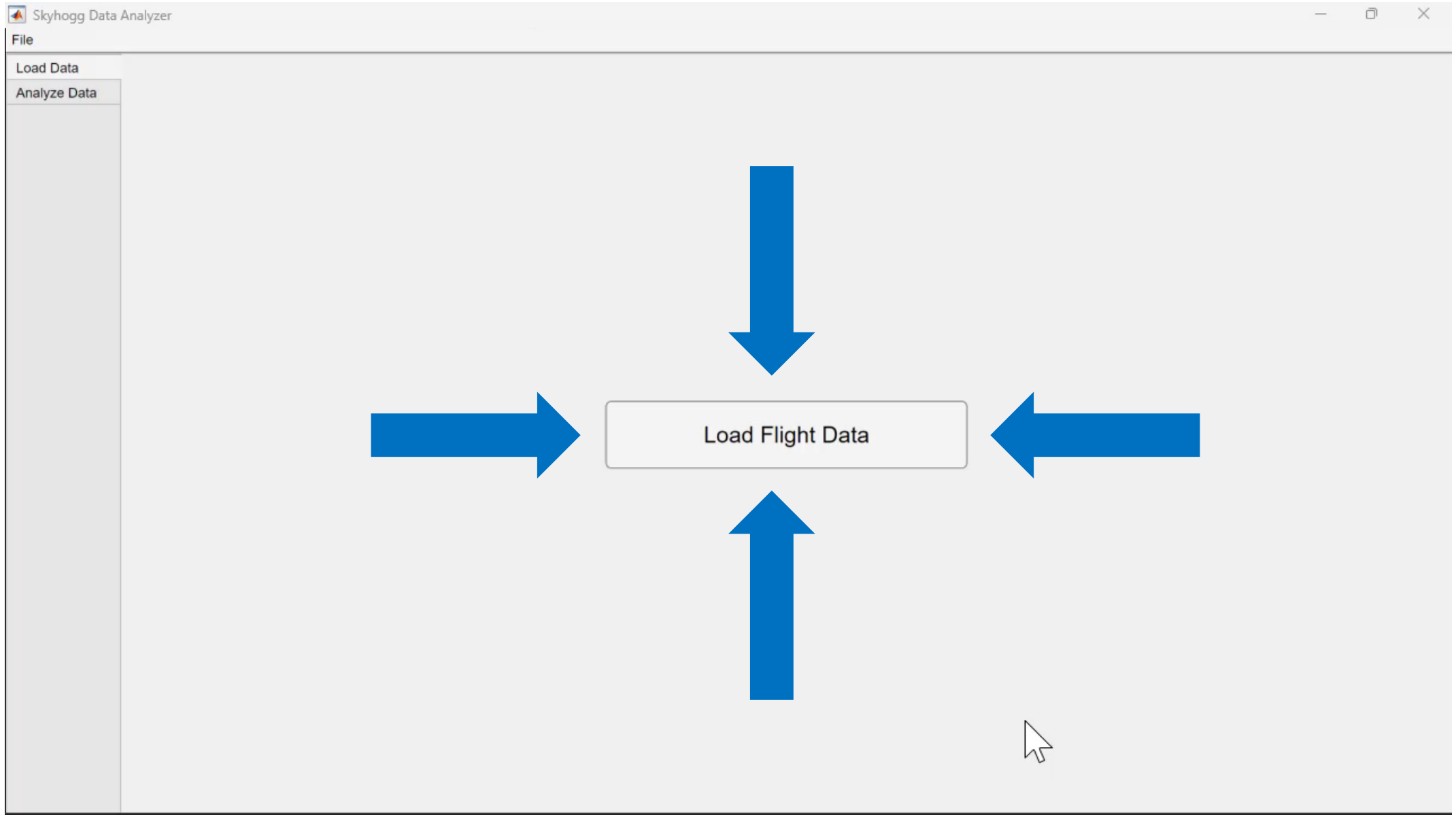
Skyhogg Data Analyzer
File
Load Data
Analyze Data
Load Flight Data


Skyhogg Data Analyzer
File
Load Data
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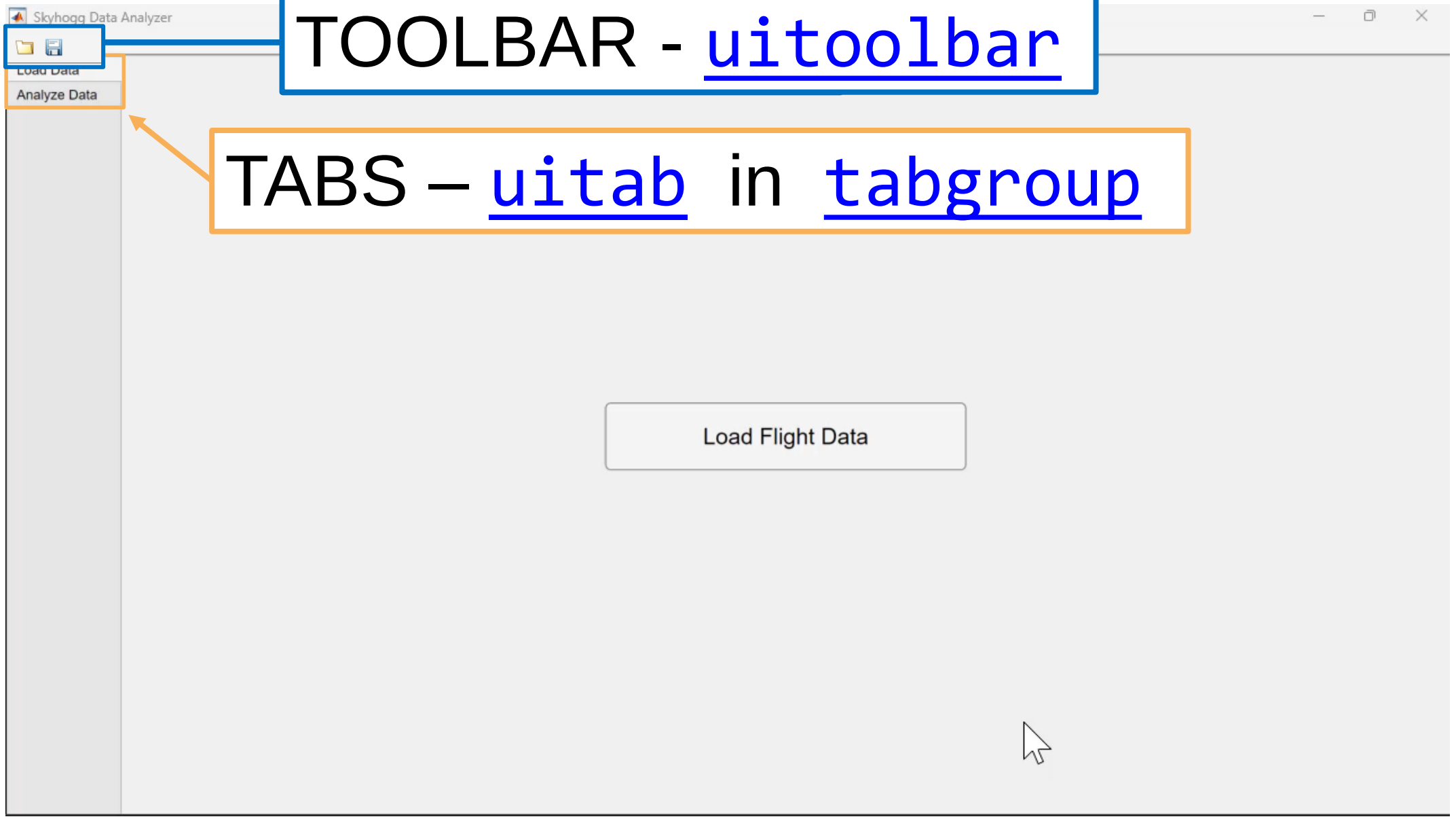

TOOLBAR - uitoolbar
TABS – uitab in tabgroup
Skyhogg Data Analyzer
Analyze Data
Load Flight Data

Skyhogg Data Analyzer

File

Load Data...

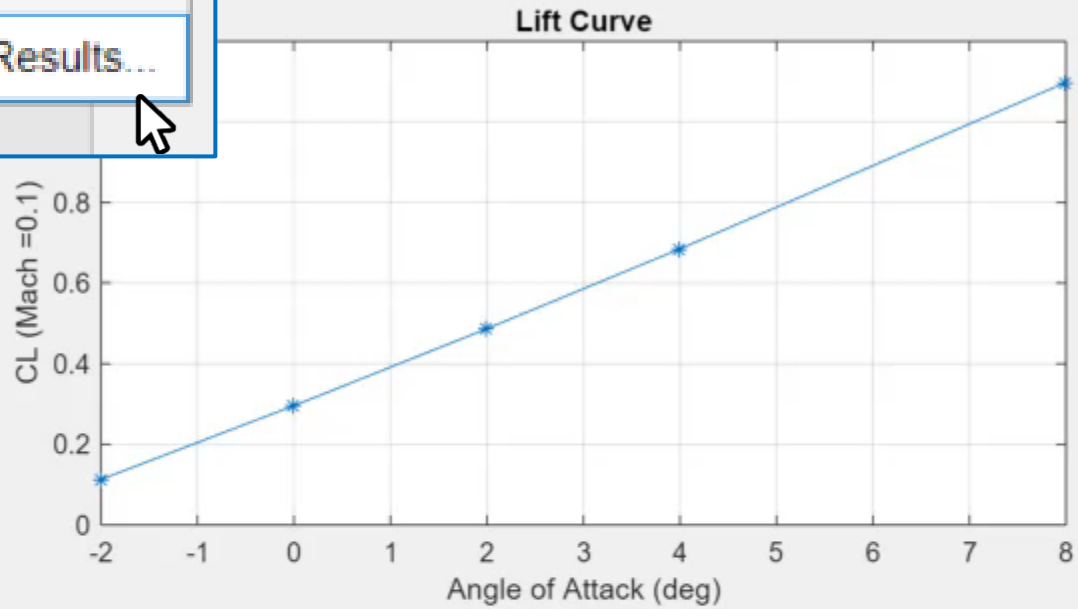
Save Results...

