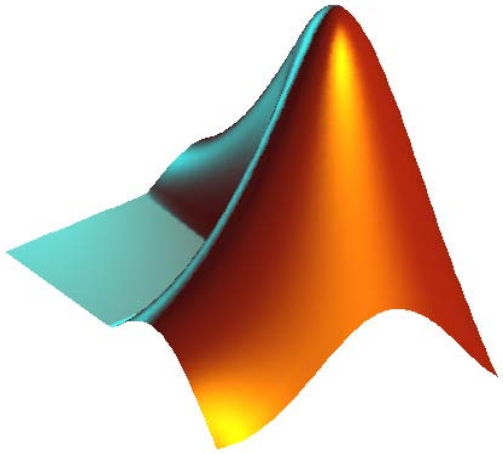
Lecture I



Matlab Crash Course

[Empirical Finance and Financial Econometrics]

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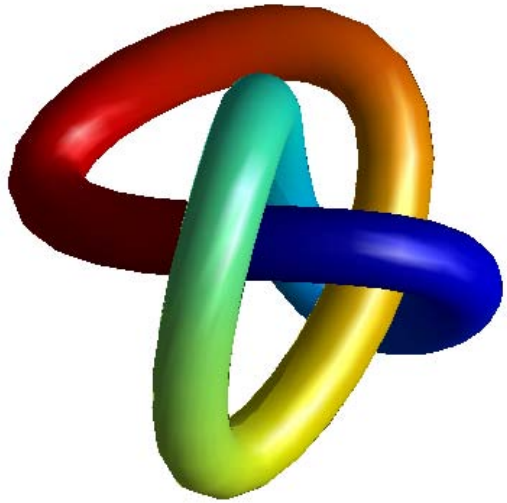


