Outils de programmation pour les mathématiques

Programming tools for mathematics

MATLAB Desktop

Introduction

- MATLAB is a software package,
- developed by MathWorks.
- It provides a high-level programming language
- and an interactive environment
- designed for numerical computation, visualization and programming.

Introduction

- MATLAB is widely used as a computational tool in science and engineering (encompassing the fields of physics, chemistry, math and all engineering streams).
- It is used in a range of applications including :

 signal processing and communications
 image and video Processing
 control systems
 test and measurement
 computational finance
 - computational biology

Introduction

- MATLAB name is derived from MATrix LABoratory allows:
- matrix manipulations;
- plotting of functions and data;
- implementation of algorithms;
- creation of user interfaces;
- interfacing with programs written in other languages, including C, C++, Java, and FORTRAN;
- analyzing data; developing algorithms; and creating models and applications (for AI).

A MATLAB session

- A minimum session consists in *starting* and *exiting* MATLAB.
- To launch MATLAB under Microsoft Windows 7 or XP in the computing laboratories :
 - double-click on the MATLAB shortcut *icon* double-click on the Window's desktop.

Or follow MATLAB installation path: C:\Program Files\ R2021a \R2021a\bin, and double-click on the MATLAB .exe file)



- To end the MATLAB session,
 - select **File**in the desktop main menu \rightarrow **Exit MATLAB**.
 - Or simply click on close icon like any other application.

Principal Desktop components

• When MATLAB starts, a special screen appears : it is called the **MATLAB desktop**.

- The desktop is a window that contains *other* windows.
- Working on a MATLAB session is equivalent to working on one of these windows or more.

Principal Desktop components

MATLAB R2021a				– 0 X	
HOME PLOTS APPS		H & H H 9 6 5 0 0	Search Documentation	🔎 🌲 Sign In	
Image: New New New Script Live Script New New New New Open Image: Compare New New Open Image: Compare New Open Image: Co	w Variable Analyze Code een Variable Favorites Run and Time ar Workspace Clear Commands Si	imulink Layout Parlel Add-Ons	② ➢ Community Help ➢ Request Support ▼ Learn MATLAB		
FILE VARIABLE	CODE SIN	MULINK ENVIRONMENT	RESOURCES	A	
P P 2 2 2 ↓ C: ▶ Program Files ▶ Polyspace ▶ R2021a ▶ bin ▶	n				
Current Folder					
B icutzdata ^ <i>fx</i> >> B icutzdata ^ <i>fx</i> >> B win32 B win54					
crash_analyzer.cfg					
5 deploytool.bat	File Edit Debug Distributed	Desktop Window Help			
// Icdata.xml	1 🔿 X 🖿 🛍 🤈 ୯	👔 🛒 📄 🕜 D:\Do	cuments and Settin	ngs\Administrateur\Mes documents\MATLAB	🖻
₩ Icdata_utf8.xml	Shortcuts R How to Add R Wh	nat's New			
4 matlab.exe	Current Directory I+ C	× Workspace		Command Window →	_ <i>₹</i> ×
5 matlab_jenv.bat	🖻 😅 🖪 🛛 🐱 📼			New to MATLAB? Watch this <u>Video</u> , see <u>Der</u>	mos, or 🗙
	All Files 🔺 Type	e Si	ze Date Modified	>>	
Norkspace Vame * Value Bytes Cli a 2 8 dc B 6 8 dc	•		•		
	Command History		× 5 □ +1		
		% % % 11 8. 9 6 7 12. 4 11 8; 9 6 7 12; 4 % %	15 14 1] 15 14 1]		
	A Start Ready				OVR

Principal Desktop components

00	MATLAB R2013a		× ²
HOME PLOTS APPS			🗇 🖻 🖸 🔇 QSearch Documentation 🔵 🔻
	Command Window	•	Workspace
Name A	f4; >>		Name A Value Min
4	1		3
	-		
In both vers	ions, we face 4 pr	incipal wind	w 8 23/01/2014 12:36€
of the deskt	op:		
1. The Com	nmand Window		2
2. The Com	nmand History	These win	dows are
3. The Wor	kspace	- called nan	ols in
•••••••		canca pan	
4. The Curr	rent Directory	latest versi	ons

Command Window

- This window (panel) is the main window in MATLAB
- It works by command line indicated by the command prompt (>>)
- It provides an interactive environment :

 It is used to type lines of commands and expressions behind the command prompt.
 Also, it displays MATLAB answers or commands result.