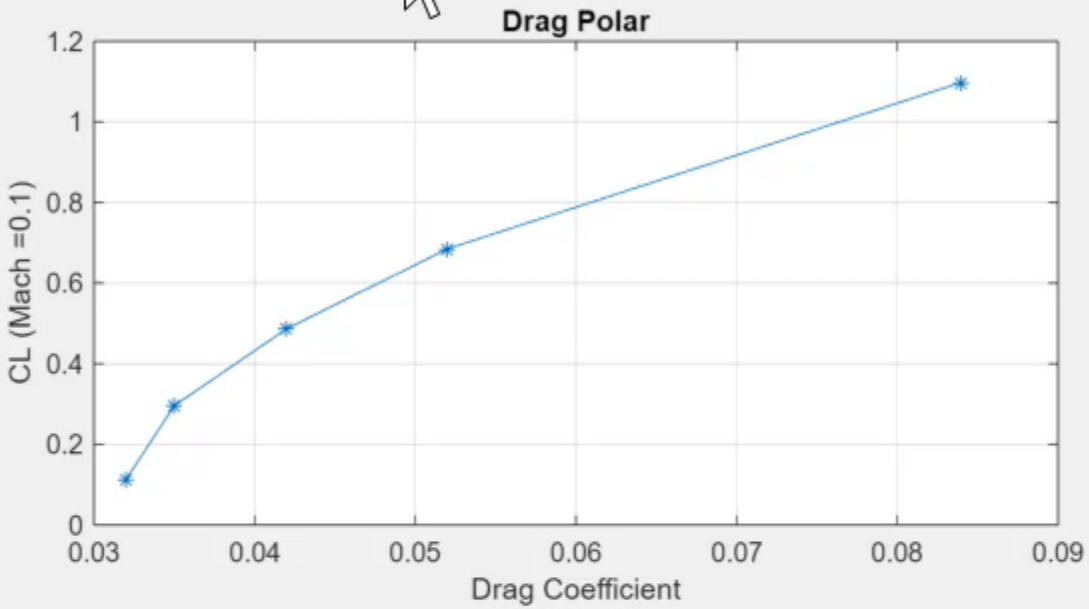
Clear All

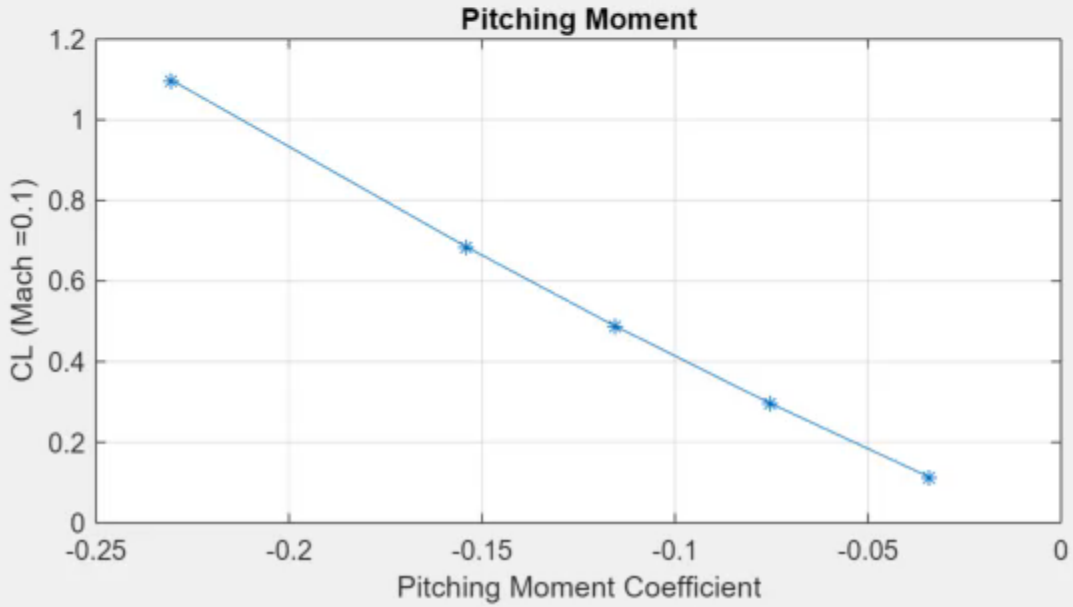
Lift Curve

Drag Polar

Pitching Moment







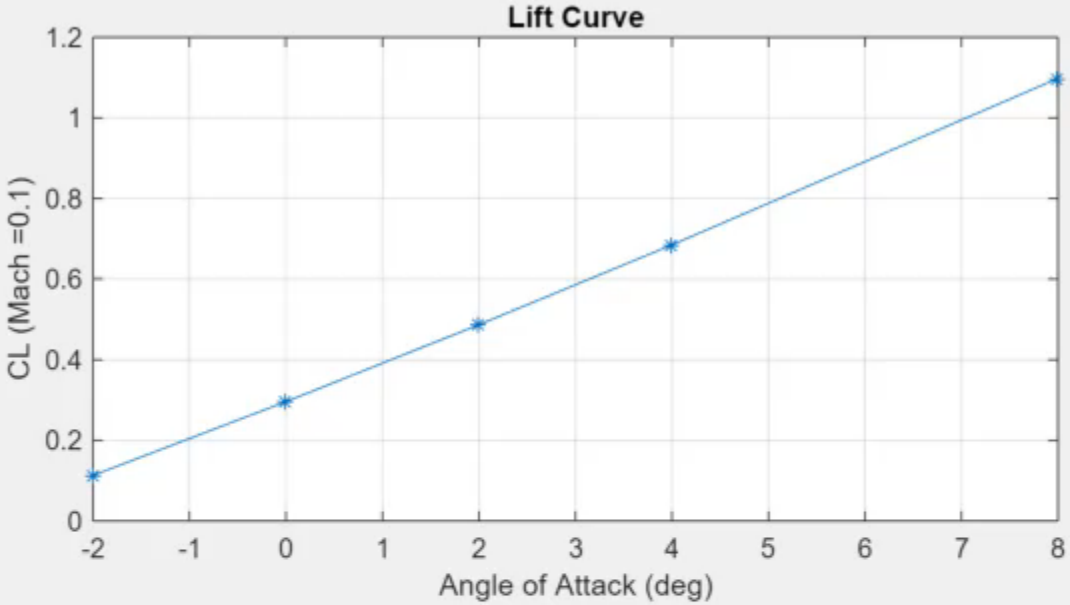
Skyhogg Data Analyzer

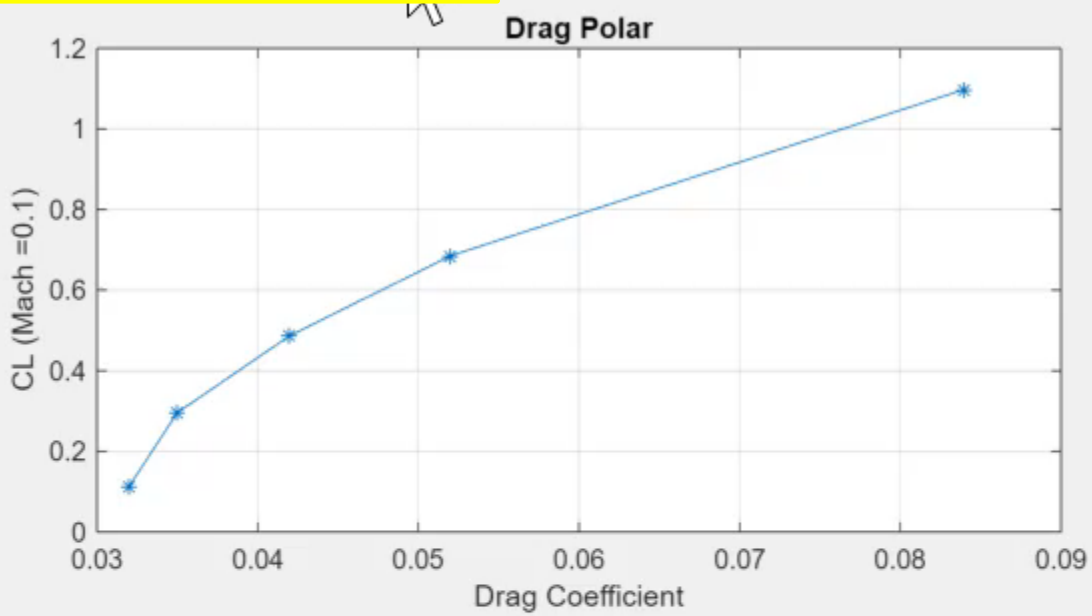
File

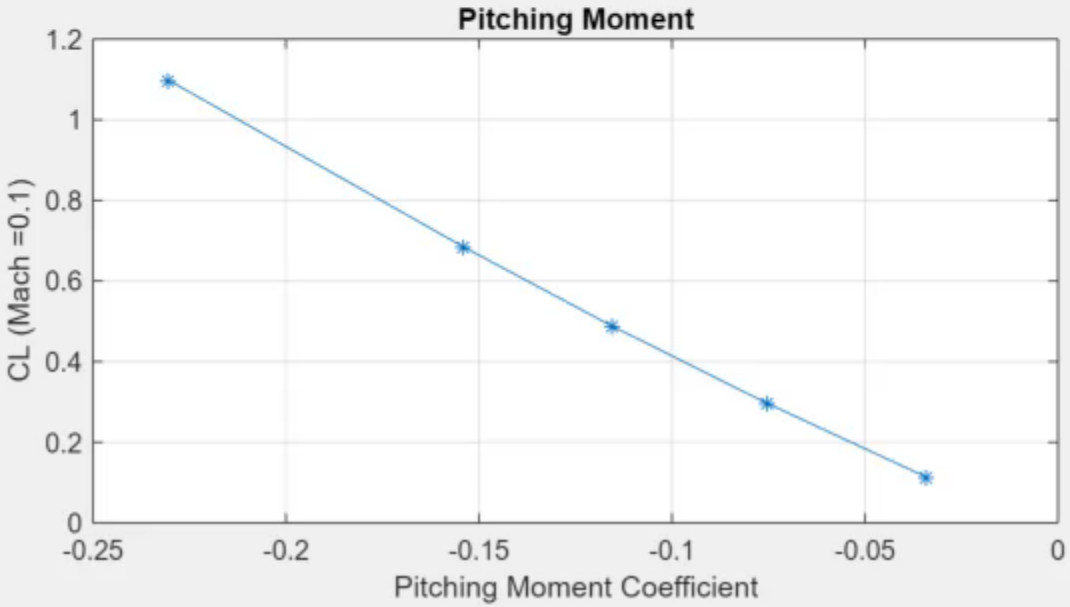
Load Data

Analyze Data

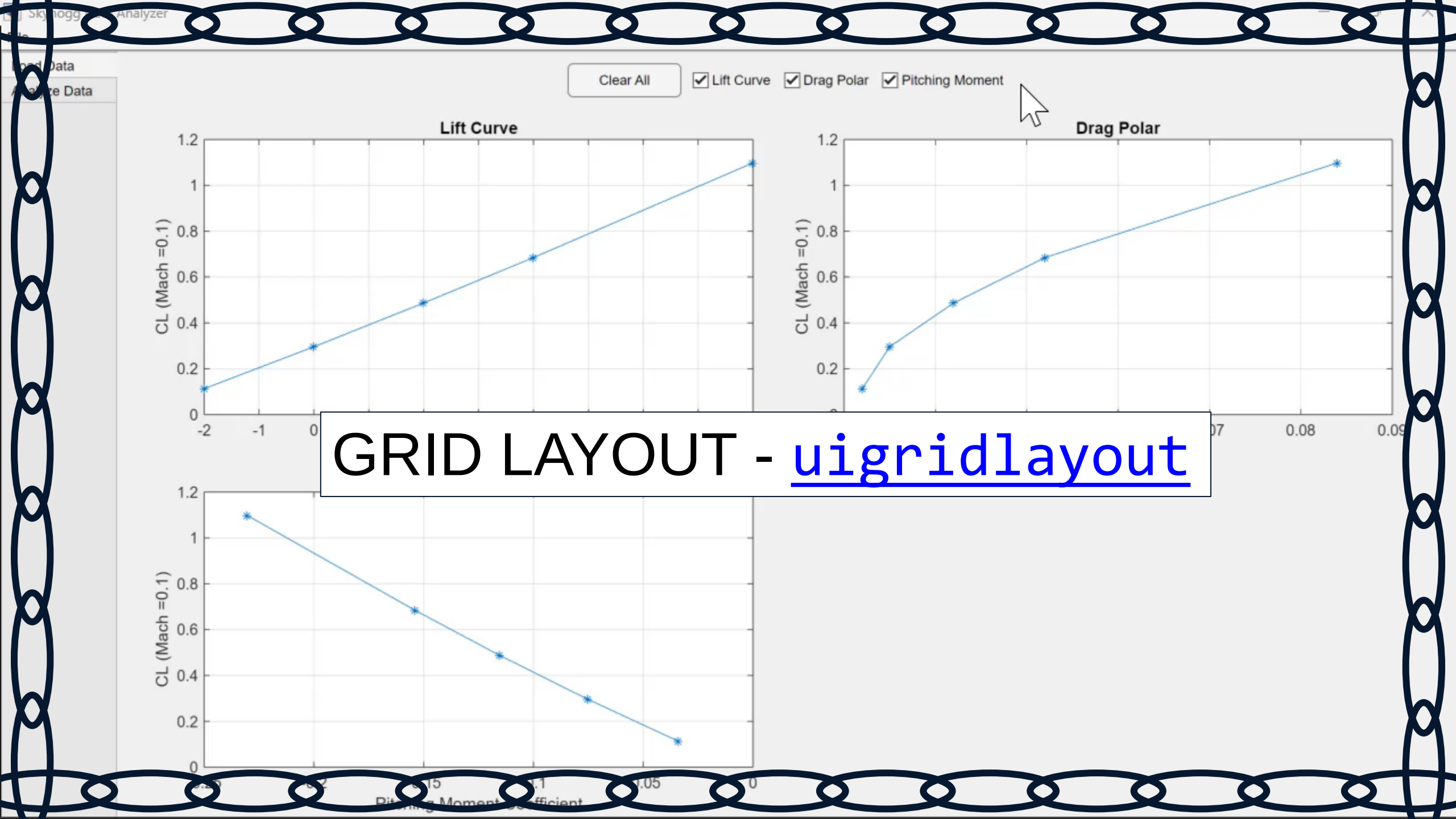
Clear All | Lift Curve | Drag Polar | Pitching Moment







TILED LAYOUT - tiledlayout


Clear All
Lift Curve
Drag Polar
Pitching Moment
Lift Curve
CL (Mach =0.1)
Drag Polar
CL (Mach =0.1)
GRID LAYOUT - uigridlayout

