

Our main challenge



1h session

- Why programming?
- Why python?
- Exercises/Ressources

***“Not everything is at
your level, but there is
something for all levels”***

Why programming?

I will do a computational PhD:
I'll get data from the start,
publish 1 000 000 papers and
get famous! What could go
wrong?



Hi Ludo, first day! Here is your data... don't print It would be 50km long if printed with font size 10...

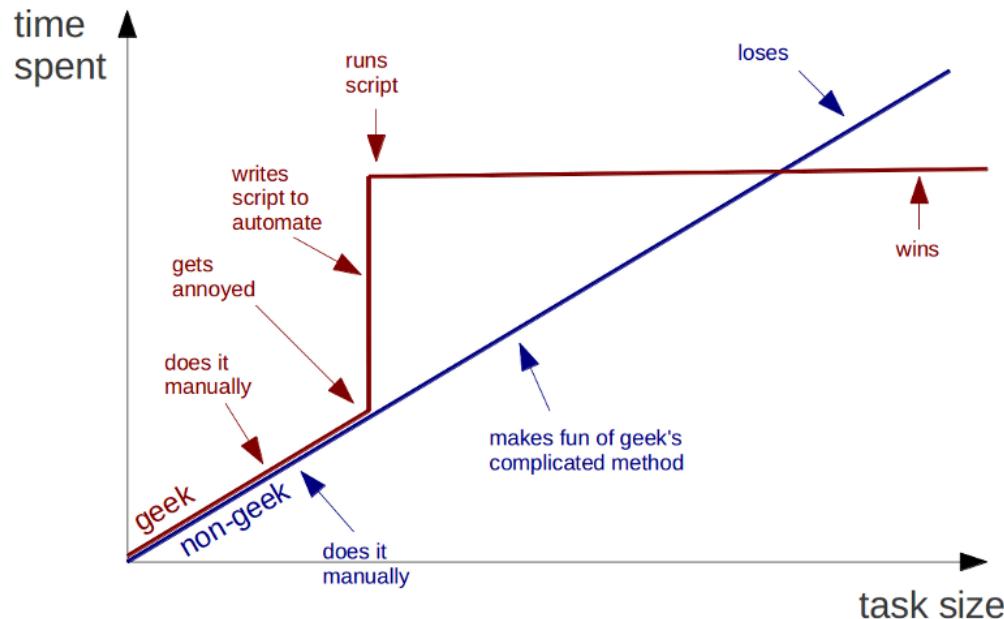


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Reproducible / Adaptable

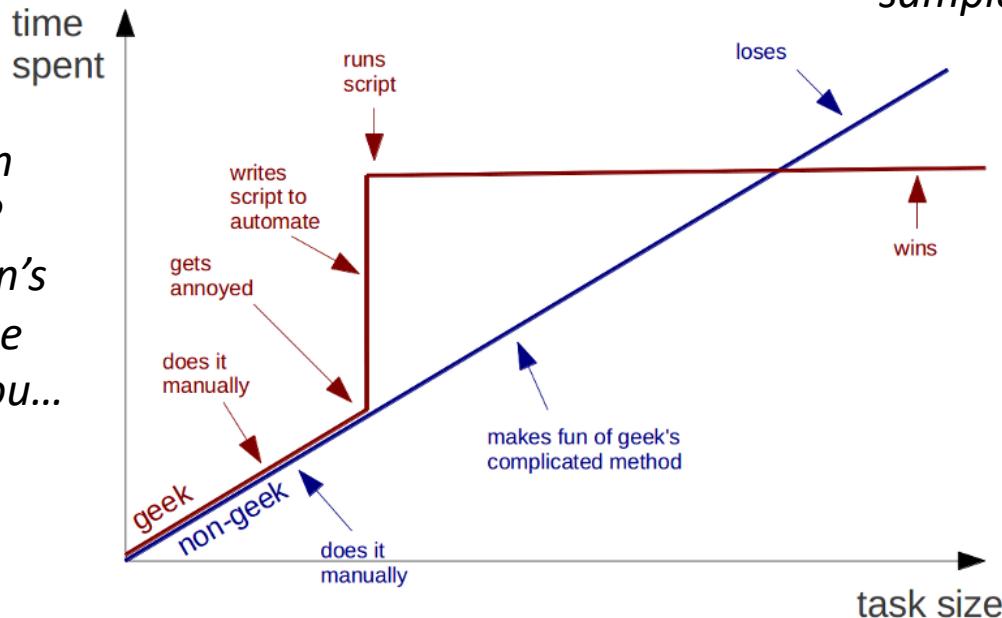
Geeks and repetitive tasks



Reproducible / Adaptable

Since you already ran this for your project? Can you do it for John's data too? That will be quick and easy for you...

Geeks and repetitive tasks



Can you re-do it with alpha = 2?

Can you remove that sample and redo it?

