BMEG3105 Lecture 2 - Data & Python

Lecture Contents

① Descriptions of common data types for this course

② Introduction to Python programming

Data types

- Sequential data
  - → gene sequences: ATGC...
- Data matrix
  - → collection of records + fixed set of attributes
  - → n (object / row) by m (attribute/column) matrix
    - ↳ 4 × 2 matrix:

		1	2
	Person	Height (m)	Weight (kg)
1	P1	1.79	75
2	P2	1.64	54
3	P3	1.70	63
4	P4	1.88	78

Rows & columns interchangeable

- **Spatial data**
  - → geographic locations and spatial information
    - e.g. image / map
  - → stored as matrix (rows & columns NOT interchangeable)
- **Temporal data**
  - → handling data involving time
    - e.g. cardiac signals
- **Graph / networks**
  - → Objects and connections (the link)
    - e.g. social network & PPI network
- **Text**
- **Multi-modality data**
  - → combination of above
    - e.g. ▷ Video = temporal images + audio + transcript
      - ▷ Electronic health records = Data matrix + images + text

Python Programming

- **Programming**:
  → communicating with computer, ask them to do something:

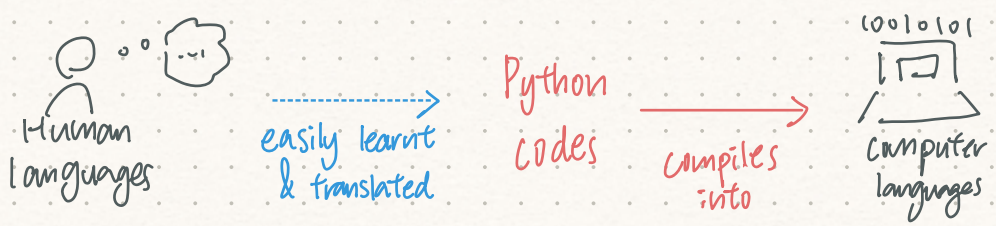
- **Python**:
  → interpreted high-level general-purpose programming language

① platform for programming, i.e. communication with computer

Python = the platform for communication

code = the message delivered
↓
ask computer to do something
e.g. calculation

② bridge between human & computer languages



→ Additional **plug-in** can make Python more **powerful**
e.g. Numpy, Scipy, Panda

→ Syntax for python (including Numpy)

▷ Add numpy to the program

`import numpy` (written in start of program)

▷ Declare an array

`a = [var 1, var 2, var 3, ...]`

▷ Functions for evaluating an array of variables:

mean: `numpy.mean(a)`

standard deviation: `numpy.std(a)`

median: `numpy.median(a)`

maximum: `numpy.max(a)`

minimum: `numpy.min(a)`

▷ Print

commas to concatenate more than 1 strings

`print ("string", var)`

"string": string in quotation ("") printed out directly

var: without quotation, value of variable will be printed