Skyhogg Data Analyzer

File

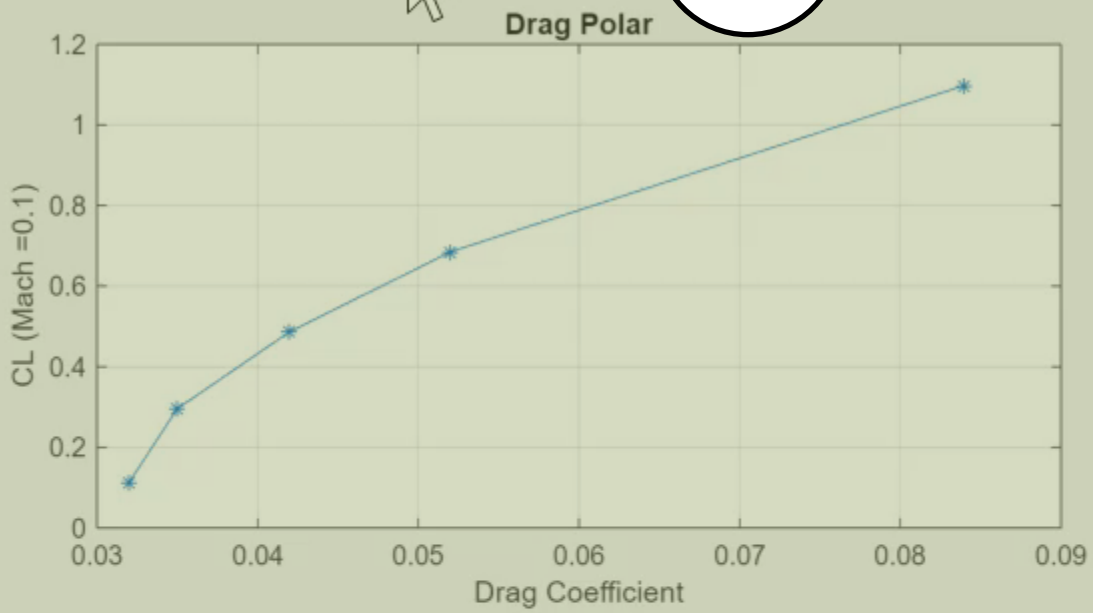
Load Data

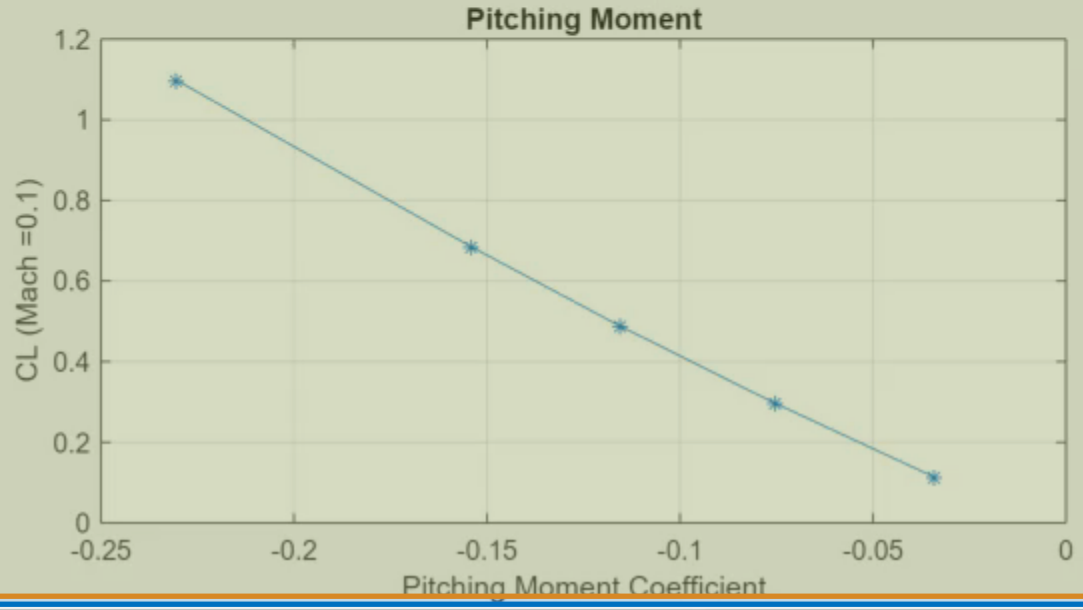
Analyze Data

1

Clear All | Lift Curve | Drag Polar | Pitching Moment

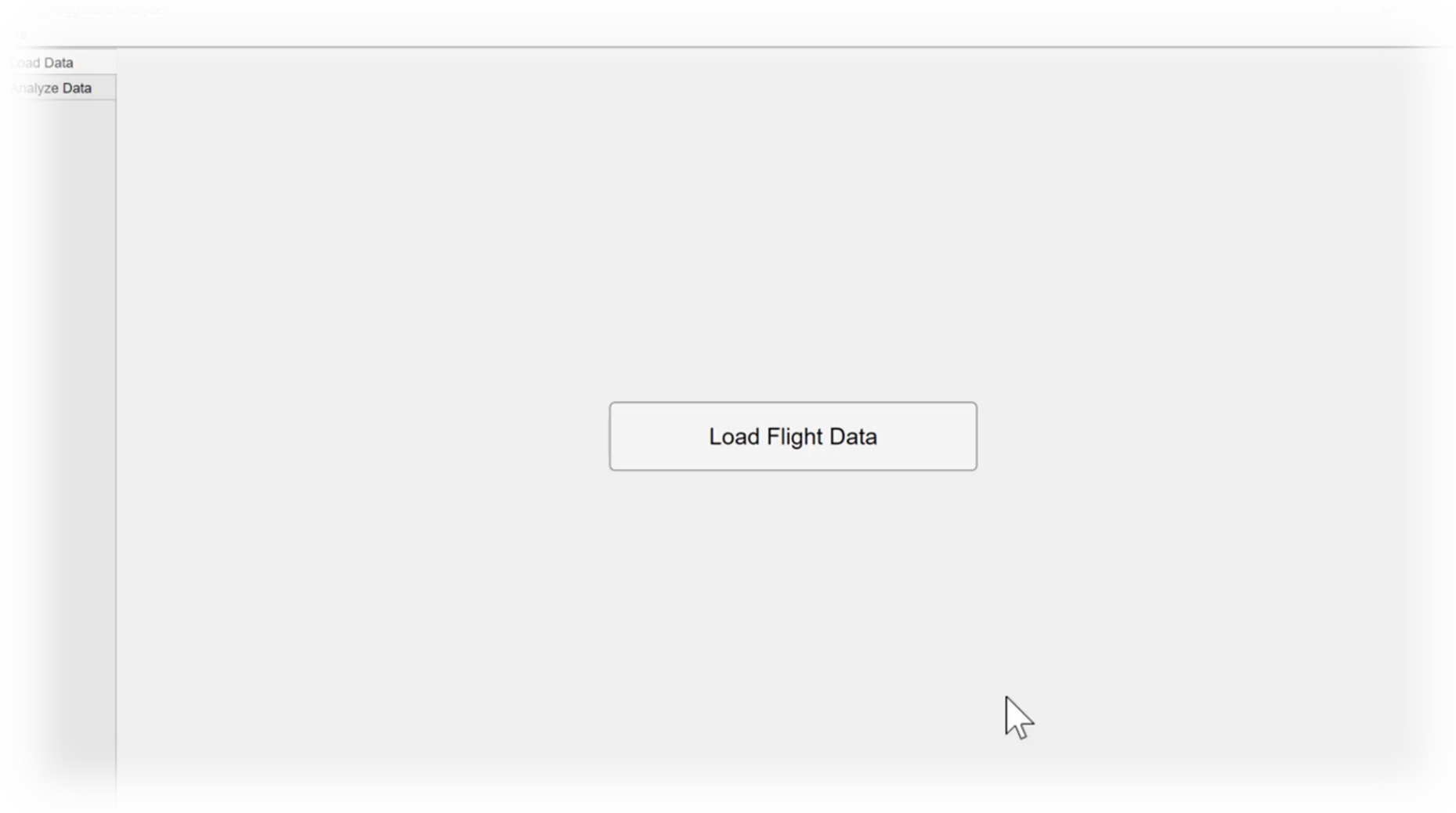
3





2

Use Grid Layout to Enable Dynamic Positioning



More details in the handout.

How To Optimize the User Experience of Your MATLAB Apps

1. Choose the correct position and size
2. **Set the expectations**
3. Provide feedback to the user
4. Anticipate user errors
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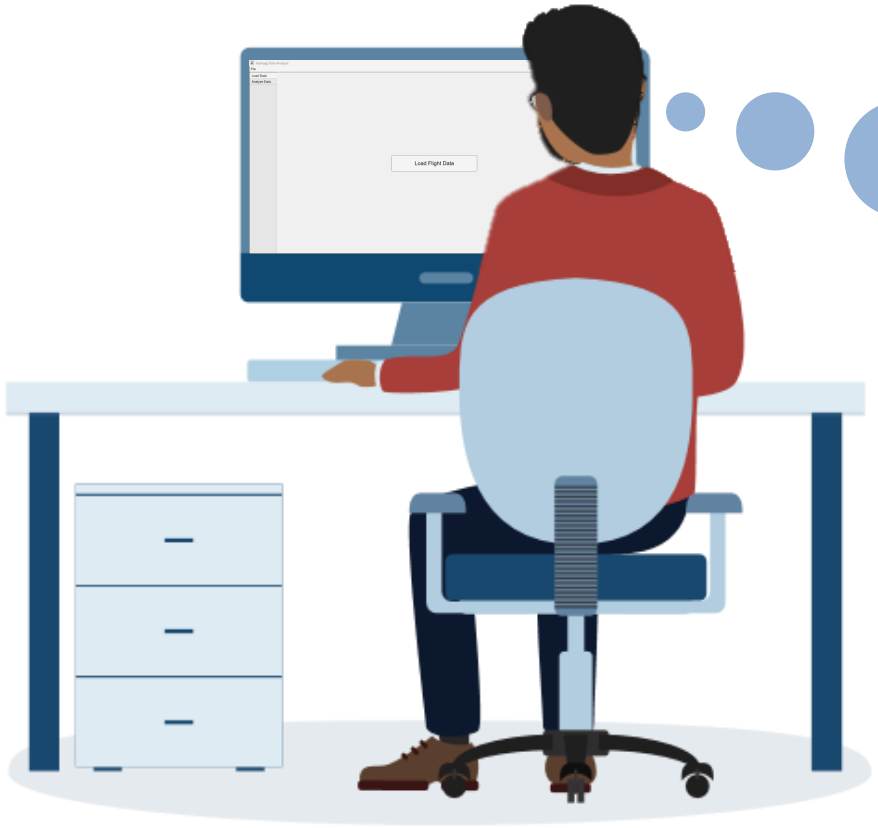
6. Enhance the appearance

Set the Expectations

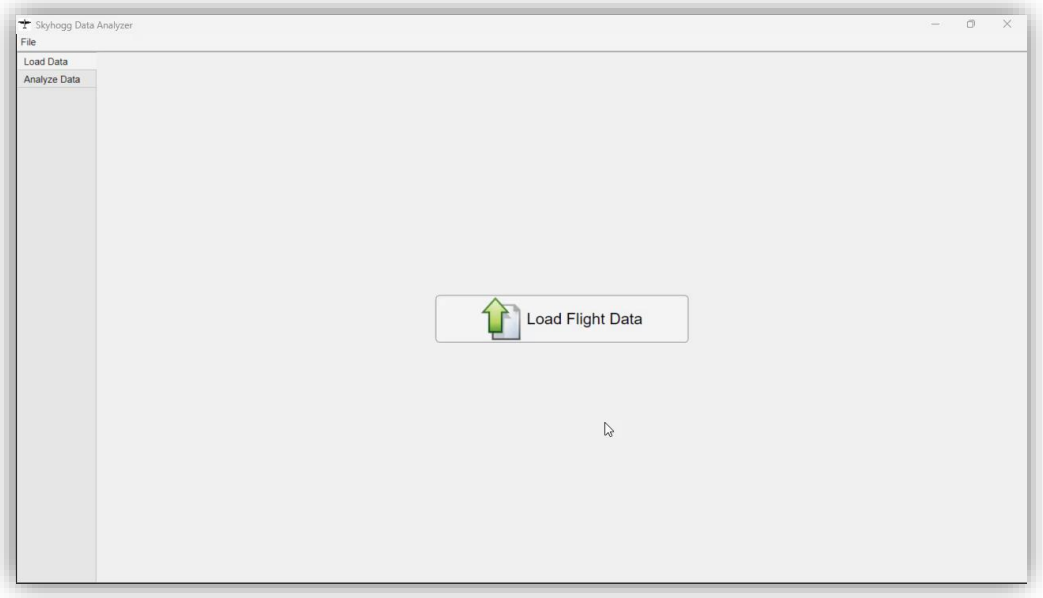


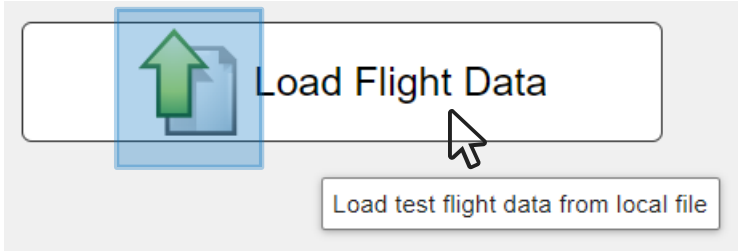
...What data do I need to provide?