Oh fudge, you did not exclude low quality samples?

Tools available



Google

Last Login: Wed Aug 22 10:32:44 on ttys003
vpnpool188-140:~ dutlu42p\$

How to avoid explicit 'self' in Python?

0 You need an explicit self in python. The self argument is always passed in.

```
class menu:
    def __init__(self,a,b):
        self.a=a
        self.b=b

    def suma(self):
        x=self.a+self.b
        print(x)

    def hola(self):
        menu.suma()

menu=menu(1,2)
menu.hola()
```

share improve this answer

answered Jul 22 at 0:45

jshamble 352 2 12

Why programming

- After some size, hand is impossible!
- Adaptable/ Reproducible
- Tools available

Why python?

Why python?

Matlab

Java

Ruby

Perl

Fortran

C

R

C++

Why python?

+

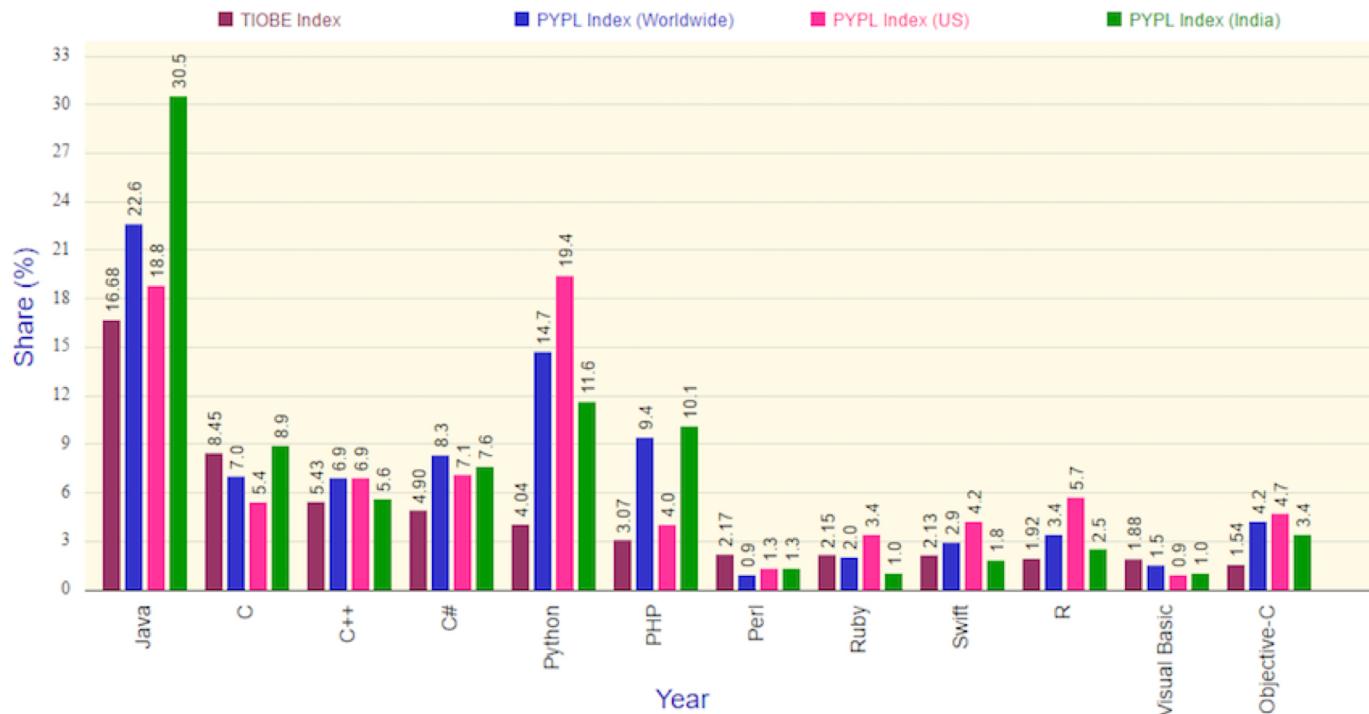
1. Modern
2. Widely used (in Science too!)
3. High level
4. Highly transferable skill
5. Free

