

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

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

| Matlab | R | Matlab | R |
|------------|-------------|----------|-----------|
| 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