

Introdução

Aula 1

Curso: BIG863 - Basic Python Programming for Ecologists

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Supervisor: Prof. Dr. Fernando A. O. Silveira

<https://meet.google.com/zdi-ueoz-nsr>, 08 de março de 2023



Roteiro*

- 1 História dos computadores
- 2 Python
- 3 Algoritmos e programas
- 4 Prática

*Conteúdo adaptado a partir de material desenvolvido pelo Prof. Zanoni Dias e disponível em <https://ic.unicamp.br/mc102>.

História dos computadores

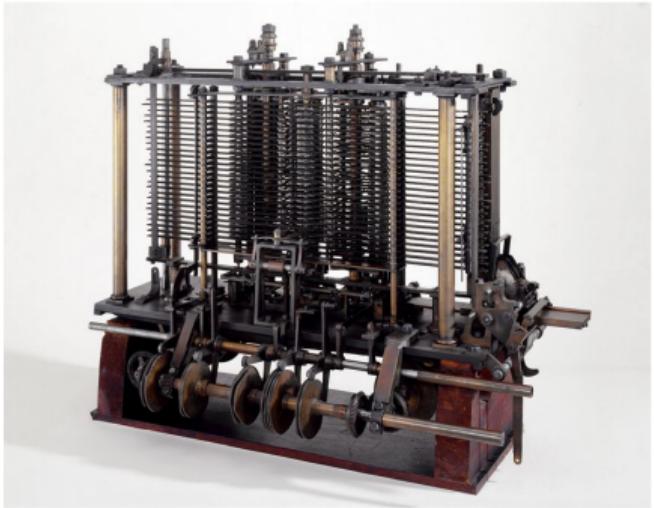


20000 BC
Osso de Ishango

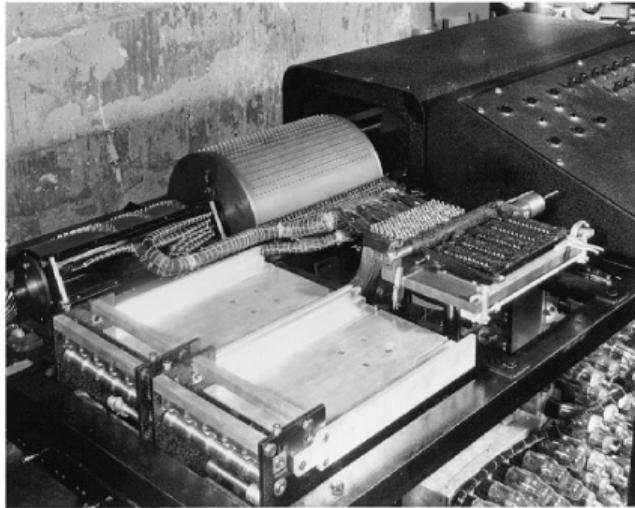


150 BC
Máquina de Anticítera

História dos computadores

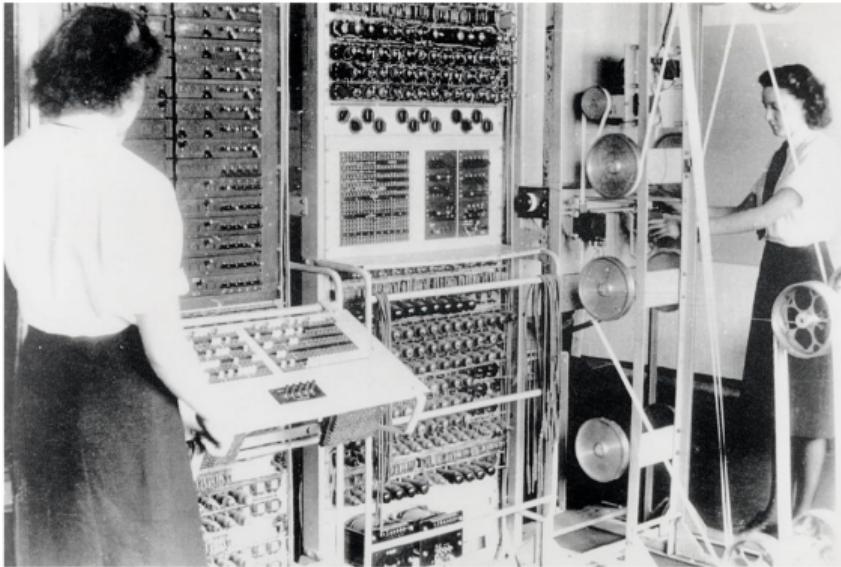


1835 (Babbage & Lovelace)
Máquina Analítica
Computador mecânico

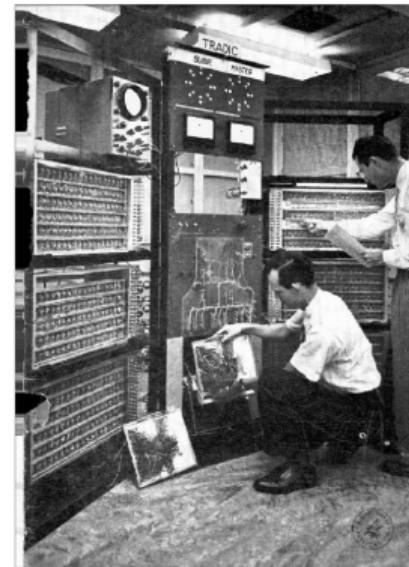


1942
ABC
Computador eletrônico

História dos computadores



1944
Colossus
Válvulas



1955
TRADIC
Transistores

