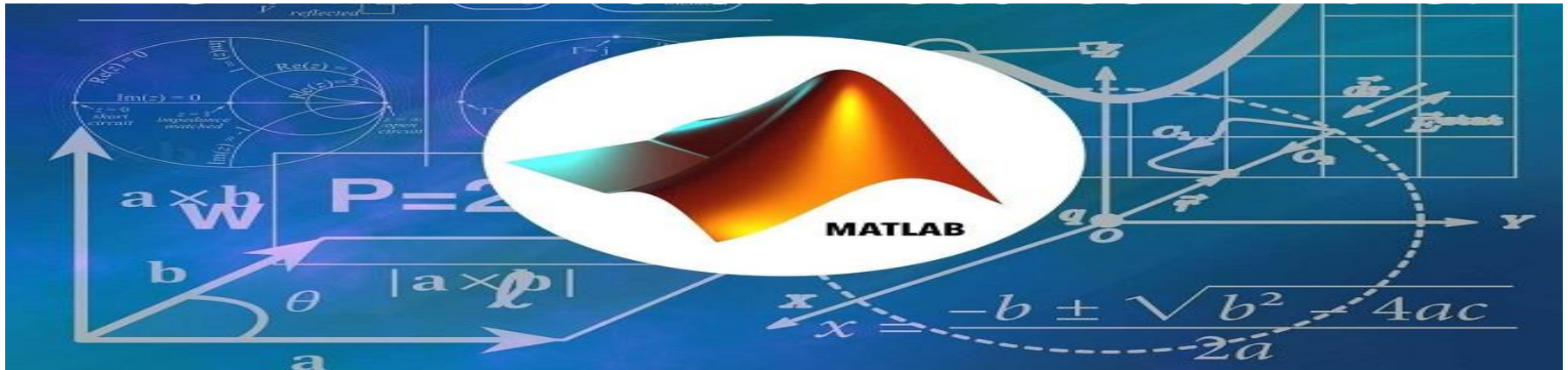




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Programming (MATLAB)

Lecture 1

Introduction

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Purpose

- ❖ The purpose of this course is to introduce you to some of the basic commands and features of MATLAB.
- ❖ This course makes you a proficient user (not an expert, it prepares you to be).
- ❖ The name MATLAB stands for MATrix LABoratory.

What is a MATLAB?

- ❖ **MATLAB** is a high-level technical computing language.
- ❖ It is a programming platform designed specifically for engineers and scientists.
- ❖ Using MATLAB, you can solve technical computing problems faster than with traditional programming languages, such as C, C++, and Fortran.

Applications of MATLAB

- ❖ Biological Sciences
- ❖ Communications
- ❖ Electronics
- ❖ Signal Processing
- ❖ Image Processing and Computer Vision (Recognition).
- ❖ Medical Devices
- ❖ Railway Systems
- ❖ Statistics.
- ❖ Software and Internet.
- ❖ Mathematics.
- ❖ Robotics.
- ❖ Data analysis.

Versions of MATLAB

Year	Version	Notable features
1978	Classic MATLAB	Original Fortran version.
1984	MATLAB 1	Rewritten in C.
1985	MATLAB 2	30% more commands and functions, typeset documentation.
1987	MATLAB 3	Faster interpreter, color graphics, high-resolution graphics printing.
1992	MATLAB 4	Sparse matrices, animation, visualization, user interface controls, debugger, Handle Graphics [®] ,* Microsoft Windows support.
1997	MATLAB 5	Profiler, object-oriented programming, multidimensional arrays, cell arrays, structures, more sparse linear algebra, new ordinary differential equation solvers, browser-based help.
2000	MATLAB 6 (R12)	MATLAB desktop including Help browser, matrix computations based on LAPACK with optimized BLAS, function handles, eigs interface to ARPACK, boundary value problem and partial differential equation solvers, graphics object transparency, Java support.
2002	MATLAB 6.5 (R13)	Performance acceleration, improved speed in core linear algebra functions for Pentium 4, more control in warning and error handling.
2004	MATLAB 7.0 (R14)	Mathematics on nondouble operands (single precision, integer), anonymous functions, nested functions, publishing an M-file to HTML, L ^A T _E X, etc., enhanced plot annotation.