Command Window

 \rightarrow MATLAB creates a default variable

ans

- (shortness of answer)
- ans stores the results of the current calculation.
- if the variable ans already exists from previous computations, it will be overwritten,
- To avoid this, you may assign the expression value to a variable or an output argument name.

Command Window

• In the assignment statements

>> x = expression, expression is a combination of numerical values, mathematical operators, variables, and function calls.

• Type the clc command to clean the command window.

Command History

 This window is directly related with command window :

> it saves and shows a list of previously typed commands.

Command History	2	Х
[}] ~~% 29.09.09 11:04%		٨
┈% 30.09.09 08:29%		
⊜~% 09.10.09 15:34%		
-A=[1,2;0,49		
[[]]		
⊜~% 13.10.09 10:09%		
toolbox		
help control system		
help linear algebra		
<mark>⊡</mark> * 14.10.09 09:17%		
A=[1 2;0 3]		
B=ones(5)		Ξ
a=4		
b=3		
a+b		¥
< III	>	

Command History

 The command history persists across multiple sessions :

each command typed during a session is saved under a title indicating the date and starting time of the session (the green line)

Command History +	7	x
**************************************		^
⊜~% 09.10.09 15:34%		
₩A=[1,2;0,49		
]		
₽~% 13.10.09 10:09%		
toolbox		
help control system		
help linear algebra		
⊡_% 14.10.09 09:17%		
A=[1 2;0 3]		
B=ones(5)		Ξ
•		
b=3		
la+b		¥
	>	

Command History

- Displayed commands on the Command History can be:
 - copied/paste on Command window
 - or dragged into the Command Window (and edited),
 - or simply double-clicked to run them again.
- On command window, we can view and search for statements previously run by using up and down keys.

- Lists all the variables generated in the current session i.e : variables used since MATLAB have been opened last time.
- It shows the value, type and size of variables,
- it can be used to quickly plot, or inspect the values of these indicated variables.

Workspace		→i [× * =
🐞 🛒 🙋 暗	🎒 1 🔚 📶 🔹 Stack:	Base 🔽	
Name 🔺	Value	Min	Max
H A	[1 2;0 3]	0	3
🗄 Ax	3	3	3
H В	<5x5 double>	1	1
🗄 a	4	4	4
🕂 ans	<5x5 double>	1	1
Η array	[1 3 5 7 9]	1	9
🕂 b	3	3	3
<			>

Wor	kspace → 🗆	7 × 5	ommand H
1	f 🖢 🛍 🎒	1 게 🚺	🔁 👻 Stack
Nam	e 🔺	Value	
H A		[1 2;3	4]
🗄 a		1	
🗄 b		2	- A
	Open Selection	on	E.L.
	Save As		<u>F</u> ile
	Сору	Ctrl+C	
	Duplicate	Ctrl+D	
	Delete	Delete	
	Rename		1
	Edit Value		2
			3

Variables values and content can be shown and modified using another window named Array Editor

1	Array Editor -	runout				
Eil	e <u>E</u> dit <u>V</u> iew	<u>G</u> raphics De	<u>b</u> ug <u>D</u> esktop	<u>W</u> indow <u>H</u> elp)	X 5 🗠
	i 🔏 🖻 🛱	🌢 🗠	🝷 怕 Stac	: <u>k</u> : Base ▼		880
	1	2	3	4	5	6
1	-0.4600	-0.2400	-0.0400	-0.3100		<u> </u>
2	-0.4600	-0.3100	-0.2500	-0.1500		
3	-0.1400	-0.3400	-0.0100	-0.0800		
4	-0.1400	-0.1700	-0.1200	0.0800		
5	0.0900	-0.1300	0.0600	-0.0600		
6	-0.2200	-0.0300	0.0200	0.0500		
7	-0.1400	-0.1900	0.0200	0.1500		
8	-0.1400	-0.0300	-0.0300	0.1700		
9	-0.0600	-0.0700	-0.1100	0.2300		
10	-0.1800	-0.2300	-0.1100	-0.2300		-
	4					•

- In addition to the graphical interface, MATLAB offers some textual commands to handle the workspace too :
- The command clear, will clear all the variables in your workspace.
 >clear
- The Who command lists all the variables used

>>who

- The whos command lists all the variables with the current values, dimensions, and other informations
 >whos
- save ,load and diary are useful commands to save data and use it later.