Course and Class Structure

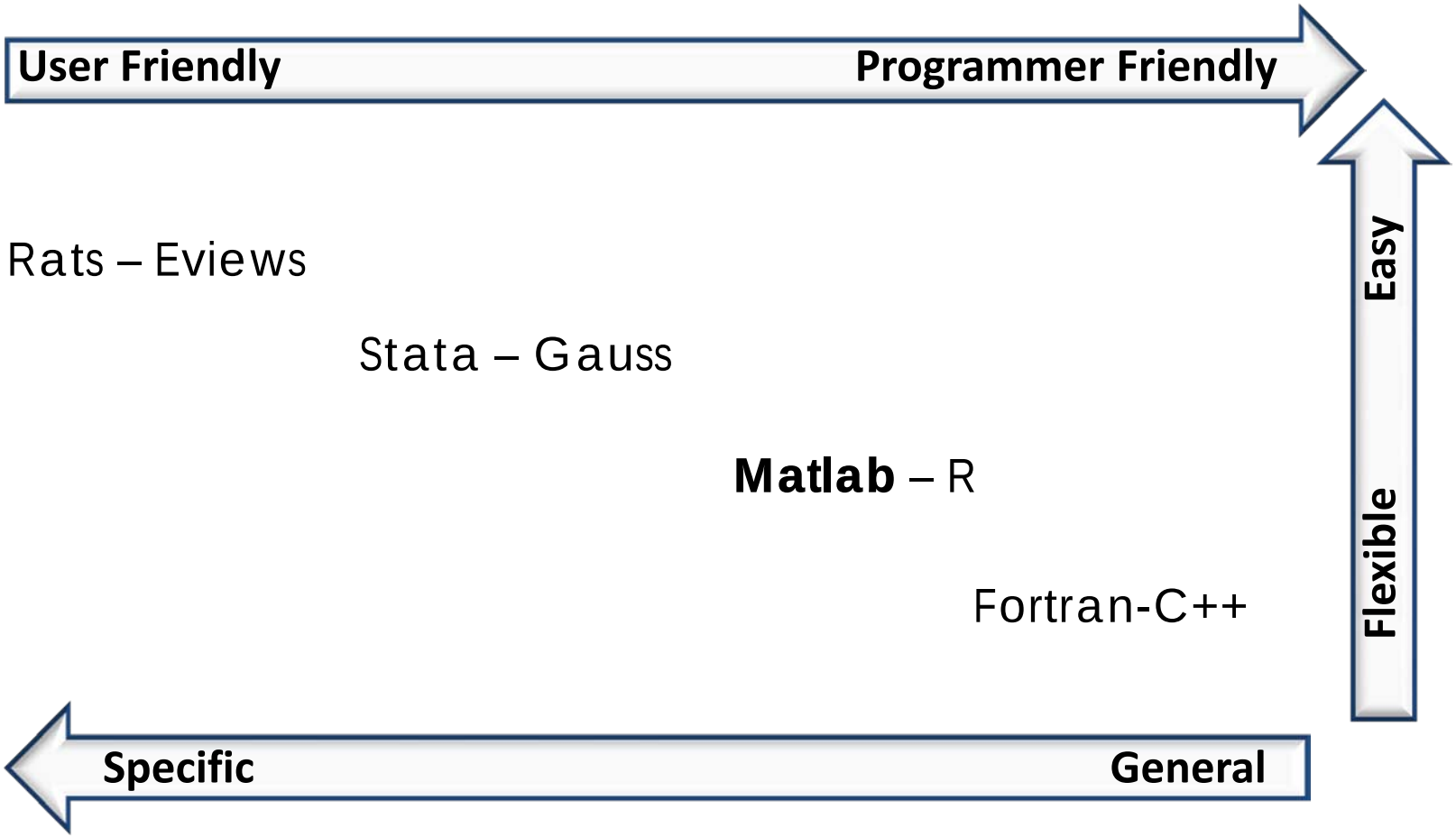
Basics

- 1st Lecture — Intro to Matlab and its Environvment
  1. Variables Definition
  2. Matrix Access
- 2nd Lecture — Intro to Matlab and its Environvment
- 3rd Lecture — Intro to Programming

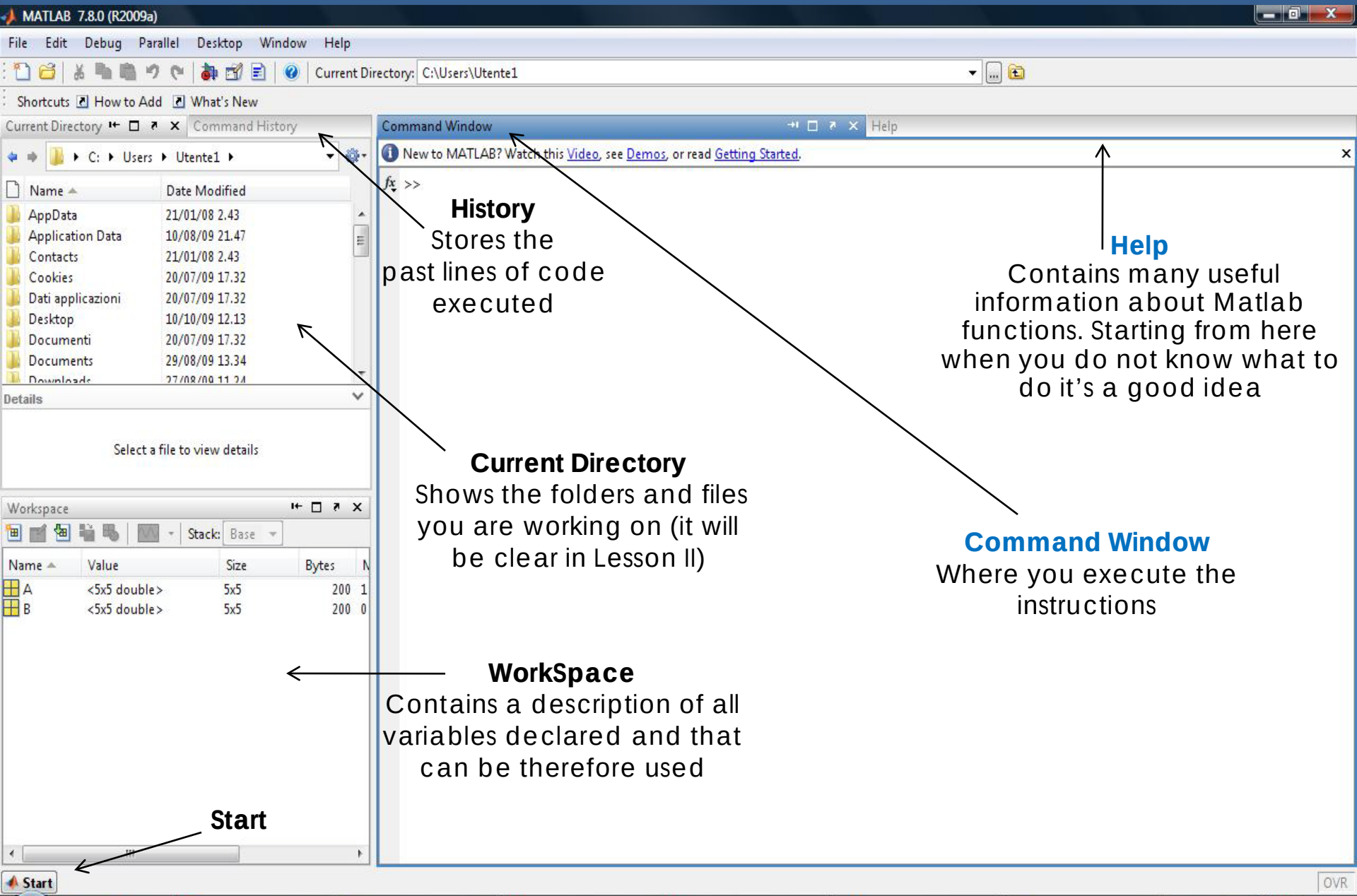
Applications

- 4th Lecture — Applications

Introduction to Matlab…



...and its environvment



History
Stores the past lines of code executed

Help
Contains many useful information about Matlab functions. Starting from here when you do not know what to do it's a good idea

Current Directory
Shows the folders and files you are working on (it will be clear in Lesson II)

Command Window
Where you execute the instructions

WorkSpace
Contains a description of all variables declared and that can be therefore used

Start

Useful resources

Matlab Help and documentation

Web

www.mathworks.com has a forum where people post codes;
Sometimes googling "matlab" and the problem you are facing might help you to find some code.