Bonus: considered good for learning

-

1. Learning a new language is an investment
2. You might not need to master all languages!
3. Field tradition

Top Computer Languages (Feb 2017)



TIOBE Index

Feb 2017	Feb 2016	Change	Programming language	Ratings	Change
1	1		Java	16.676 %	-4.47 %
2	2		C	8.445 %	-7.15 %
3	3		C++	5.429 %	-1.48 %
4	4		C#	4.902 %	+0.50 %
5	5		Python	4.043 %	-0.14 %
6	6		PHP	3.072 %	+0.30 %
7	9	↑	JavaScript	2.872 %	+0.67 %
8	7	↓	Visual Basic .NET	2.824 %	+0.37 %
9	10	↑	Delphi/Object Pascal	2.479 %	+0.32 %
10	8	↓	Perl	2.171 %	-0.08 %

PYPL Index (Worldwide)

Feb 2017	Change	Programming language	Share	Trends
1		Java	22.6 %	-1.3 %
2		Python	14.7 %	+2.8 %
3		PHP	9.4 %	-1.2 %
4		C#	8.3 %	-0.3 %
5	↑↑	Javascript	7.7 %	+0.4 %
6		C	7.0 %	-0.2 %
7	↓↓	C++	6.9 %	-0.6 %
8		Objective-C	4.2 %	-0.6 %
9	↑	R	3.4 %	+0.4 %
10	↓	Swift	2.9 %	+0.1 %

Duck typed

```
#In C
```

```
int x;  
x = 4;
```

```
#In Python
```

```
x = 4
```

“If it walks like a duck if it quacks like a duck, let’s just assume it is a a duck”

```
# whatever is after # is not read,  
it is a comment  
  
x = 4 # x is an integer  
y = "4" # y is a string or  
z = 4. # is a float  
test = True # boolean: True/False
```

Some more

```
list_a = [4,'3'] # list
list_b = [[2,3],[1]] # list of list

set_d = set([1,2])

dict_e = {"days": ["Mon","Tue"], month :
["Jan"] }
```

Indentation in python

```
if a == 2 and len(b) == 3: #check
    tab print a,b
else:
    print a

for i in range(10):
    tab print i,i*2,i**2,i.bit_length()
```

Objects

```
a = "awekjbcbdba" # string
type(a) # print out the type of a, a is a
dir(a) #string
help(a.count()) # print help for the count
method
a.count("b") # count the b
a.split("j") # split a in a list
```

Indentation in python

```
def is_even(x): #create your own funct  
    return x%2 == 0
```

```
is_even(2)
```

```
#module  
import os # import the module os  
help(os) # list possibilities of os  
os.listdir() # function listdir of os
```

What more

<https://github.com/ldutoit/zool-coding-group>

Concept of the day: Paths

<https://www.youtube.com/watch?v=ephId3mYu9o>

Install Anaconda

- Install anaconda version **2.7** from:

<https://www.anaconda.com/download/>

It will directly install a lot of useful tools related to python usage to your computer. If your computer refuses to install it, then download python 2.7 here instead:

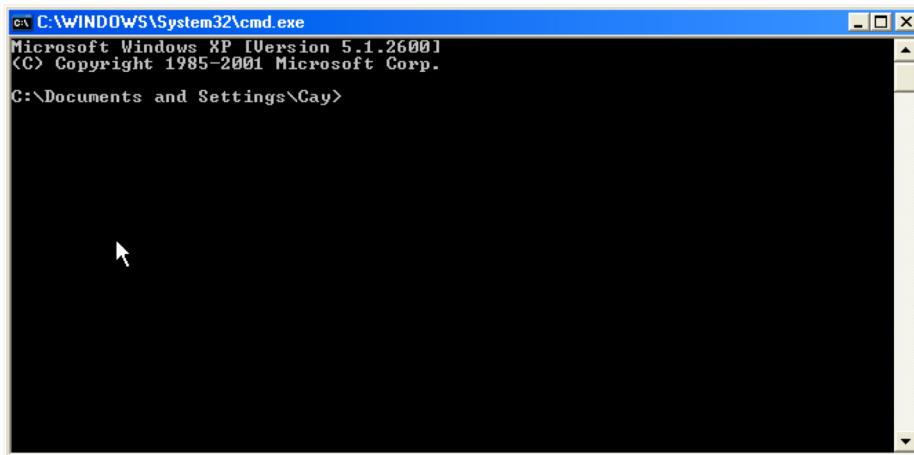
<https://www.python.org/downloads/release/python-2712/>



You need:

1. Windows Command Prompt

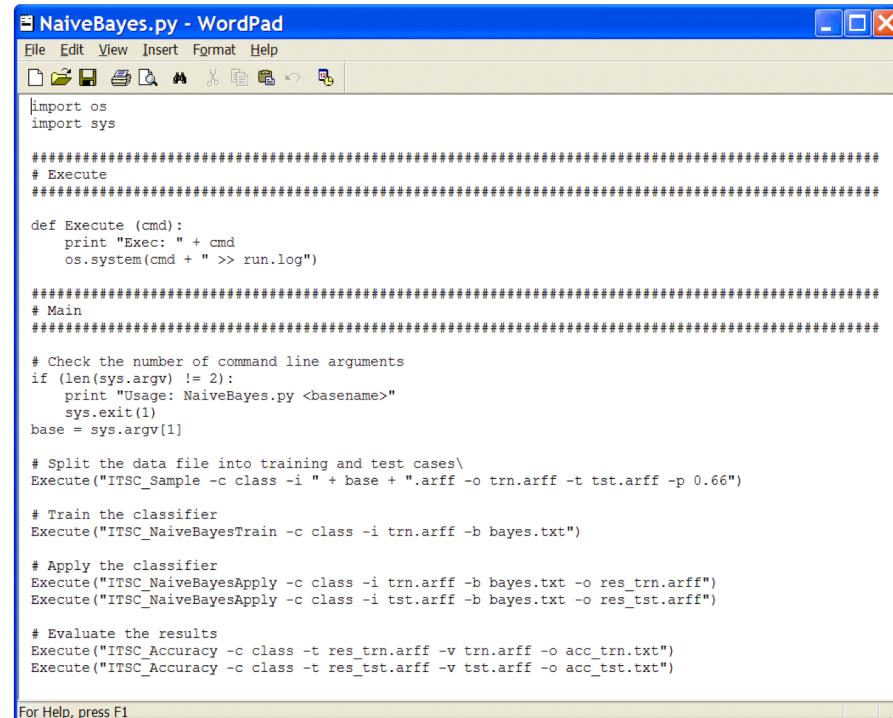
It will read python code if you type:
ipython



A screenshot of a Microsoft Windows XP Command Prompt window titled 'cmd.exe'. The title bar shows 'C:\WINDOWS\System32\cmd.exe' and the status bar shows 'Microsoft Windows XP [Version 5.1.2600] <C> Copyright 1985-2001 Microsoft Corp.'. The command line prompt is 'C:\Documents and Settings\Cay>'. The window is black with white text.