História dos computadores

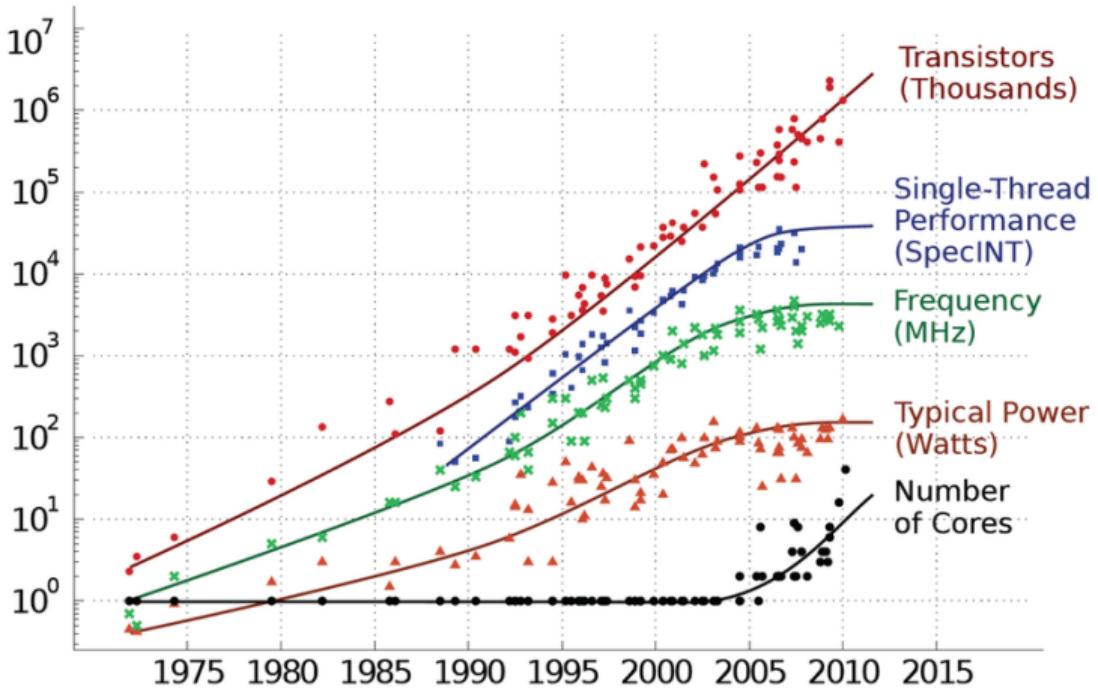


1977
Microcomputador Apple II



1981
Microcomputador IBM 5150

História dos computadores



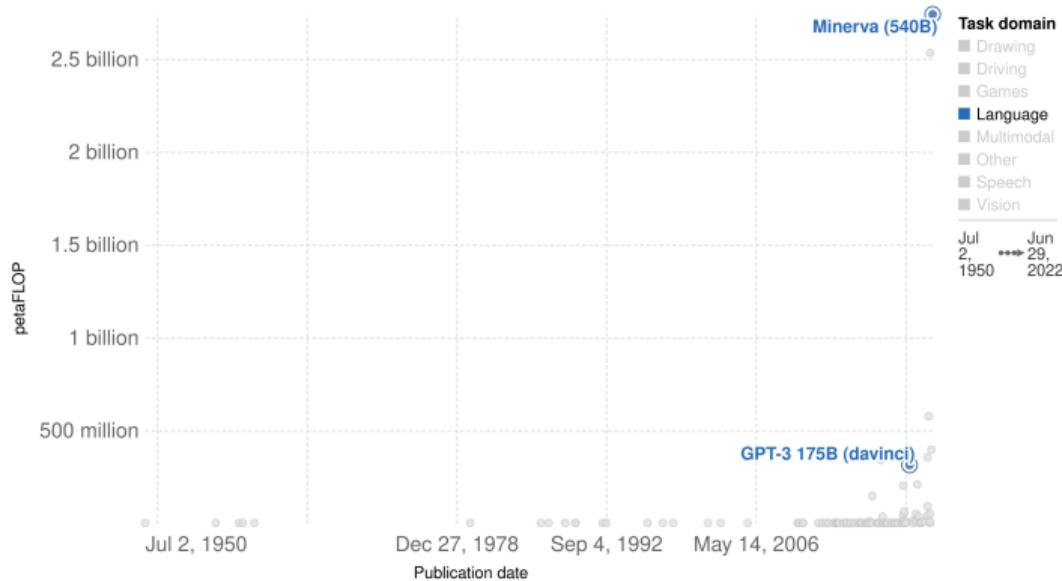
Data collected by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, C. Batten

História dos computadores

Computation used to train notable artificial intelligence systems

Computation is measured in total petaFLOP, which is 10^{15} floating-point operations¹.

