Biomedical Data Analysis in Python3

Introduction to Scientific Computing, Visualization, Machine Learning and Debugging

— Orientation and A Python3 Tour —

All materials and slides are available on GitHub (ZaneMuir/FDU-DataAnalysis-Workshop).

- Introduction
- Future Topics
- Environment Setup
- A Python3 Tour
- Assignments

File Types

	Binary File	Plain Text File
Executable	.exe .o	**.py** .js .r .m
Non-Executable	**.mat** .mp3 .tif .mov	**.json .csv** .txt .html .c .h

Your Options

- Excel
- SPSS
- Origin
- …

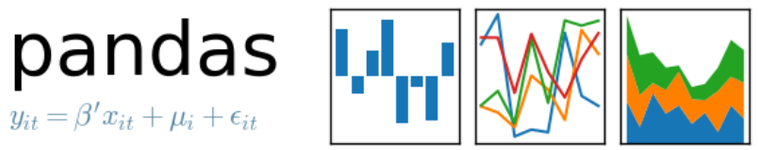
- C/C++
- R
- MATLAB
- **Python**
- Julia
- …

A Basic Workflow

- Understanding your experiment design
- **Knowing the structure of the raw data:** numeric, tabular
- **Extracting features:** data transformation, hypothesis testing
- **Visualization:** chart types, statistical parameters, scientific presentation, etc.
- **Machine Learning:** classification, regression, clustering, dimensionality reduction

Future Topics

- Numeric Matrix and Math: ***numpy***



- Tables and Statistics: ***pandas, scipy***

- Visualization: ***matplotlib***

- Machine Learning: ***scikit-learn***

Tensorflow, Caffe, Keras, MXNet, etc.