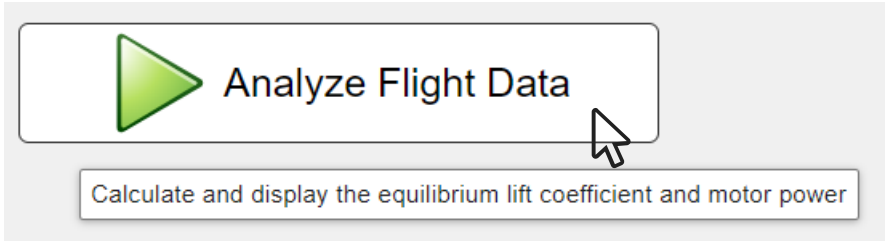
...What is this app going to calculate?

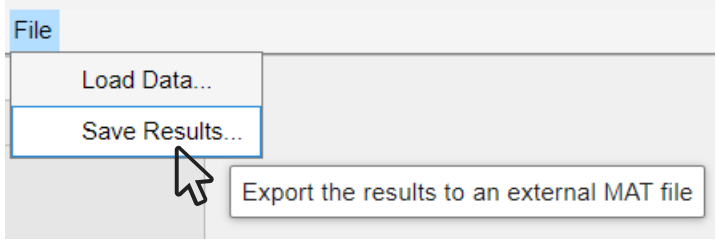
...Can I shut this down safely?

Set the Expectations – Tooltips and Icons





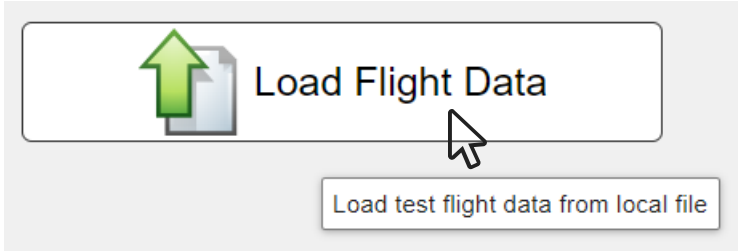


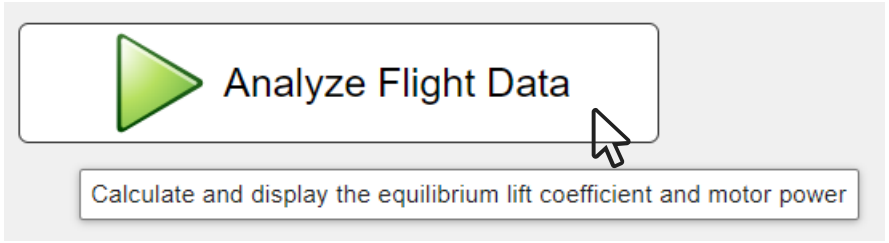


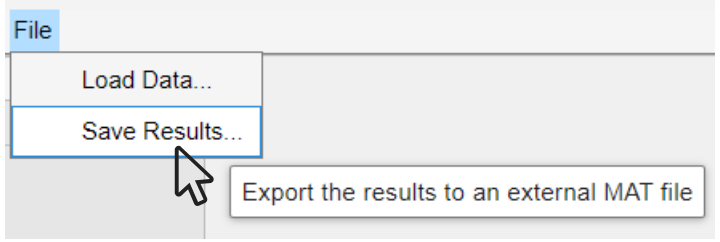
Set the Expectations – Tooltips and Icons

"`Icon`" and "`Tooltip`" are properties of the UI component; set these using «dot» notation, e.g.:

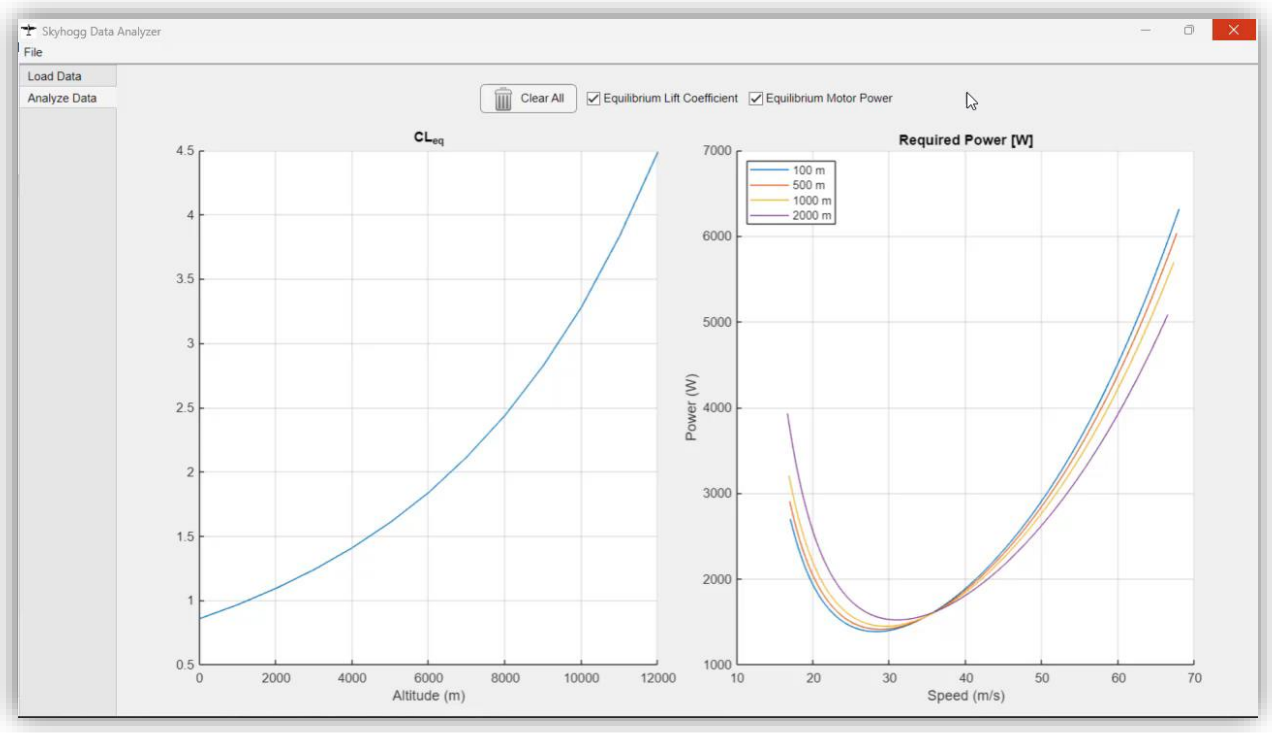
```
obj = uibutton;
obj.Icon = "myIcon.png";
obj.Tooltip = "Description";
```

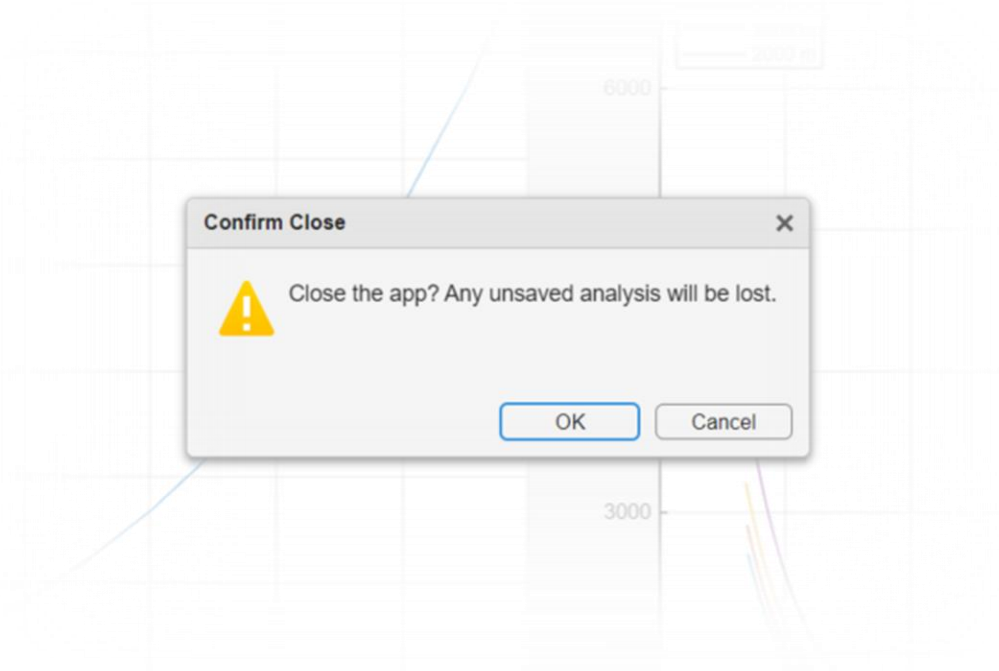






Set the Expectations – Dialog Windows





Set expectations with dialog windows using:

- `uialert`
- `uiconfirm`

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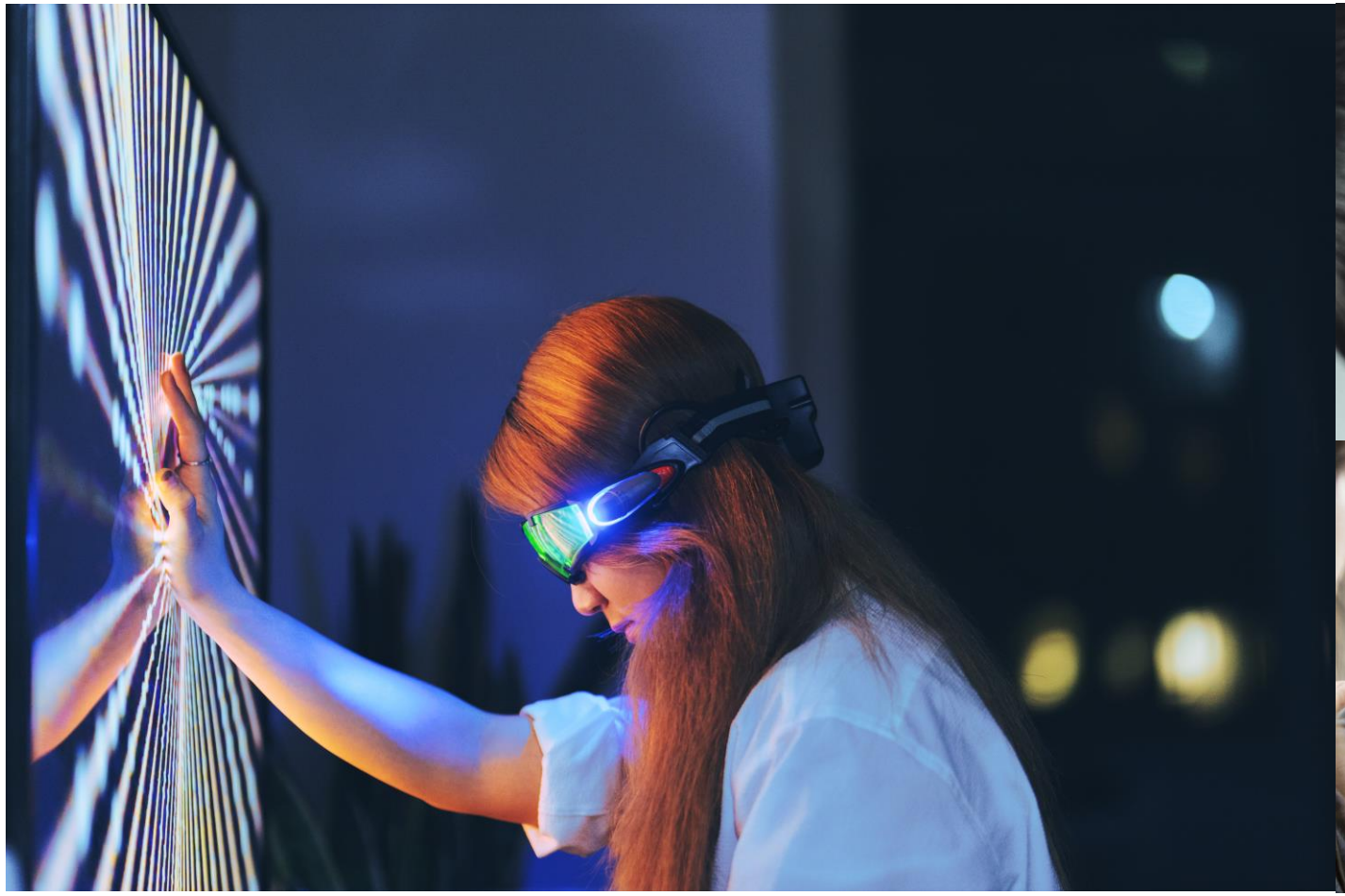
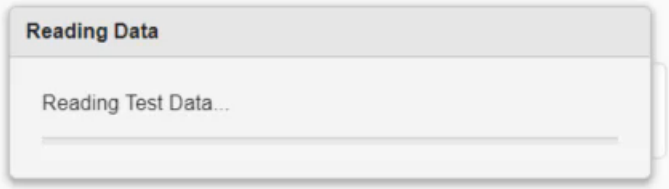
We Need Feedback

