CALL C From MATLAB

Ling Guo, Kaixian Yu,Yilin Dai
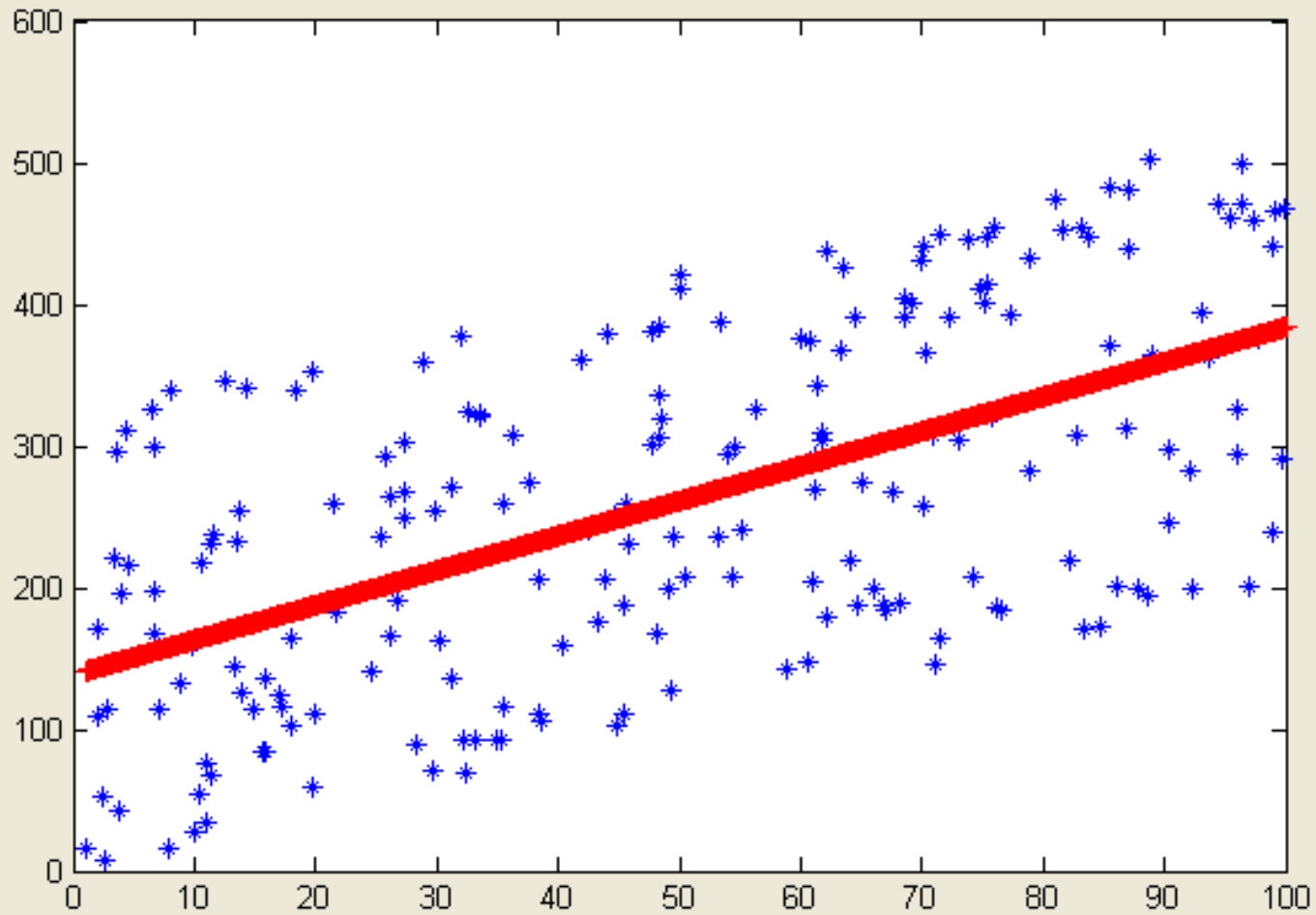
CALL C From MATLAB

- Matlab functions written in C are called **MEX-files**.

- MEX stands for Matlab EXectuable.

- the Interface to MATLAB :

   On windows these files have the extension **.dll**

- Why CALL C From MATLAB

1. To use pre-existing function

2. Increase speed

mxArray

- In C, the Matlab array is declared to be of type **mxArray, which is a structure.**

- The structure contains:

  Its type.

  Its dimensions.

  The data associated with the array.

  If numeric, whether real or complex.

  If sparse, its nonzero indices.

  If a structure or object, more info.

Components of MEX Files

A MEX-file consists of **two distinct parts**:

1. A computational routine: code that does what function is supposed to do.

2. A gateway routine: code that interfaces the computational routine with MATLAB.

   (The main() function is replaced with mexFunction.)

```
#include "mex.h"
void mexFunction(int nlhs, mxArray *plhs[], int nrhs, const mxArray
*prhs[]) {   //code that handles interface and calls
                        //to computational function
                        return; }
```

- mexFunction arguements:
    - nlhs: The number of lhs (output) arguments.
    - plhs: Pointer to an array which will hold the output data, each element is type mxArray.
    - nrhs: The number of rhs (input) arguments.
    - prhs: Pointer to an array which holds the input data, each element is type const mxArray.

MATLAB
Call the MEX-file function:
Ans=myfit(data)

Pass the "data" to the MEX file

Myfit.c
void **mexFunction**(
int nlhs, mxArray *plhs[],
int nrhs, const mxArray *prhs[])
{
the gateway routine:
Create the input from outside
The computational routine:
Do its job
the gateway routine:
Passing the output data back
as function parameter
}

On return from MEX file:
Ans=myfit(data)

Pass the "Ans" to the M- file

Reference

- ## Writing C functions in Matlab(MEX-Files)
  Jason Laska,
  http://cnx.org/content/m12348/latest/

- ## Calling C from Matlab:introduction
  Andreas Uhl ,http://www.cosy.sbg.ac.at/~uhl/C-matlab.pdf