MATLAB Brush Up Course

by Joan Margalef

Presentation

About me

Joan Margalef

I studied engineering in industrial organization, followed by a master's degree in economics in the IDEA program. Currently, I am pursuing my PhD in Economics.

Research interests

Public Economics, Conflict, Development Economics, Finance, Political Economy, and Applied Game Theory.

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What about you?

About Matlab

What is MATLAB?

MATLAB (Matrix Laboratory) is a high-level language and interactive environment used for numerical computation, visualization, and programming.

- **Interpreted Language:**
  - MATLAB is an interpreted language, as opposed to a compiled language.
  - It executes commands without code compilation.
- **High-Level Language:**
  - MATLAB is a high-level language: high level of abstraction from machine language.
  - Allows to focus on higher-level constructs like variables, arrays, objects, arithmetic expressions, functions, ...
- **Original Design Purpose:**
  - Designed to solve linear algebra equations using matrices.

MATLAB in Economics

- **Applications in Economics:**
    - *Solving Static and Dynamic Optimization Problems:* For example, determining how much an agent should work and consume to maximize a utility function, subject to constraints.
    - *Estimating Parameters of Econometric Models:* For instance, measuring the income elasticity in response to an additional year of education.
    - *Performing Simulations:* Investigating the asymptotic properties of an estimator or simulating time series generated by theoretical economic models.

Comparison with other Softwares

Software	Purpose	For Me
MATLAB	Numerical computing, simulations, and modelling.	Math and simulations.
Python	General-purpose programming, web development, data analysis, and machine learning.	One for all. But I use it for Data Retrieveing and Cleaning.
R	Statistical analysis, data visualization, and econometrics.	Great for data retrieveing, cleaning, analysis, and plotting
Stata	Data analysis and econometrics.	Best for econometric analysis.

Trade-off

- MATLAB stands out for its user-friendliness, making it accessible for those new to programming or those who prefer a more intuitive interface.
- However, it is important to note that MATLAB can be less efficient in terms of speed compared to some of these other languages.

This Course

Methodology

- **Teaching Through Code:** Hands-on coding sessions
- **Learning by Doing:** At each step of the coding process, there will be opportunities to perform small exercises.
- **Additional Material:** I will provide more extensive materials for further study and practice.
- **Final Examination:** The last session of this course will be dedicated to an exam.

Syllabus

1. **Introduction to MATLAB: Environment and Matrices** (session1)
2. **Logical/Relational Operators, Conditional Statements, Loops, and Random Variables** (session2)
3. **Symbolic Expressions, Anonymous Functions & Local Functions** (session3)
4. **Data Import/Export & Plotting** (session4)
5. **Practical Exercise: Replicating a Paper** (session5)

Helpers

Google

- Good for all levels
- Immersive, so more time-consuming.

I highly recommend it for this course. Altough you can copy paste code, at least, you learn by adapting it to your problem.

ChatGPT

- Great for Basics
- Missleading for Advanced Topics

I do not recommend it for this course. During the masters, you will do advance things, so you need to internalize very well the basics.

Let's Start!

And remember, programming is about **patience** and **practice**. Grab a coffee, tea, or a snack, and try to enjoy the process.