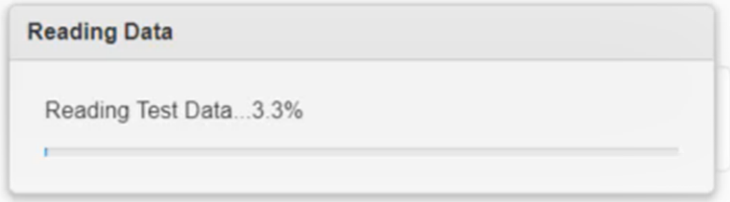


Feedback Is Needed Also in Software

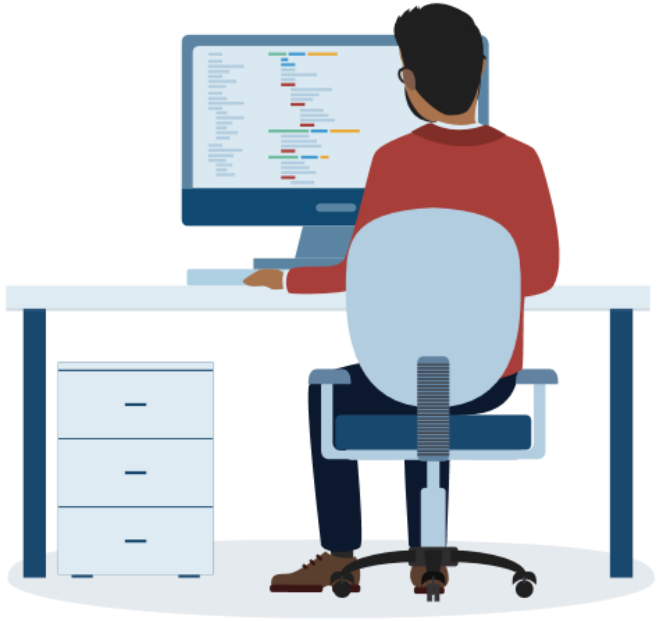
Provide Feedback to the User – Progress Bar

`uiprogressdlg`





Feedback Should Be Mutual



DEVELOPER

FEEDBACK

LOG FILE

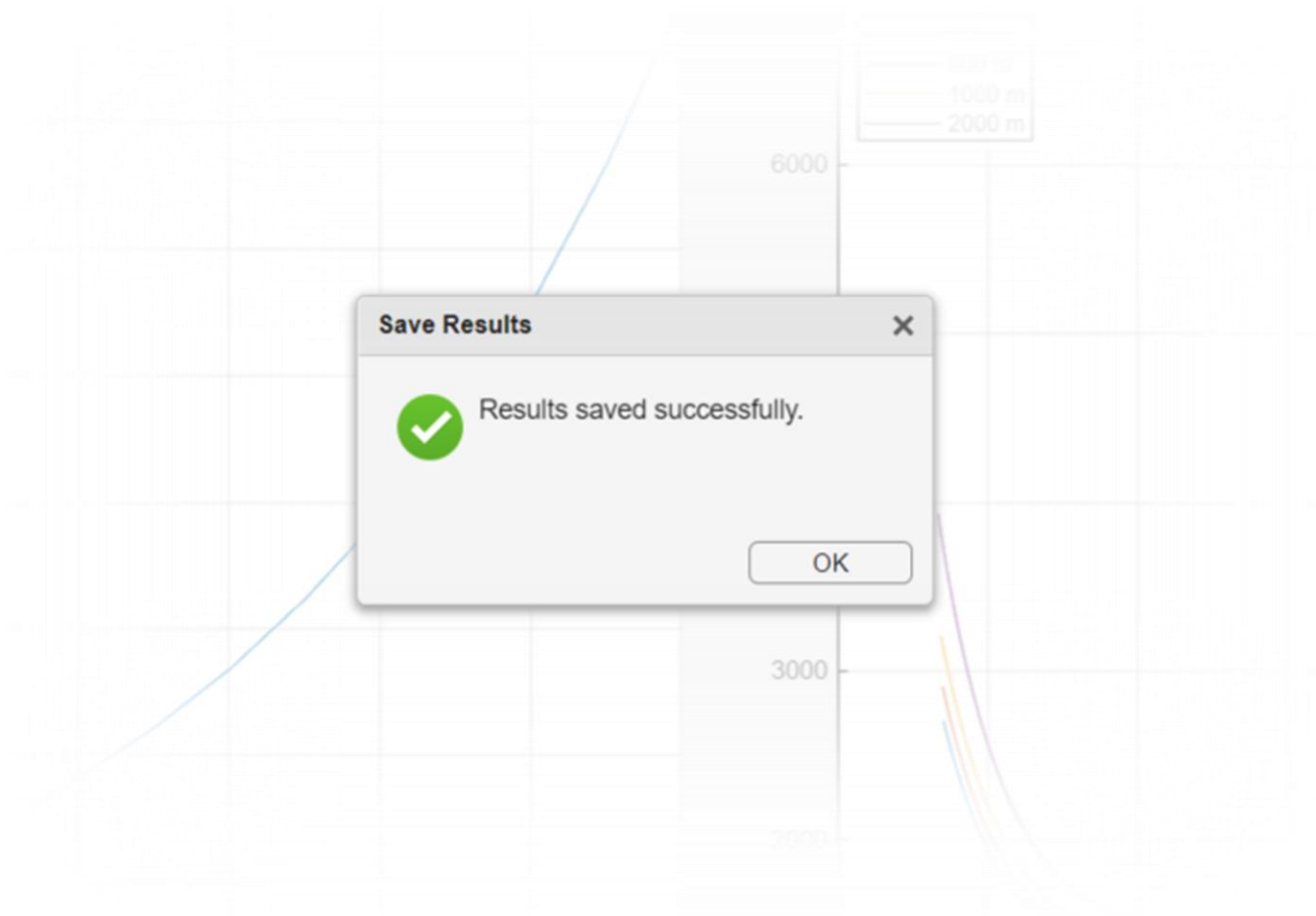
APP LOG

1
2
3
4
5
⋮

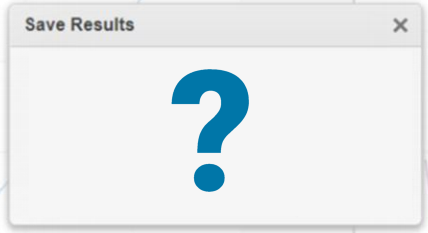
END USERS

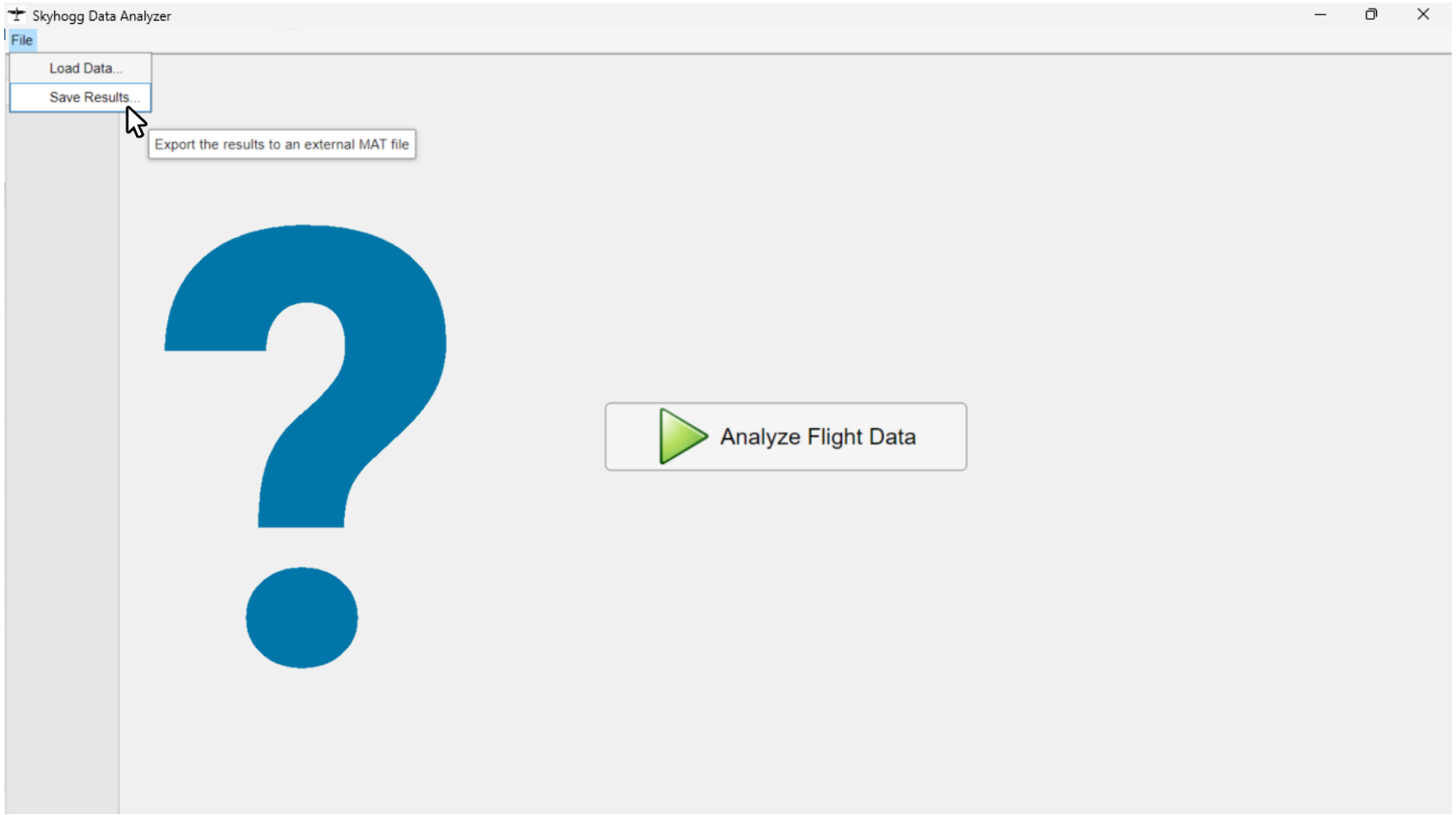
[Advanced Logger for MATLAB – File Exchange]