Versions of MATLAB

MATLAB 7.0.1	R14SP1	October, 2004	
MATLAB 7.0.4	R14SP2	March 7, 2005	
MATLAB 7.1	R14SP3	September 1, 2005	
MATLAB 7.2	R2006a	March 1, 2006	
MATLAB 7.3	R2006b	September 1, 2006	
MATLAB 7.4	R2007a	March 1, 2007	
MATLAB 7.5	R2007b	September 1, 2007	Last release for Win. 2000 and PowerPC Mac
MATLAB 7.6	R2008a	March 1, 2008	New Class-Definition Syntax
MATLAB 7.7	R2008b	October 9, 2008	
MATLAB 7.8	R2009a	March 6, 2009	First release for 32-bit & 64-bit Microsoft Win. 7
MATLAB 7.9	R2009b	September 4, 2009	
MATLAB 7.9.1	R2009bSP1	April 1, 2010	
MATLAB 7.10	R2010a	March 5, 2010	
MATLAB 7.11	R2010b	September 3, 2010	
MATLAB 7.11.1	R2010bSP1	March 17, 2011	
MATLAB 7.12	R2011a	April 8, 2011	
MATLAB 7.13	R2011b	September 1, 2011	
MATLAB 7.14	R2012a	March 1, 2012	
MATLAB 8	R2012b	September 11, 2012	First release with Toolstrip interface
MATLAB 8.1	R2013a	2013 March 7, 2013	New unit testing framework
MATLAB 8.2	R2013b	September 6, 2013	New table data type

Versions of MATLAB

MATLAB 8.3 R2014a: It was released in March 2014.
MATLAB 8.4 R2014b: It was released in October 2014.
MATLAB 8.5 R2015a: It was released in March 2015.
MATLAB 8.5 R2015aSP1: It was released in October 2015.
MATLAB 8.6 R2015b: It was released in 2015.
MATLAB 9.0 R2016a: It was released in March 2016.
MATLAB 9.1 R2016b: It was released in September 2016.
MATLAB 9.2 R2017a: It was released in March 2017.
MATLAB 9.3 R2017b: It was released in September 2017.
MATLAB 9.4 R2018a: It was released in March 2018.
MATLAB 9.5 R2018a: It was released in September 2018.
MATLAB 9.6 R2019a: It was released in March 2019.
MATLAB 9.7 R2019b: It was released in September 2019.
MATLAB 9.8 R2020a.
MATLAB 9.9 R2020b
MATLAB 9.10 R2021a.
MATLAB 9.11 R2021b.
MATLAB 9.12 R2022a
MATLAB 9.13 R2022b
MATLAB 9.14 R2023a.

Advantages and Disadvantages

■ **Advantages of MATLAB:**

- Ease of use.
- Good visualization of results.
- Popularity in both academia and industry.