Books

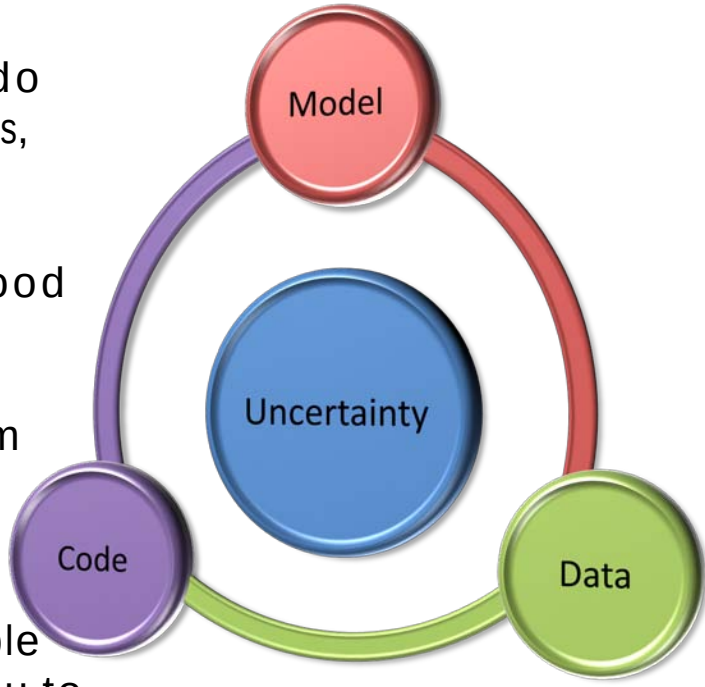
Have a look to the Bibliography in the last slide

When you work on non trivial and real project, and you do not get immidiatly (as often the case) the expected results, it might depend on the fact that

a) your model is "wrong" (ex. linear Regression is not a good approximation of the data)

b) the data are not correct (ex. you did not re-scale them correctly or maybe you are using the wrong variables)

c) that your code has some bugs. Therefore, sometimes, having a CRITICAL look at some available and trustable piece of code might speed up your work and help you to cope with a source of uncertainty



Variable Definition

Scalars

n=1, n=0.001, n=10e3

a=n

Vectors

row vector: V=[1 2 3 . . .n]

column vector: V=[1; 2; 3; 4; . . .n] V=[1 2 3 4 . . .n]'

V=1:20 V=1:2:10

Matrices

3x3 matrix M=[1 2 3; 4 5 6; 7 8 9]

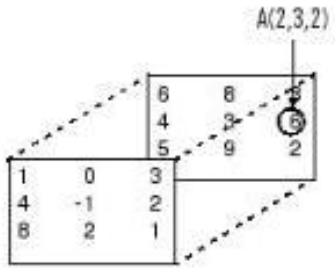
2x4 matrix M=[1 2 3 4; 5 6 7 8]

M=zeros(r,c) M=ones(r,c)

M=eye(dim) M=diag([1:n],index)

M=random('norm',0,1,2,2)

3d-Matrices




```
A(:,:,1) =

     1     0     3
     4    -1     2
     8     2     1

A(:,:,2) =

     6     8     3
     4     3     6
     5     9     2
```

Useful Automatic Matrices

EXERCISES on Variable Definitions [10 minutes]

a) Write a 50x1 vector of 5s: [5 5 5 … 5 5]'

hint: do not write manually the vector! Use some linear algebra

b) Write a row vector : [1 . . . 30 30 . . . 1]

hint: try with negative numbers

c) Given a square matrix , define matrix "Eigen" that contains its eigenvector(s)

hint: it's easier than you think, do not try to calculate it "manually"

Solutions…

a.1) ones(50,1)*5
a.2) floor(5:0.01:5.49)
a.3) random('norm',5,0,50,1)

b.1) [1:30 abs(-30:-1)]
b.2) [1:30 (-30:-1)*-1]
b.3) [1:30 30:-1:1]

c.1) Search "eigenvalues" in the helper!
You will find the function E=eig(X)

References

General References

1. "Matlab. *Mathematics*", Mathworks
2. "Matlab. *Getting Started Guide*", Mathworks
3. "Matlab. *Programming Fundamentals*", Mathworks

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4. "Fundamental Probability. A computational approach", (M. Paolella), Wiley
5. "Econometric ToolBox", J. LeSage (available at www.spatialeconometrics.com)
6. "Matlab. *Econometrics Toolbox User's Guide*", Mathworks
7. "Numerical Methods in Finance and Economics. A Matlab based Introduction", (P. Brandimarte), Wiley