Provide Positive/Negative Feedback



Provide Positive/Negative Feedback





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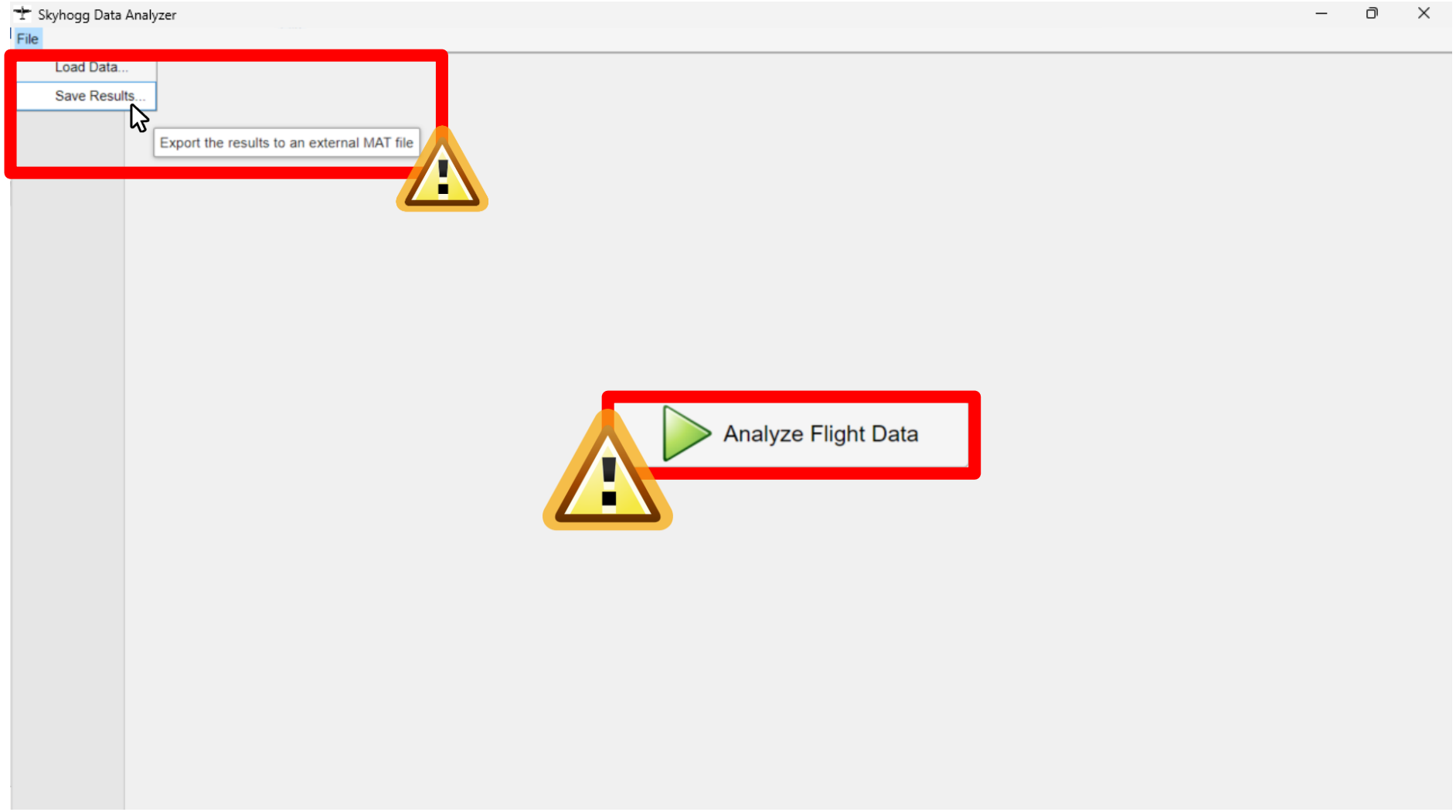
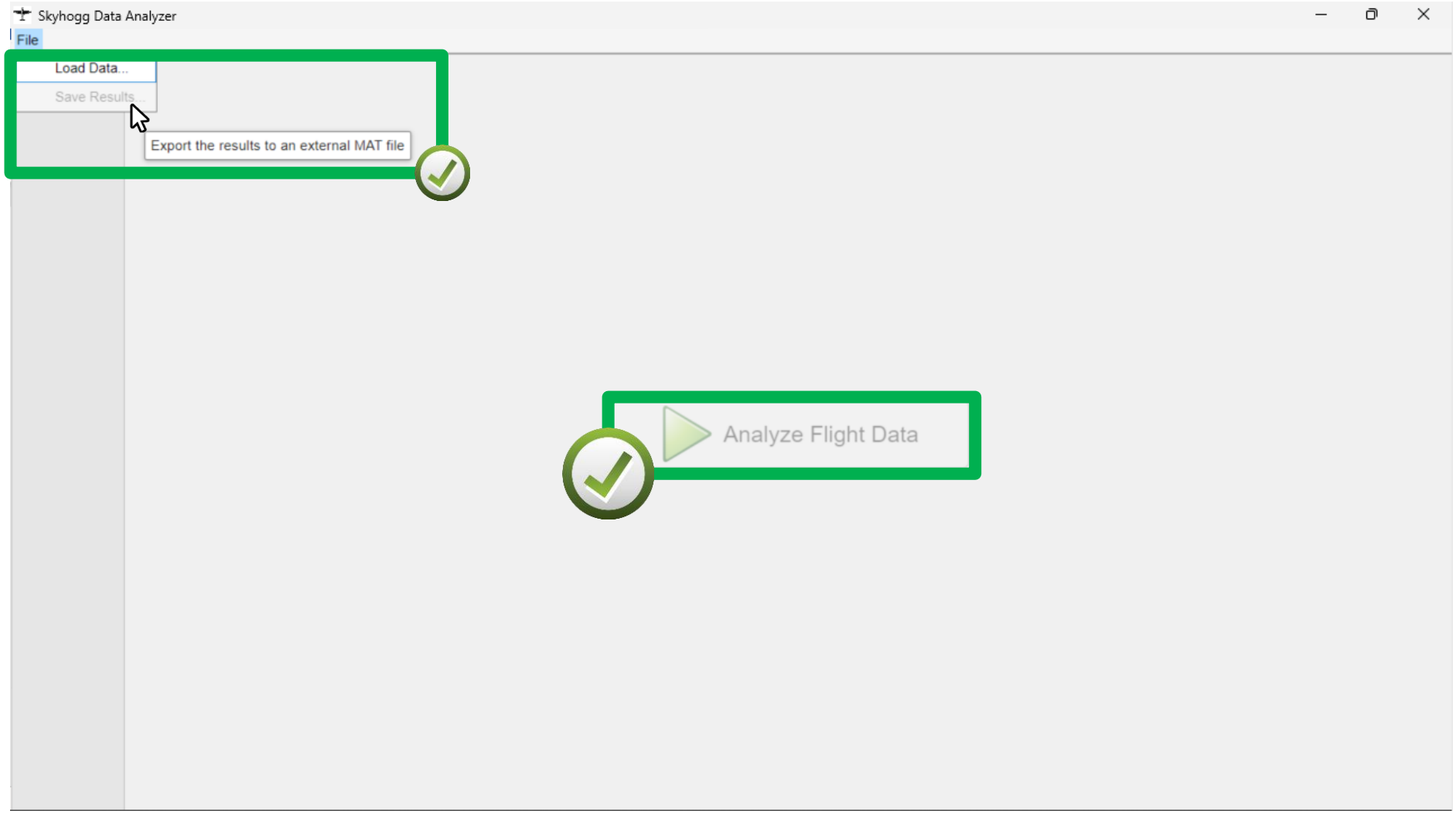
Anticipate User Errors



Anticipate User Errors



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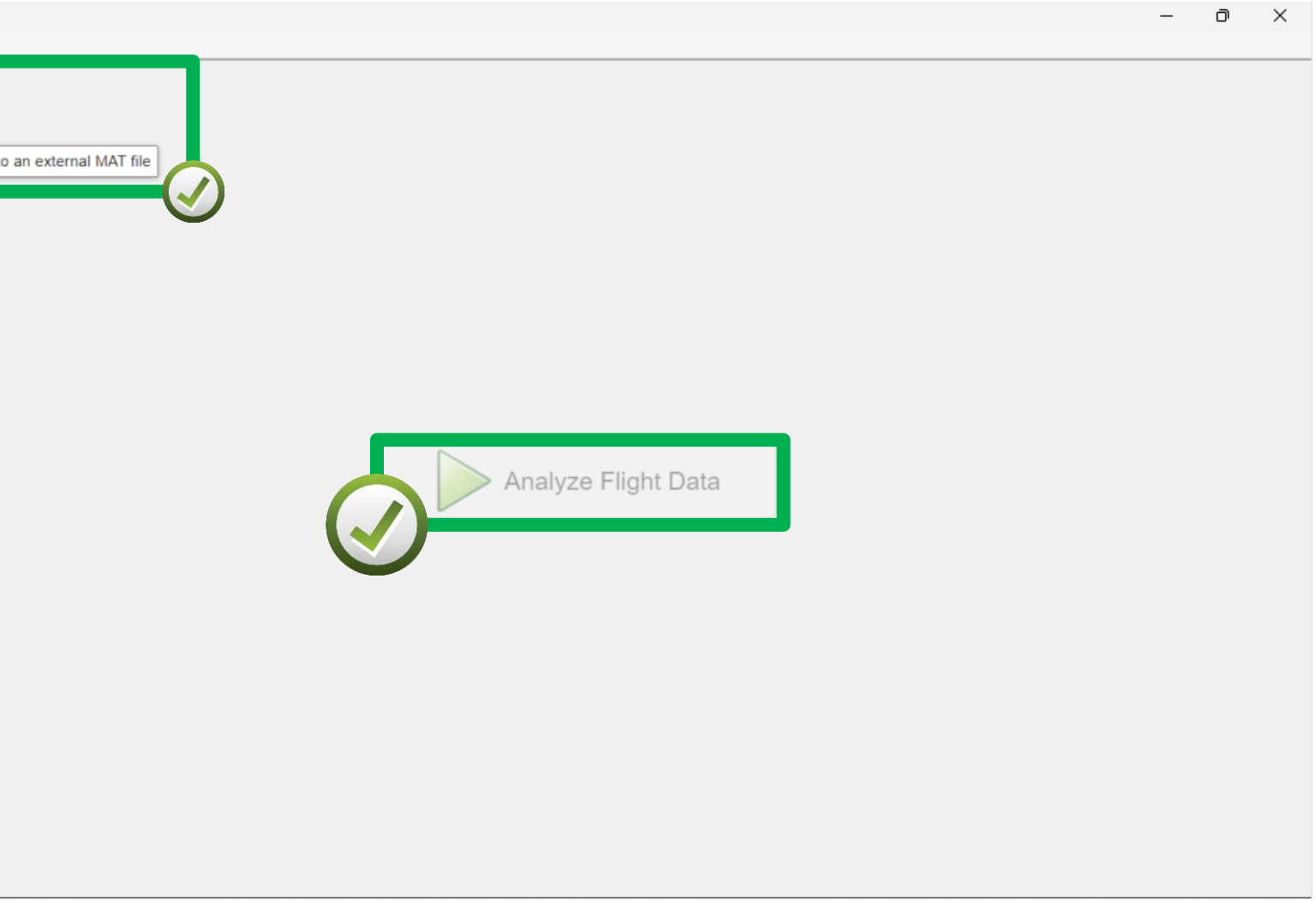