* If you opened ipython directly from Anaconda no need of starting ipython from the terminal, it is the same thing.

2. A Text editor. You can open scripts there. For example *wordpad*. All the scripts are text files that can be ran bit by bit or at once. Today we want to run them bit by bit.



A screenshot of a Microsoft WordPad window titled 'NaiveBayes.py - WordPad'. The window shows a Python script named 'NaiveBayes.py'. The code includes imports for os and sys, defines an Execute function, handles command-line arguments, splits data files, trains a classifier, applies the classifier, and evaluates results. The status bar at the bottom says 'For Help, press F1'.

```
import os
import sys

#####
# Execute
#####

def Execute (cmd):
    print "Exec: " + cmd
    os.system(cmd + " >> run.log")

#####
# Main
#####

# Check the number of command line arguments
if (len(sys.argv) != 2):
    print "Usage: NaiveBayes.py <basename>"
    sys.exit(1)
base = sys.argv[1]

# Split the data file into training and test cases\
Execute("ITSC_Sample -c class -i " + base + ".arff -o trn.arff -t tst.arff -p 0.66")

# Train the classifier
Execute("ITSC_NaiveBayesTrain -c class -i trn.arff -b bayes.txt")

# Apply the classifier
Execute("ITSC_NaiveBayesApply -c class -i trn.arff -b bayes.txt -o res_trn.arff")
Execute("ITSC_NaiveBayesApply -c class -i tst.arff -b bayes.txt -o res_tst.arff")

# Evaluate the results
Execute("ITSC_Accuracy -c class -t res_trn.arff -v trn.arff -o acc_trn.txt")
Execute("ITSC_Accuracy -c class -t res_tst.arff -v tst.arff -o acc_tst.txt")
```

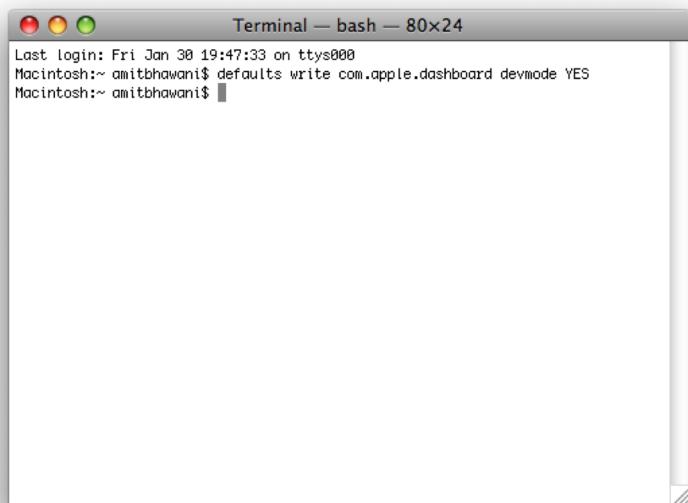


You need:



1. Terminal (in Applications/Utilities)

It will read python code if you type:
ipython



```
Terminal — bash — 80x24
Last login: Fri Jan 30 19:47:33 on ttys000
Macintosh:~ amitbhawani$ defaults write com.apple.dashboard devmode YES
Macintosh:~ amitbhawani$
```

