Introduction to MATLAB

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- MATLAB is a high-performance technical computing environment developed by MathWorks Inc. in 1984.
- Capabilities: numerical calculations, matrix manipulations (MATLAB=MATrix LABoratory), data analysis, data visualization, simulations, analytical calculations,…

Why MATLAB ?

- Quick to learn, and good documentation
- Many existing code, toolboxes, built-in functions available.
- Excellent display capabilities
- Easy to do very rapid prototyping
- Widely used for teaching and research in universities and industry
- Weakness: MATLAB is an interpreted language, slower than C/C++.

Why MATLAB for Image Processing

- A digital image is a matrix!
- Well supported by toolboxes.
- A good choice for image processing development

Some Facts on MATLAB

- Everything in MATLAB is a matrix! (A single number is really a 1x1 matrix)
- MATLAB is an interpreted language, no compilation needed
- MATLAB does not need any variable declarations, no dimension statements, has no packaging, no storage allocation, no pointers
- Programs can be run step by step, with full access to all variables, functions, etc.
- Rows and columns are always numbered starting at 1

MATLAB Environment

- Command Window
  - Type commands
- Workspace
  - View program variables
  - Double click on a variable to see it in the Array Editor
- Command History
  - View past commands
  - Save a whole session using *diary*

Three Places to Write Code

- Prompt: write and press enter
- Script file
- Function file

Script Files (.m)

- Sequences of MATLAB commands can be written to m-files.
- Enter the name of the file (without extension) will automatically execute all statements
- Use the Editor/Debugger to edit, run

Function Files

- Function files take input arguments and/or return output arguments. Used for replacing repetitive portions of the codes.
- See myfunction.m
- Call it with f=myfunction(x,y)

Operators

Arithmetic operators:

+, -, *, /, ^, .*, ./, .^

Logical operators:

==, ~=, <, <=, >, >=, &, |, ~

MATLAB Graphics

- See script file myplot.m

Getting Help

- Use the Help Browser
- Type
  - Help
  - Help function
- Run demos
  - Type demos
  - Type help demos