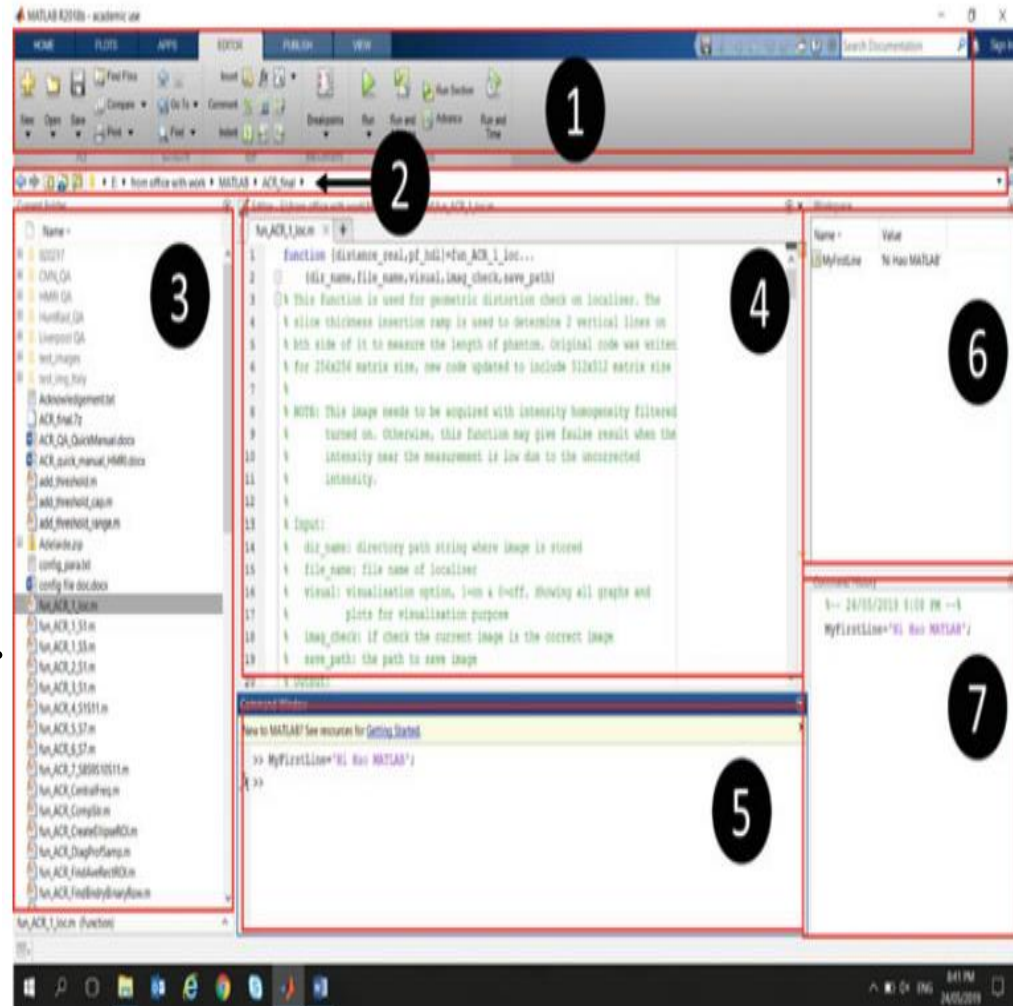
■ **Disadvantages of MATLAB:**

- Can be slow (MATLAB is an interpreted language).
- Must be licensed (it's not free :)

MATLAB layout

❖ A typical MATLAB layout is shown in Figure 1.1.

1. Toolstrip panel.
2. Directory panel.
3. Current Folder panel.
4. Editor panel.
5. Command Window panel.
6. Workspace panel.
7. Command History panel.



MATLAB layout

- ❖ The **Toolstrip panel** provides users with quick interactive access to basic functionalities.
- ❖ It has two groups of tabs, the fixed tabs (dark blue) which always show up, and the tabs for the currently highlighted application (light blue) which show different options depending on which panel is currently selected.

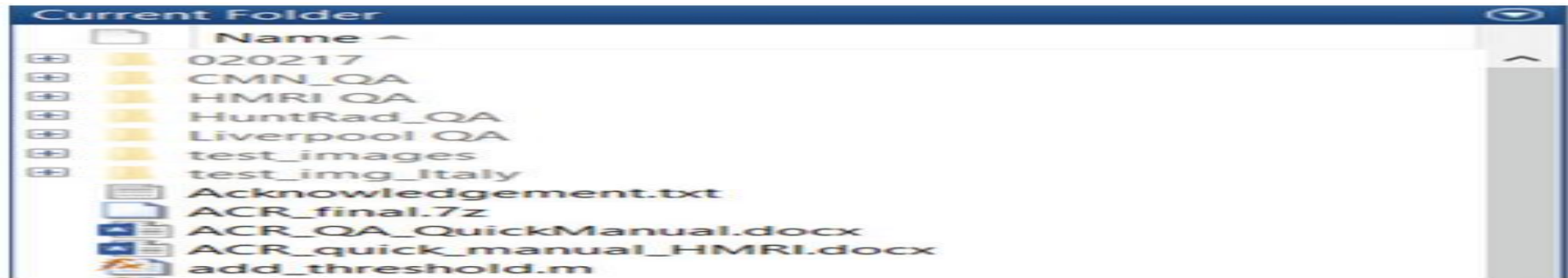


- ❖ The **Directory panel** lets the user select and navigate to a directory of interest.