STARTUP:

```
button.Enable = "off";
menu.Enable = "off";
```

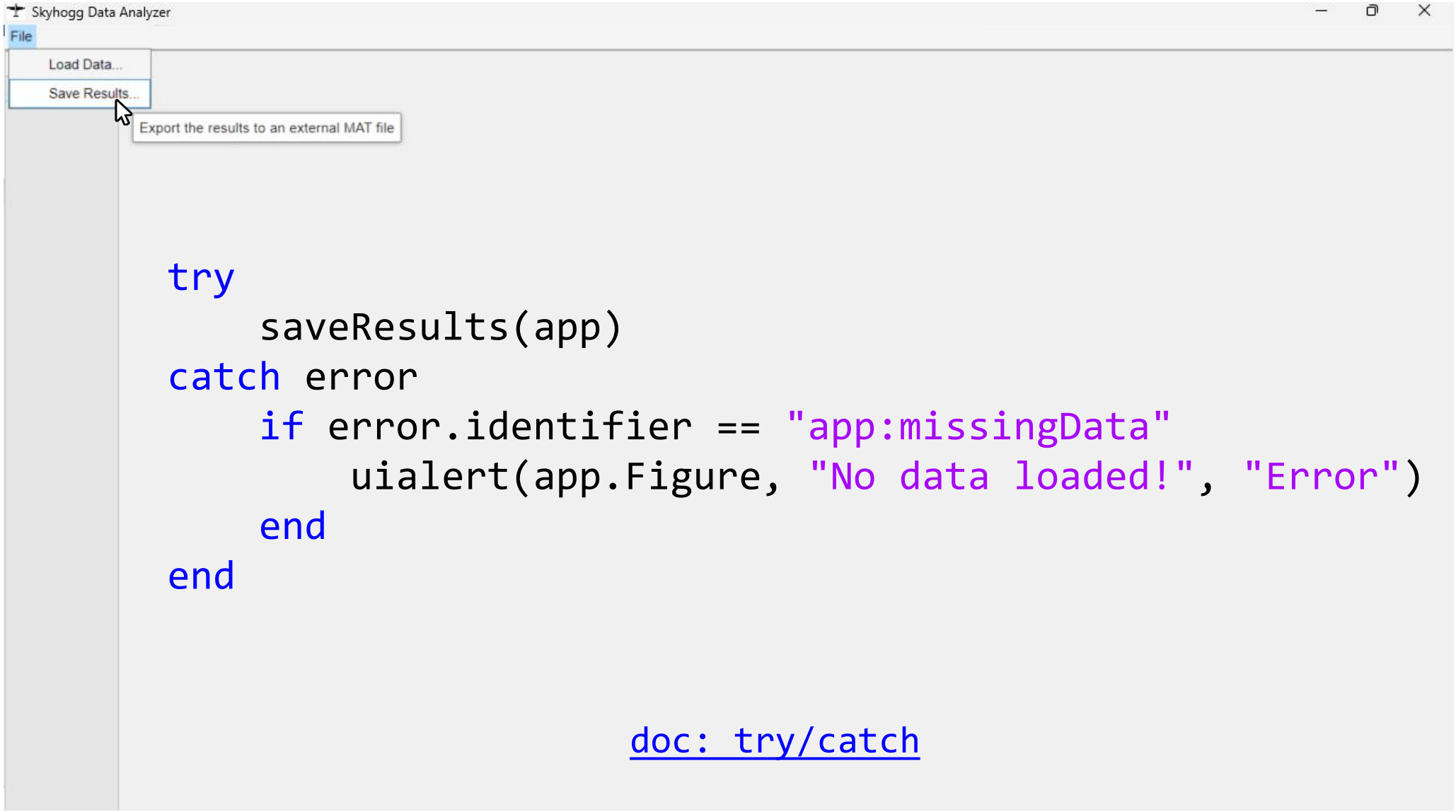
LOAD DATA...

```
button.Enable = "on";
```

ANALYZE DATA...

```
menu.Enable = "on";
```

Anticipate User Errors – Try/Catch Block



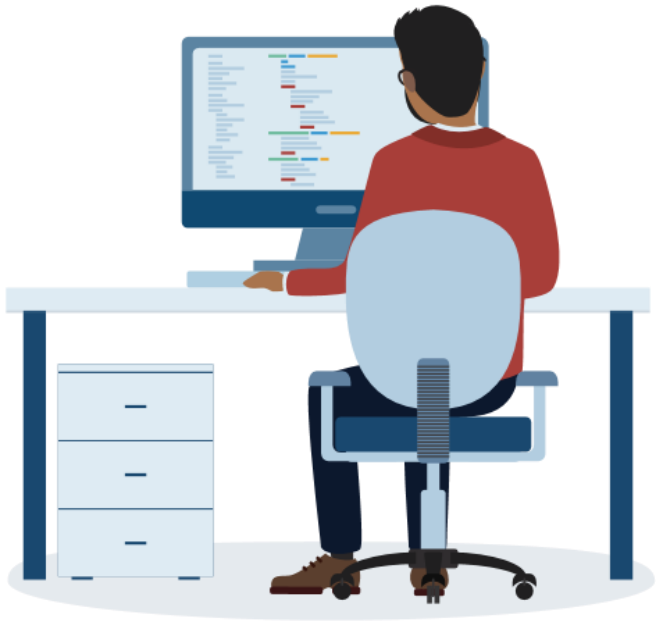

```
try
    saveResults(app)
catch error
    if error.identifier == "app:missingData"
        uialert(app.Figure, "No data loaded!", "Error")
    end
end
```

doc: try/catch

How To Optimize the User Experience of Your MATLAB Apps

1. Choose the correct position and size
2. Set the expectations
3. Provide feedback to the user
4. Anticipate user errors
5. **Provide documentation**
6. Enhance the appearance

