

Short introduction into (Scientific) Python

Prof. Dr. Christian Herta

Scientific Python

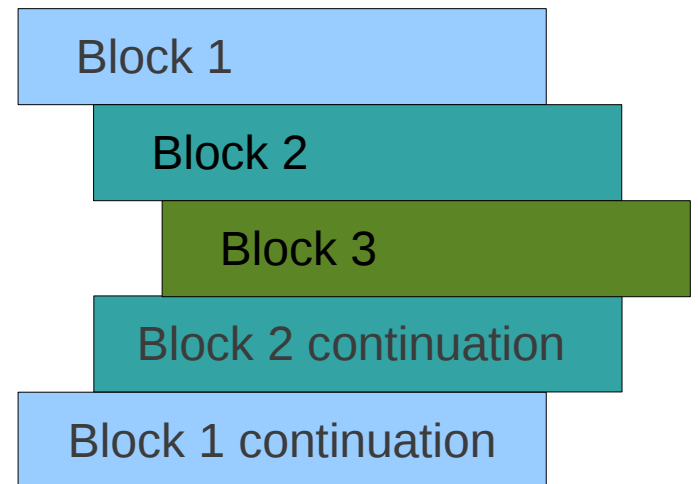
- Python
- IPython
- Numpy
- Scipy
- Matplotlib
- Mayavi
- Pandas
- Scikit
- ...

Programing Language Python

block structure

- not braces, instead
indentation

```
def factorial(x):  
    if x > 1:  
        return x * factorial(x - 1)  
    else:  
        return 1
```



data types

<http://docs.python.org/2/library/stdtypes.html>

- boolean
- numeric
 - int, 4321
 - long: 63636363L
 - float: 3.14159 oder 17.3e+02
 - complex: 1.2+3j
- strings `s = "Python"`
- more: lists, tupels, sets, dictionaries

short introduction

- demonstration according to

<http://python.net/~goodger/projects/pycon/2007/idiomatic/handout.html>

<http://www.decalage.info/en/python/tutorial>

<http://www.youtube.com/watch?v=OSGv2VnC0go&feature=youtu.be>

Style Guide

- <http://www.python.org/dev/peps/pep-0008/>
- <http://google-styleguide.googlecode.com/svn/trunk>



IPython

IPython

<http://ipython.org/>

- interactive Python Shell
- help (? or command?), e.g. len?
- IPython "magic" commands with prefix %
 - `lsmagic`
 - z.B. `%history`, `%who`
 - `%run (-i)` runs python code from a file
 - `%edit` macros
- '!' for commands of the OS
 - e.g.: `!ls`

Numpy and Scipy

Numpy and Scipy

- Mathematical and numerical routines in precompiled fast functions
- Numpy: Numerical Python
 - mainly for (large) arrays (for vectors, matrices, tensors) and operations on it
- Scipy: Scientific Python
 - algorithms, like minimization, matrix decomposition, regression etc.

AI and machine learning

- Scikit learn: Machine Learning

<http://scikit-learn.org>

- Pandas Data Frames

<http://pandas.pydata.org/>

- Pymc: Probabilistic Programming and Bayesian Inference - <http://pymc-devs.github.io/pymc/>

– Online Book: Bayesian Methods for Hackers:

http://nbviewer.ipython.org/github/CamDavidsonPilon/Probabilistic-Programming-and-Bayesian-Methods-for-Hackers/blob/master/Chapter1_Introduction

- AI library list:

<https://wiki.python.org/moin/PythonForArtificialIntelligence>

numpy

- `import numpy as np (or %pylab)`
- `a = np.array([1, 4, 5, 8], float)`
- demonstration according

<http://www.engr.ucsb.edu/~shell/che210d/numpy.pdf>

literature and links

- <http://docs.python.org>
- <http://ipython.org/>
- <http://www.python-kurs.eu>
- <http://cs231n.github.io/python-numpy-tutorial/>
- <http://scipy-lectures.github.io/intro/intro.html>

<http://nbviewer.ipython.org/github/fonnesbeck/Bios366/tree/master/notebooks/>