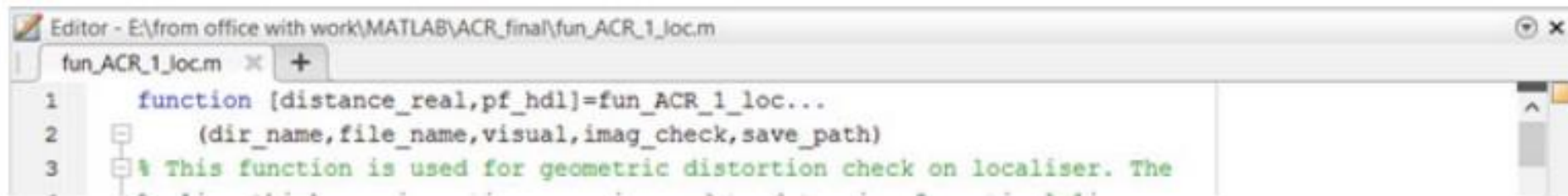
MATLAB layout

❖ Once the directory has been selected the folders and files under that directory will be shown under the **Current Folder** panel.



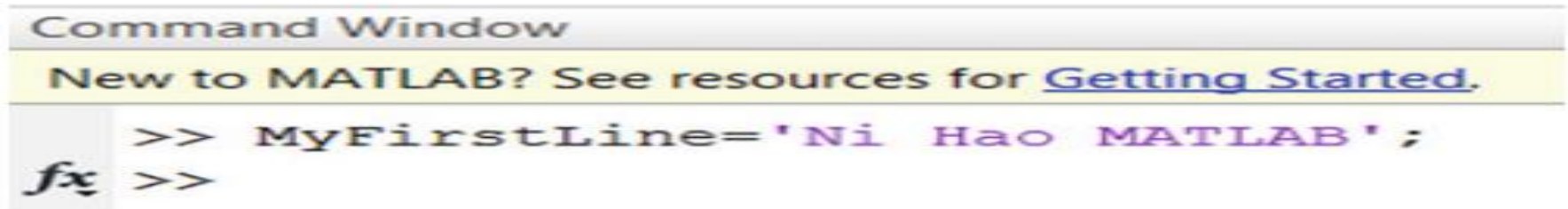
❖ MATLAB's own format file (such as .m or .mlx) or text file (such as .txt) can be opened in the **Editor** panel.

❖ The Editor is where you create your MATLAB code, e.g., script, function, live script, live function, or others.



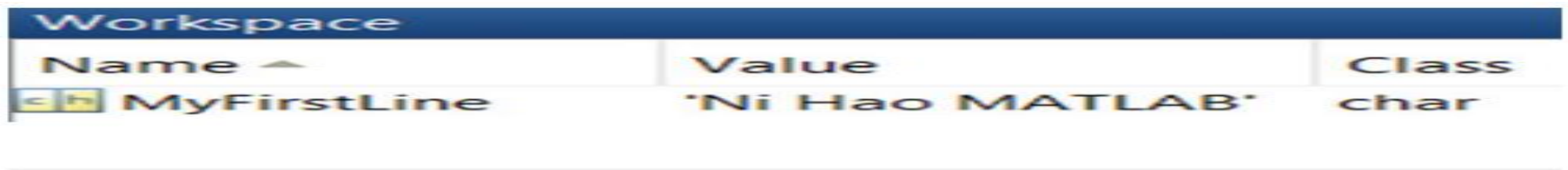
MATLAB layout

- ❖ For quick code testing or any error feedback, the **Command Window panel** is useful.



A screenshot of the MATLAB Command Window. The title bar reads "Command Window". Below it is a yellow banner with the text "New to MATLAB? See resources for [Getting Started](#)." The command prompt shows the command `>> MyFirstLine='Ni Hao MATLAB';` followed by a new line with the prompt `>>`. A small icon of a function handle `fx` is visible on the left side of the command line.

- ❖ Now you have created a new variable. Where does it sit? What type of variable is it? What value does it have? What is the size of the variable? How big is the variable in the memory? This information is shown in the Workspace panel.



A screenshot of the MATLAB Workspace panel. It shows a table with three columns: Name, Value, and Class. The first row contains the variable name "MyFirstLine", its value "'Ni Hao MATLAB'", and its class "char".

Name ^	Value	Class
MyFirstLine	'Ni Hao MATLAB'	char

MATLAB layout

- ❖ The **Command History** panel stores all the commands the user has executed in the Command Window panel for the record.

Command History

%-- 24/05/2019 8:08 PM --%

MyFirstLine='Ni Hao MATLAB';

References

1. Basics of MATLAB and beyond, By Andrew Knight, CRC Press, USA, 1st Edition, 2000.
2. MATLAB Demystified, By David McMahon, McGraw-Hill Companies, USA, 1st Edition, 2007.
3. Different internet sources.
<https://www.mathworks.com/>