2. A Text editor. You can open scripts there.
For example *TextEdit*. All the scripts are
text files that can be ran bit by bit or at once.
Today we want to run them bit by bit.



```
ubiquitous_C63CFE0-FC5F-4BC0-B628-7CF7680AB20D.mailsignature — Edited
Content-Type: text/html;
charset=us-ascii
Message-Id: <A9B62A79-4B47-431B-B5C1-4DF487B0E499@nyc.rr.com>
Mime-Version: 1.0 (Mac OS X Mail 8.0 \1955.2X)

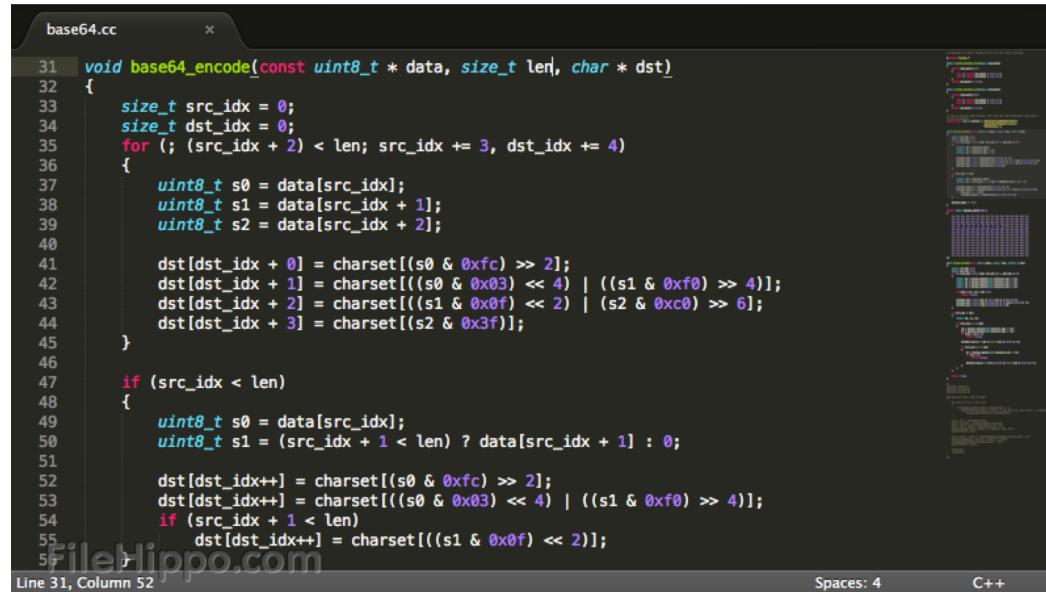
<body style="color: #000; letter-spacing: normal; orphans: auto; text-align: start; text-indent: 0px; text-transform: none; white-space: normal; widows: auto; word-spacing: 0px; -webkit-text-stroke-width: 0px; word-wrap: break-word; -webkit-nbsp-mode: space; -webkit-line-break: after-white-space;">This is a temporary
placeholder. It will be overwritten later...</body>
```

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Extra tips to get started

Sublime text is a great looking and very helpful text editor for windows, OS X or linux

<https://www.sublimetext.com/>



```
base64.cc
```

```
31 void base64_encode_(const uint8_t * data, size_t len, char * dst)
32 {
33     size_t src_idx = 0;
34     size_t dst_idx = 0;
35     for (; (src_idx + 2) < len; src_idx += 3, dst_idx += 4)
36     {
37         uint8_t s0 = data[src_idx];
38         uint8_t s1 = data[src_idx + 1];
39         uint8_t s2 = data[src_idx + 2];
40
41         dst[dst_idx + 0] = charset[(s0 & 0xfc) >> 2];
42         dst[dst_idx + 1] = charset[((s0 & 0x03) << 4) | ((s1 & 0xf0) >> 4)];
43         dst[dst_idx + 2] = charset[((s1 & 0x0f) << 2) | (s2 & 0xc0) >> 6];
44         dst[dst_idx + 3] = charset[(s2 & 0x3f)];
45     }
46
47     if (src_idx < len)
48     {
49         uint8_t s0 = data[src_idx];
50         uint8_t s1 = (src_idx + 1 < len) ? data[src_idx + 1] : 0;
51
52         dst[dst_idx++] = charset[(s0 & 0xfc) >> 2];
53         dst[dst_idx++] = charset[((s0 & 0x03) << 4) | ((s1 & 0xf0) >> 4)];
54         if (src_idx + 1 < len)
55             dst[dst_idx++] = charset[((s1 & 0x0f) << 2)];
56     }
57 }
```

Line 31, Column 52 Spaces: 4 C++
FileHippo.com