vg101: Introduction to Computer Programming

Mid1 RC Plotting and Data Structure

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Outline

- Lectures
  - Plotting
  - Advanced topics
    - Data types
    - Structures

Lectures

Plotting

Matlab has a whole catalog including all the plotting related information in **Graphics** (under Documentation -> MATLAB -> Graphics).

Common used functions

- axes: create, and specify the range of axes in the current figure window
- plot: create a new plot, will cover the prev plot in the same figure window
- hold on/off: retain (or not) the current plot when adding new plots
- subplot: `subplot(m, n, p)`
- title: add title on the top of a figure (LaTeX syntex supported)
- xlabel/ylabel: set axis labels (LaTeX syntex supported)
- line: `line([x0 x1],[y0 ,y1])` Draw a line from (x0, y0) to (x1, y1)
- rectangle: `rectangle('Position',[left_down_x0 left_down_y0 width height])`
  Lines and rectangles are annotations, so no need to use *hold on*
- clf: delete all the graphics objects on the current figure, replot evereything afterwards

Advanced topics

Data type

- What is data type? Why we need it?
  - Each variable has a specific data type
  - It tells the interpreter how to allocate memory and how to load and interpret some bits at certain address in memory
  - It defines the operations a certain variable can have
- Different data types in Matlab
  - int: int8, int16, int32, int64
    The most significant bit is the sign bit.
  - uint: uint8, uint16, uint32, uint64
  - single(32 bit), double(64 bit)
  - logical
  - char (single quotation mark), string(double quotation mark)
    - provide storage for text data, but string array treats each phrase as a unit, whereas a char array treats each character as a unit
    - their ways for storage data is likely to be different
      eg: Try this in command window

```
chr='abcd';
chr(1)
whos chr
str="abcd";
str(1)
whos str
```

    - string specfic functions are both suitable for *string* and *char array* (like str2num, strcmp, strfind, strrep), but the data type of the return value may be affected by your choice
  - cell array
  - structure
  - function handle
  - classes
- Type Conversion
  There are many ways to convert one data type into another in MATLAB.
  eg. convert string into double

```
str = "123.45";
db = str2double(str); % similar to int2str, mat2str, num2str, str2num

db = cast(str,'double')
```

```
5
6 db = double(str);
```