Provide Documentation

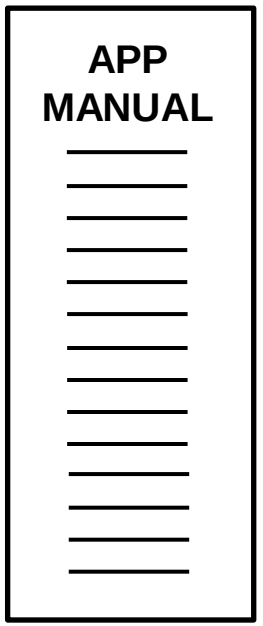


DEVELOPER

APP

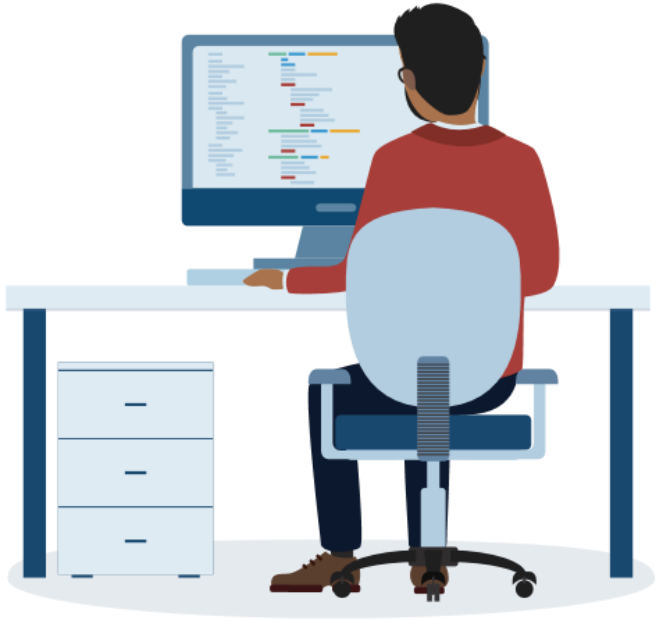
+

DOCUMENTATION



END USERS

Provide Documentation



DEVELOPER

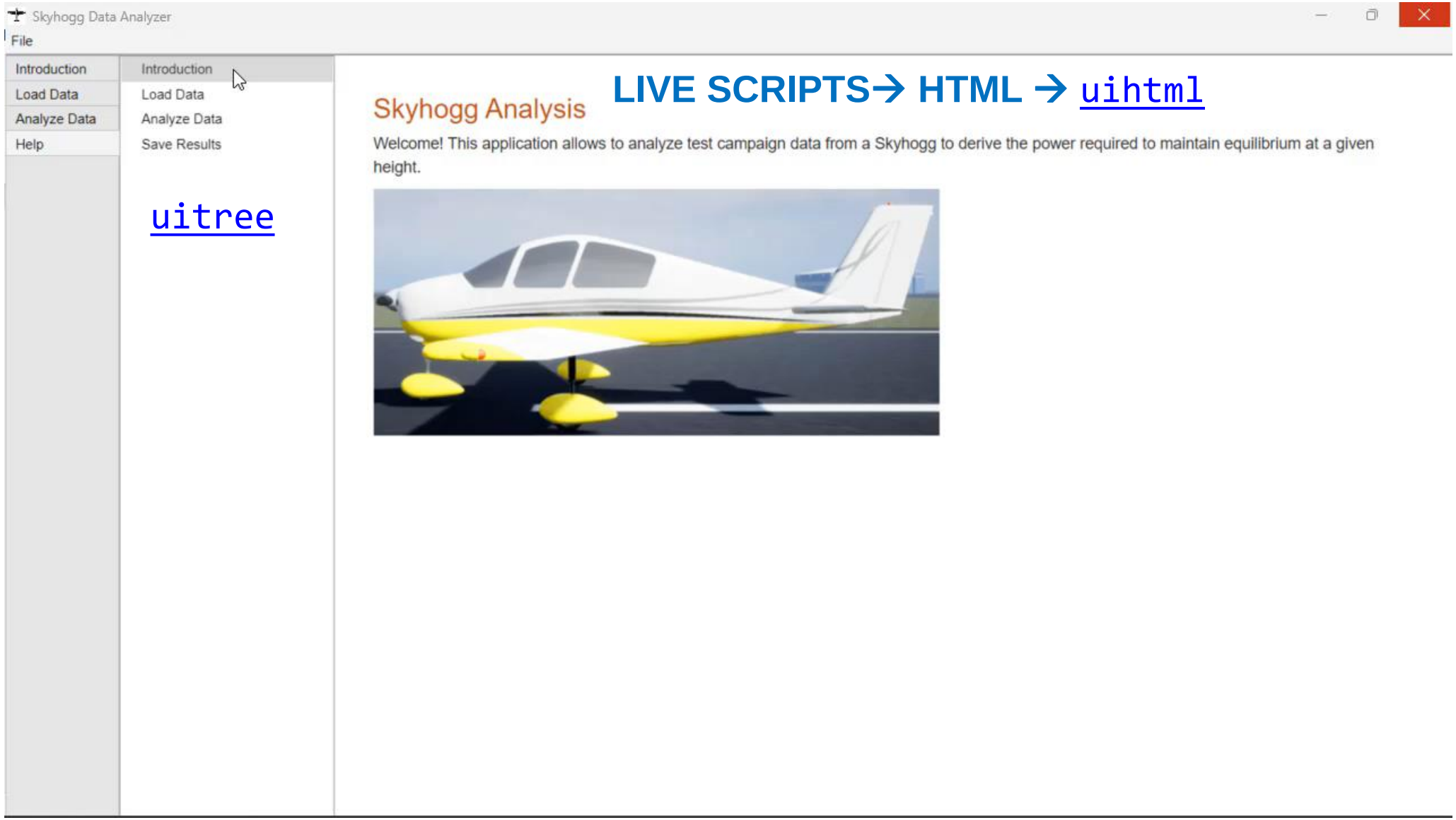
APP

WITH

DOCUMENTATION

END USERS

Provide Documentation

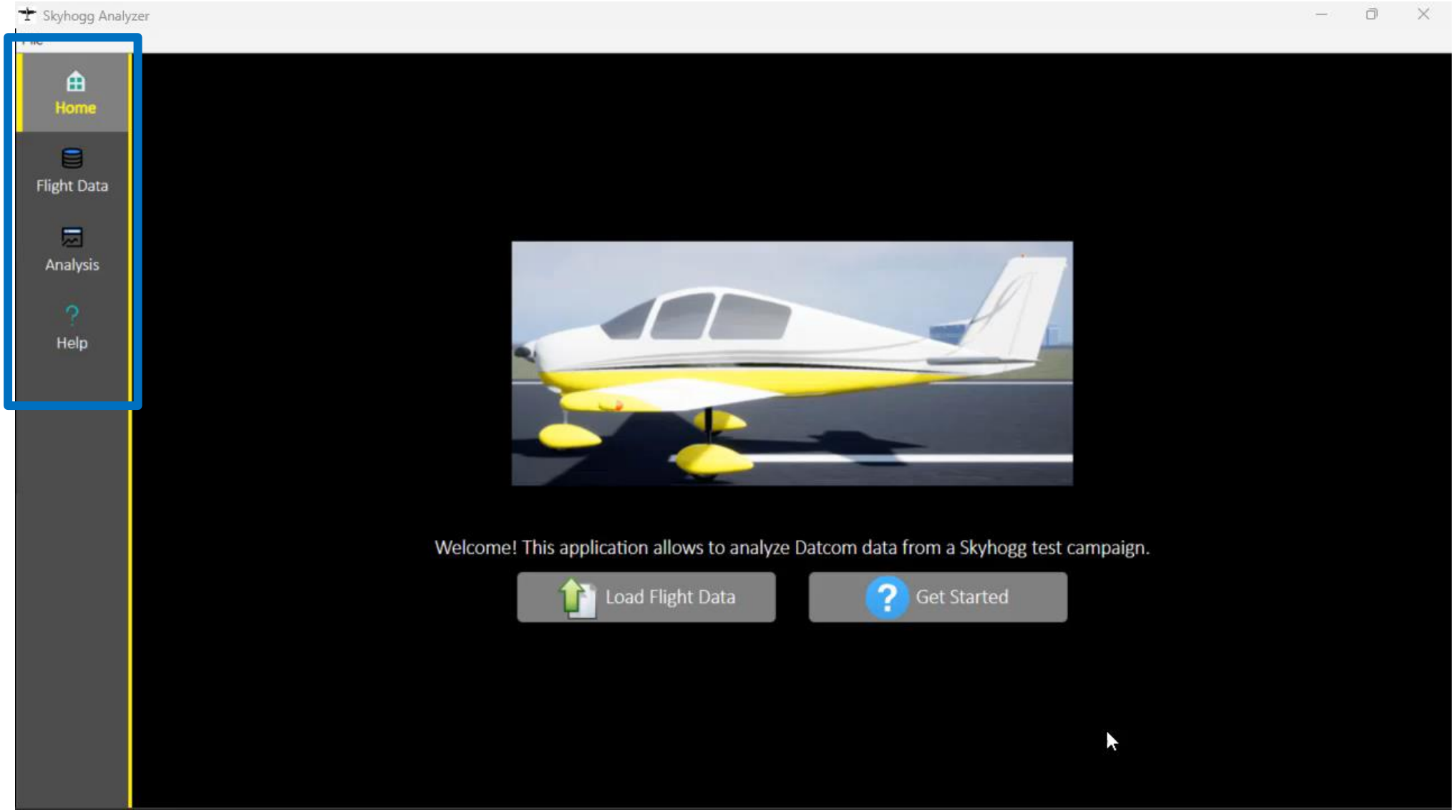


How To Optimize the User Experience of Your MATLAB Apps

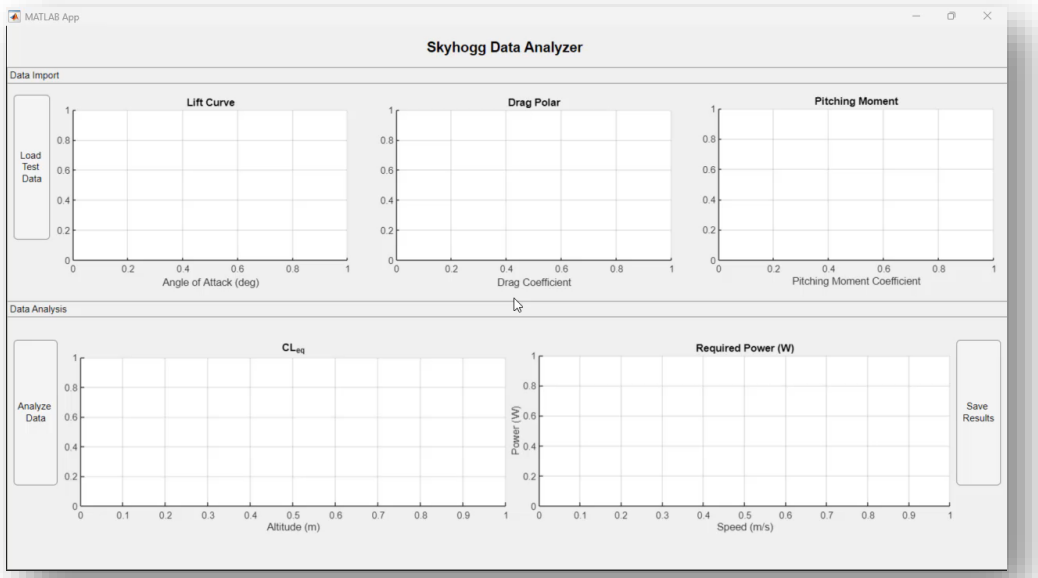
1. Choose the correct position and size
2. Set the expectations
3. Provide feedback to the user
4. Anticipate user errors
5. Provide documentation
6. **Enhance the appearance**

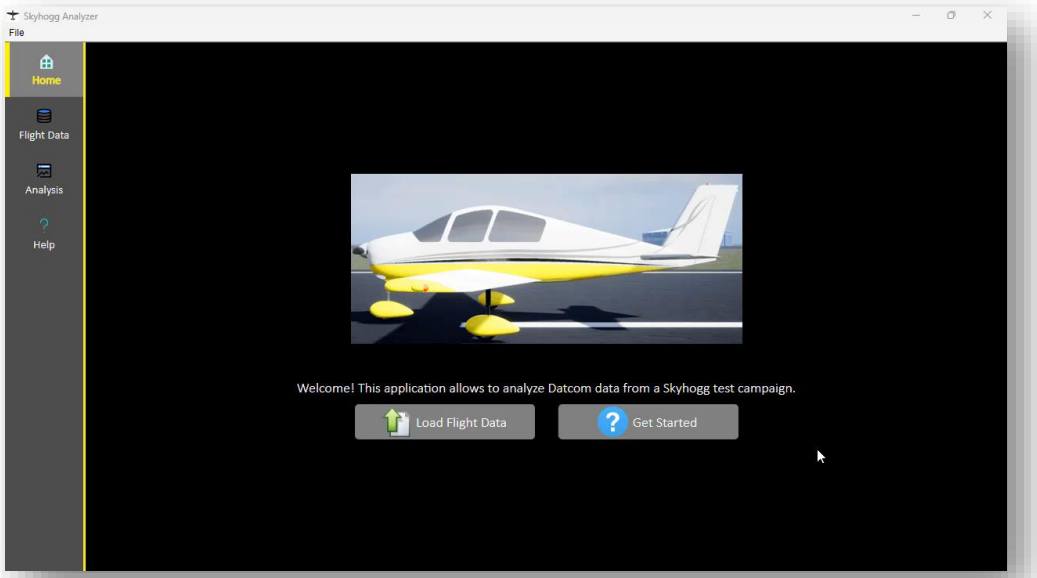
Enhance the Appearance

HTML
+
CSS
+
JavaScript
+
`uihtml`

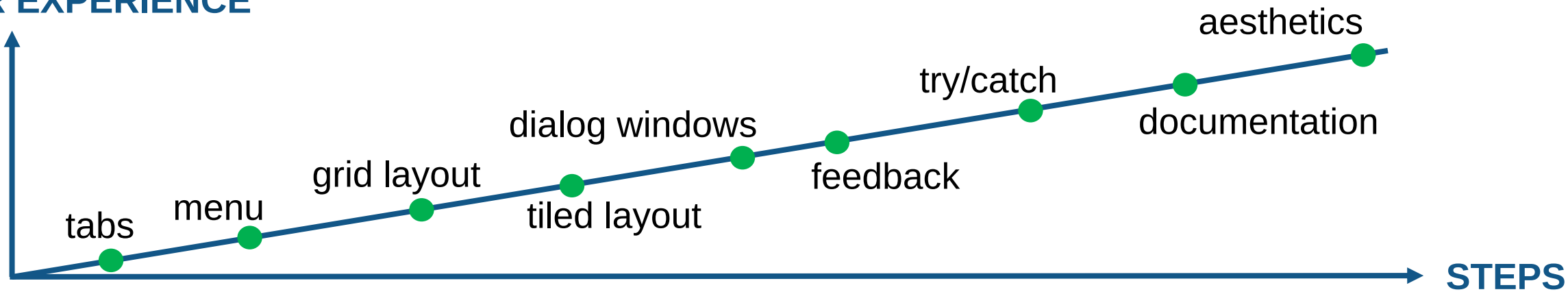


In Summary





USER EXPERIENCE



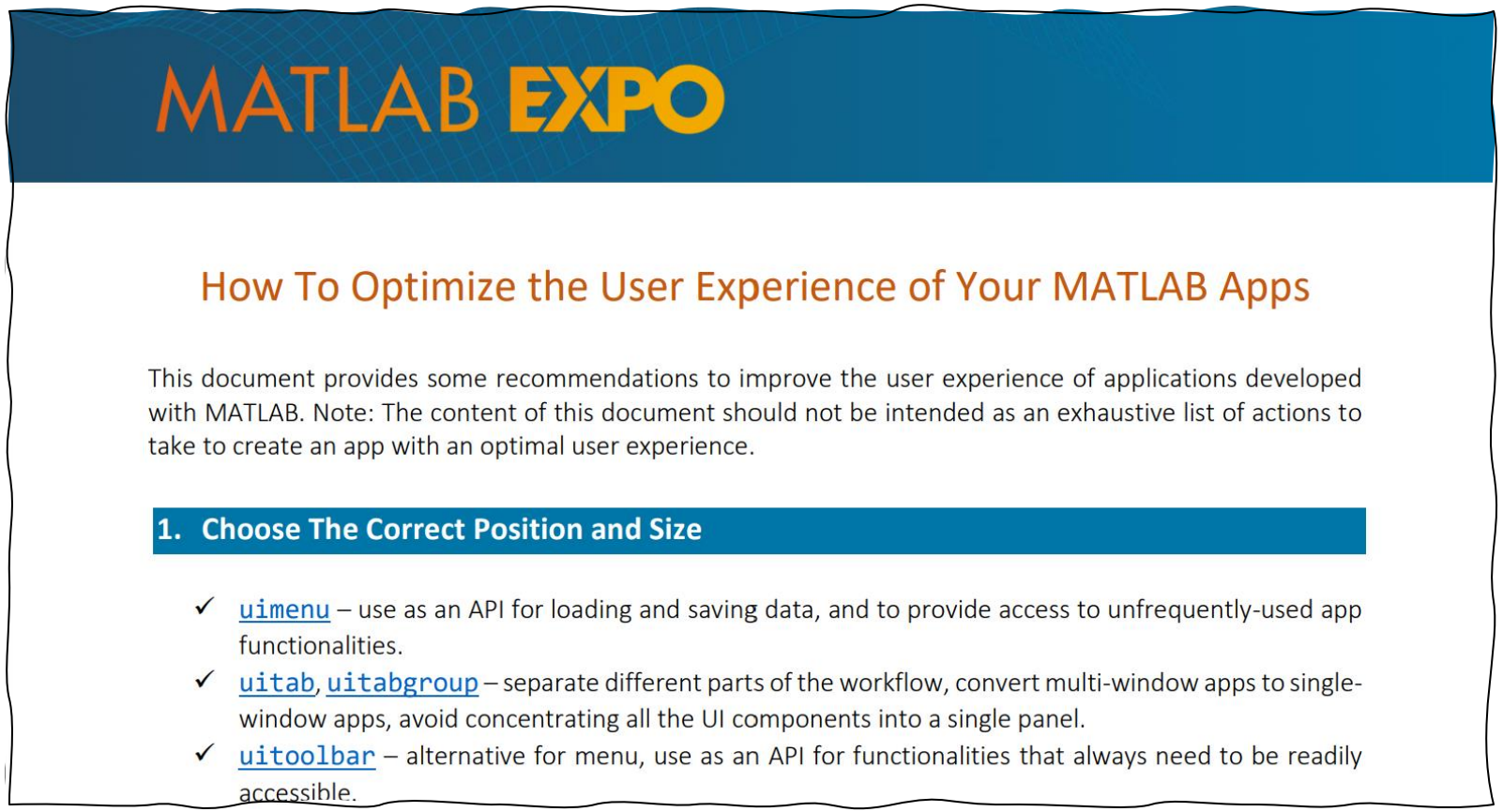
Conclusion

- **Key takeaways:**
  - Develop professional-grade apps with a great user experience in MATLAB
  - A user-friendly app will result increased productivity

- **Call to action:**
  - Use the tools and techniques learned in this presentation to optimize the user experience of your MATLAB apps

Learn More

- Download the handout



MATLAB EXPO

How To Optimize the User Experience of Your MATLAB Apps

This document provides some recommendations to improve the user experience of applications developed with MATLAB. Note: The content of this document should not be intended as an exhaustive list of actions to take to create an app with an optimal user experience.

1. Choose The Correct Position and Size

- ✓ `uimenu` – use as an API for loading and saving data, and to provide access to unfrequently-used app functionalities.
- ✓ `uitab`, `uitabgroup` – separate different parts of the workflow, convert multi-window apps to single-window apps, avoid concentrating all the UI components into a single panel.
- ✓ `uitoolbar` – alternative for menu, use as an API for functionalities that always need to be readily accessible.

MATLAB EXPO

Thank you