- As seen before in command window, MATLAB variables are created by an assignment statement,
- However, MATLAB allows variable creation by importing them from files :
- In fact, one may save some/all workspace variables to a text file (.mat file), using icons on workspace bar

Workspace	3	→	5	×
🐞 🛒 💯	📸 🎒 🐐 🔤 🔹 Stack: Bas	e 🗸		
Name 🔺	Value	Min	Ma	ах
ΗA	[1 2;0 3]	0	3	
🗄 Ах	3	3	3	
🎛 В	<5x5 double>	1	1	
🗄 a	4	4	4	
🞛 ans	<5x5 double>	1	1	
田 array	[13579]	1	9	
🗄 b	3	3	3	
<				>

Current Folder

 This window → shows the files and directories available in the current folder.

But, What is current folder?

 By default, it is a directory created by MATLAB in your documents folder,

D:\Documents and Settings\Administrateur\Mes documents\MATLAB



 and this is where you should save your work (saved as files!).

Current Folder

 The path to the current directory is listed/shown on the top of the MATLAB desktop. (on the address bar or in the toolstrip).



Current Folder

You should set you working folder as the Current
 Directory

Or

 set your working folder as part of the search path,



Set Path

All changes take effect immediately.

00

	, MATLAB search path:
Add Folder	/Users/hansha/Documents/MATLAB
Add with Subfolders	 /Applications/MATLAB_R2014a.app/toolbox/matlab/demos /Applications/MATLAB_R2014a.app/toolbox/matlab/graph2d /Applications/MATLAB_R2014a.app/toolbox/matlab/graph3d
	 /Applications/MATLAB_R2014a.app/toolbox/matlab/graphics /Applications/MATLAB_R2014a.app/toolbox/matlab/plottools /Applications/MATLAB_R2014a.app/toolbox/matlab/scribe
Move to Top	 /Applications/MATLAB_R2014a.app/toolbox/matlab/specgraph /Applications/MATLAB_R2014a.app/toolbox/matlab/uitools
Move Up	 /Applications/MATLAB_R2014a.app/toolbox/local /Applications/MATLAB_R2014a.app/toolbox/matlab/optimfun
Move Down	/Applications/MATLAB_R2014a.app/toolbox/matlab/codetools /Applications/MATLAB_R2014a.app/toolbox/matlab/datafun
Move to Bottom	 /Applications/MATLAB_R2014a.app/toolbox/matlab/datamanager /Applications/MATLAB_R2014a.app/toolbox/matlab/datatypes /Applications/MATLAB_R2014a.app/toolbox/matlab/elfun /Applications/MATLAB_R2014a.app/toolbox/matlab/elmat /Applications/MATLAB_R2014a.app/toolbox/matlab/elmat /Applications/MATLAB_R2014a.app/toolbox/matlab/elmat /Applications/MATLAB_R2014a.app/toolbox/matlab/elmat /Applications/MATLAB_R2014a.app/toolbox/matlab/elmat
Remove	A /Applications /MATLAR P201/a app/toolbox/matlab/quide
?	Save Close Revert Default

Editor

- The Editor is used to create scripts and mfiles.
- Click the "New Script" icon/button in the Toolbar

2	Editor	D:\Pro	gran	n File	s\MAT	LAB\R2()07b\ext	ern\e	ample	esico				•	
File	Edit	Text	Go	Cell	Tools	Debug	Deskto	op W	ndow	Help					3
0	đ	,	ł	h	90		Å (• •••	<u>fo</u>) • •) 🗶	9	a	V	»
1	+ ⊡			- 1.0)	÷	1.1	X	%4 %	<u>%</u> 0 ,					
1	Ę	funct	tion	a	= add	lmatri	ix(a1,	a2)							
2	þ	\$ADDI	IATF	XIX	Add t	wo ma	atrice	8							
3	-	ł	Thi	s f	uncti	ion ad	lds th	e tu	o ma	trices	s pa	Isse(i as	in	put.
4 ()¢	a = a	a1 +	- a2	;										
				ā	a2: 1	x1 do	uble :	-							
	addm	x Ur	titled	5 ×		7									
						a	ddmatrix					ln 4	(Col	1

Illustrations above show the default configuration of the MATLAB desktop.

We can customize the arrangement of the windows to suit our needs or preferences.

We can return back to the default layout by following : Desktop menu \rightarrow

desktop layout \rightarrow

default