

# A little background

4GL, just like R/SAS/Mathematica/...

Fairly expensive

Engineers love it, not statisticians

Have a free counterpart Octave

Company's website [www.mathworks.com](http://www.mathworks.com)

# Comparison to R

A little (even) easier than R

Syntax is loose

(Used to be) a little faster than R

Better and easier graphics for the \$\$\$

Have an IDE, which is IMHO very useful

Have a GUI builder GUIDE (tcl/tk in R?)

Available document: software manual

# Access Matlab at jhsph

Matlab is installed on post

“ssh post” from enigma

“matlab” to start

“matlab -h” to get help on other options

“quit” or “exit” to quit

# Basics

There're commands and functions:

Basic commands include: dir, rm, save, addpath, ...

Build-in functions (provided by Matlab) are stored in toolboxes (counterpart to R's packages)

Your own functions

To get help type “help”, then “help <topics>”

Syntax is similar to C but very loose, e.g., “,” can be omitted in many cases

# Data type

Numeric: everything is a matrix; have “int”, “double”, ...

Character: in single quote, e.g., str= 'abc'.

Strings are stored as vector of characters

Class: like list in R; use “.” instead of “\$” to access object fields

No data frame, factor, ...

# Control flows

## If ... else ...

```
if i==n
    a=a+1;
else
    a=a-1;
end
```

## For loops:

```
for i=1:n
    a=a+1;
end
```

# Control flow (cont.)

**while loops:**

```
while (i<n)
  a=a+1;
end
```

**Switch ... case ...**

**Others ...**

**No {}, control flows are closed by “end”**

# Make a function (1)

```
function out=foo(input1, input2)
% FOO is a dummy function
%
% Syntax:
%   out=foo(input1, input2)
%
% Inputs:
%   input1, input2 - some inputs
%
% Output:
%   out - some outputs
%
% See also: foo1, foo2

disp 'This is function foo';
fprintf('inputs are %d, %d', input1, input2);
out=0;
```

# Make a function (2)

Save the function to a directory in the search path and Matlab will find it

Function help is in the function

When it's updated, don't need to "source"

# Make a toolbox (package)

Just put a bunch of functions in a directory

# A Matlab-R dictionary

Many Matlab and R functions share the same name

Convert from one to the other is fairly easy

| <b>Matlab</b> | <b>R</b>    | <b>Matlab</b> | <b>R</b>  |
|---------------|-------------|---------------|-----------|
| who           | objects()   | inv           | solve     |
| ls            | dir()       | figure        | X11/...   |
| size          | dim         | mat'          | t(mat)    |
| zeros/ones    | rep         | error         | stop      |
| [1,2,3]       | c(1,2,3)    | '             | "         |
| [1;2;3]       | t(c(1,2,3)) | mat(:,1)      | mat[,1]   |
| .             | \$          | addpath       | library() |

# M-Editor: the IDE

Can use it to write and debug codes

No R counterpart (let's make one!)

# Matlab graphics

Very easy to work on

Figures can be modified after generated

Can control the figure in program using the “object handles”

In R you must have all parameters ready before calling “plot”

In Matlab you generate the figure then modify it

# GUIDE – GUI builder

Help to make a GUI on the fly

Easily linked to code

# Interface to other languages

Have interface to C/Fortran/Java

Very awkward, R is much easier