

Learning MATLAB: Functions and Function Files

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Overview

1 Functions

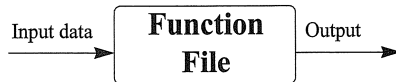
2 Conclusions

References:

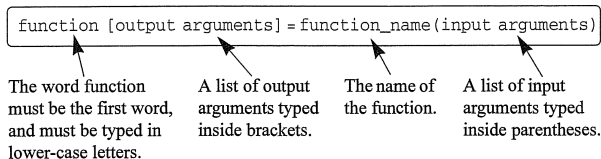
[1] Desmond J. Higham and Nicholas J. Higham, MATLAB Guide, 2nd ed. Society for Industrial and Applied Mathematics, 2005.

[2] Amos Gilat, MATLAB An Introduction with Applications. John Wiley & Sons Inc., 2004.

Functions



- Beside MATLAB built-in functions, user-defined functions are very powerful tools of MATLAB features as they allow users to build their own functions to perform a specific task.
- The structure of the MATLAB function is as follows:



Examples

The MATLAB considers a radian scale for the trigonometric functions, e.g., $\sin(\pi) = 0$. Suppose that we want to reassign the degrees scale instead. Write a MATLAB function to perform the built-in function `sin` in a degrees scale.

Answer:

```
function a = sineD(x)
% This function computes the sine in the degrees scale.
a = sin(x*pi/180);
```

Note that, in MATLAB functions, three names have to be the same: 1) the function name, 2) the file name of the function, and 3) the used name to recall the function.

Examples (cont'd)

Write a MATLAB function to compute the number of bit errors and the Bit Error Ratio (BER) of two sequences; the transmitted and received signal.

```
function [nBitEr ber] = FnBer(s_in,s_out)
% Computes BER of a transmission system given both transmitted and
% received bits
% Input Parameters:
% s_in - transmitted symbols
% s_out - received symbols
% Output Parameters:
% nBitEr - number of bit errors
% ber - bit error ratio
ErrMsg = isequal(size(s_in),size(s_out));
if ErrMsg == 0,
error('transmitted and detected symbols are not of same size')
end
nBitEr = sum(sum(s_in~=s_out)); ber = nBitEr/numel(s_in);
```

Previous Example (cont'd) — Test

TEST:

```
s_in = round(rand(4,1000)); % generates a 4×1000 bits of 0 & 1 with equal probability.
```

```
s_out=s_in; % assumes that both i/p and o/p bits are the same
```

```
s_out(1,:)=not(s_out(1,:)); % negate the first row of s_out
```

```
[nBitEr ber] = FnBer(s_in,s_out)
```

Results: nBitEr = 1000 and ber = 0.2500

Conclusions

Concluding remarks

- MATLAB user-defined considered
- Some examples that highlight the MATLAB function is given