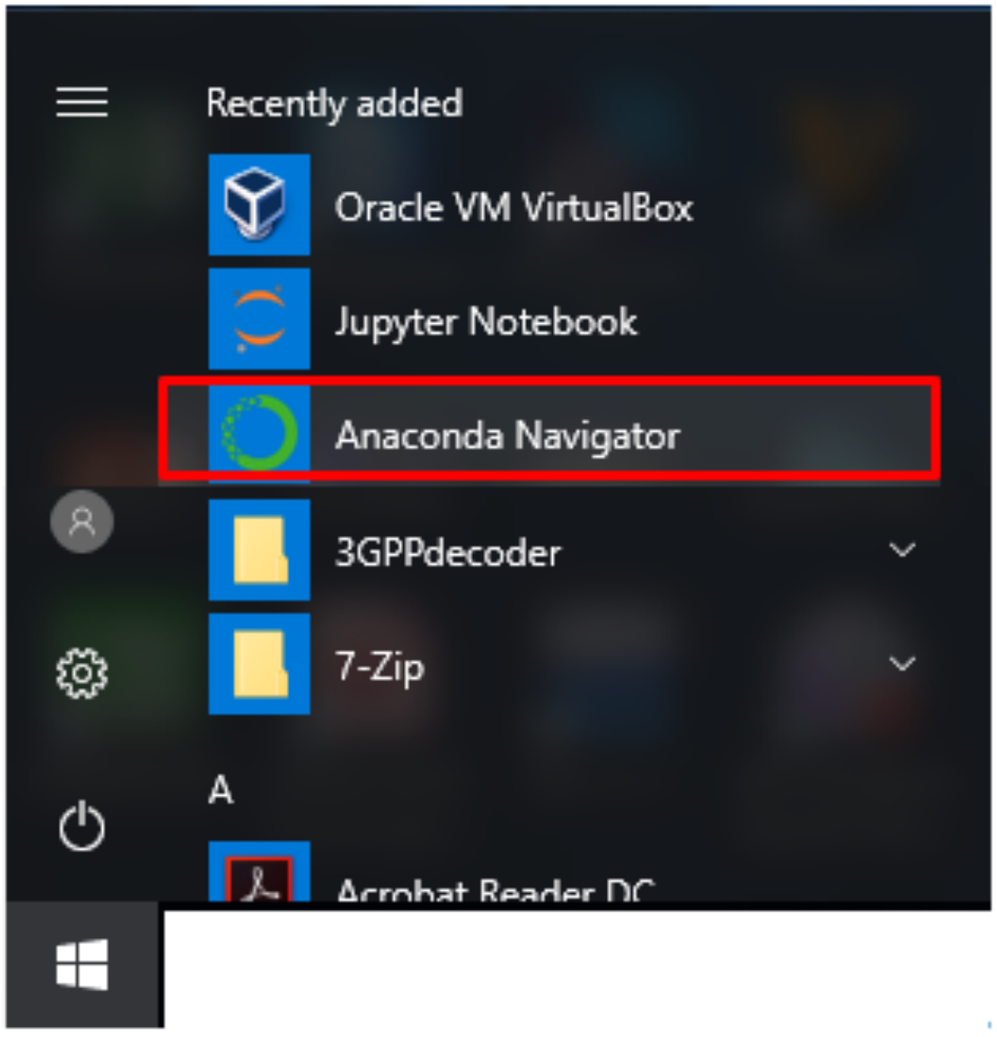
Setup Working Environment

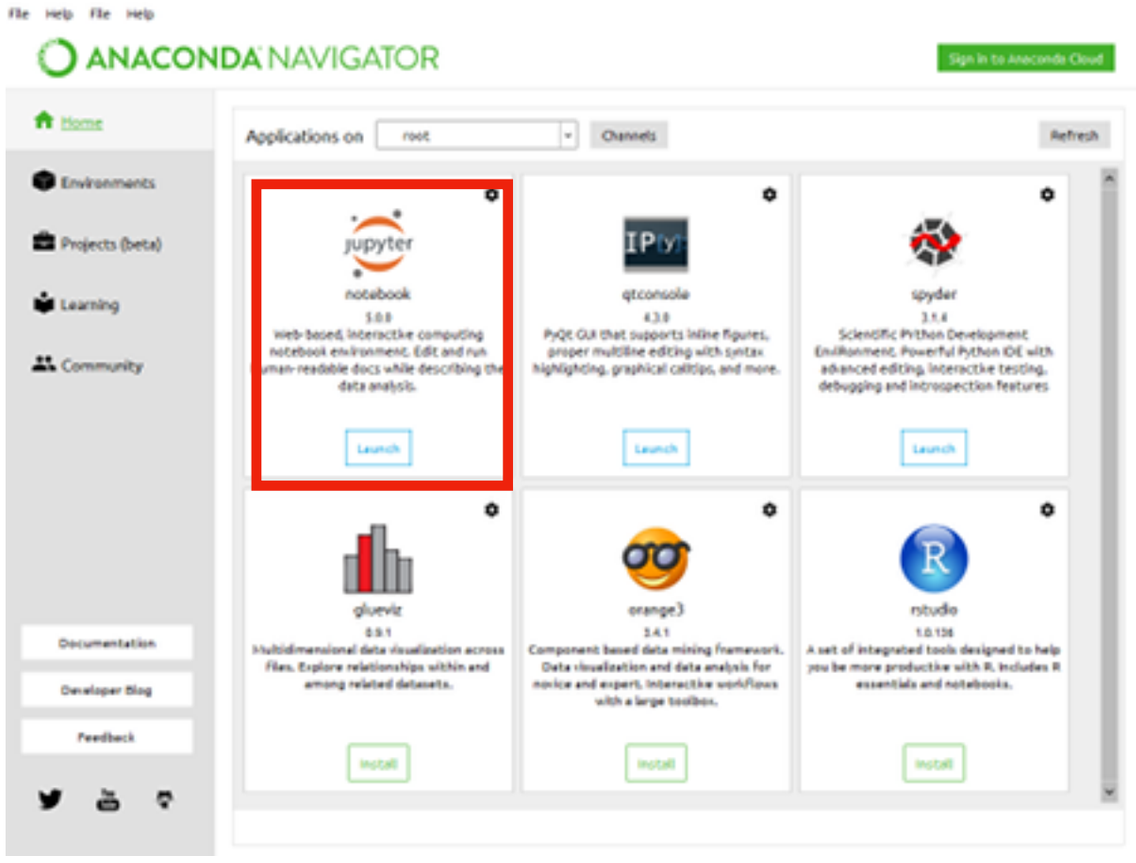
- **Jupyter**: interactive computing running in the browser
- **Anaconda/Miniconda**: package & environment manager
- **PowerShell/iTerm2**: running your executable scripts from terminal
- **Atom/Sublime/Vim/Emacs**: better text editors for programming

Above Specific Languages

- Operators
- Values and Types
- Variables
- Conditionals
- Loops
- Functions

A Python3 Tour





Assignments

- Review and Understand Basic Concepts on Python3 Programming
- Familiarize yourself with Jupyter
- Review Your Dataset (more details on GitHub)

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“The best way to learn how to write code is to write code.”