Our World
in Data

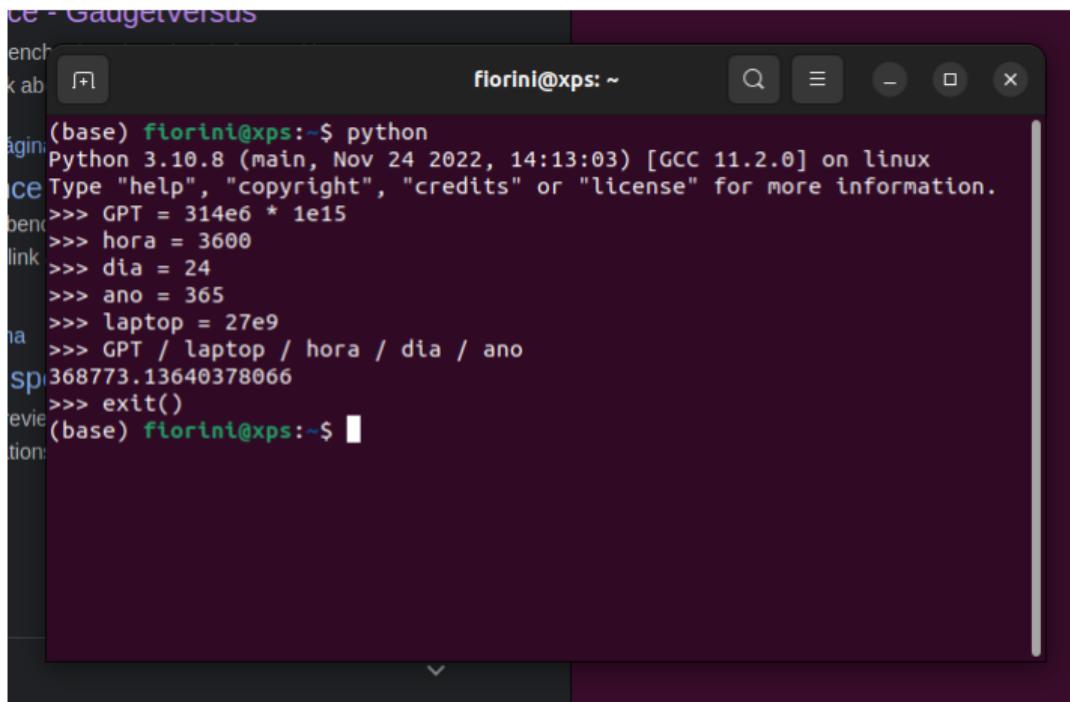


Source: Sevilla et al. (2022)

Note: Computation is estimated based on published results in the AI literature and comes with some uncertainty. The authors expect the estimates to be correct within a factor of 2.

OurWorldInData.org/artificial-intelligence • CC BY

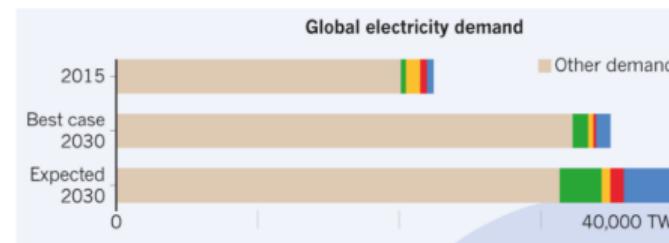
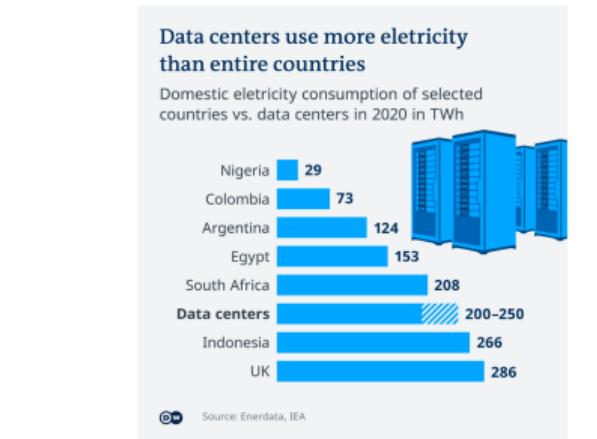
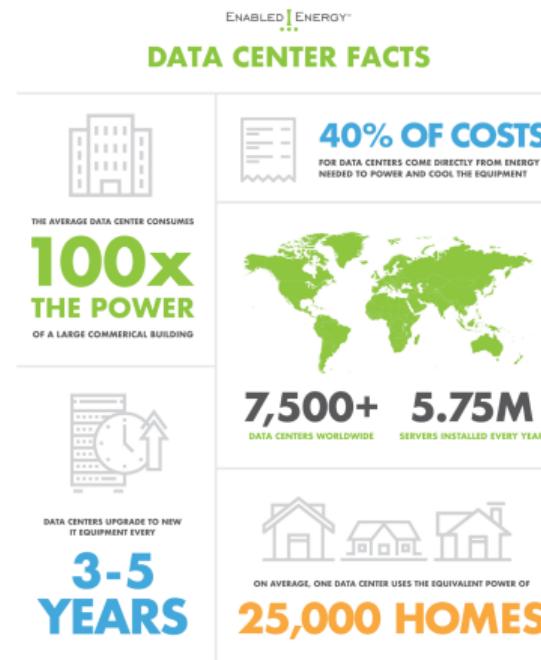
História dos computadores



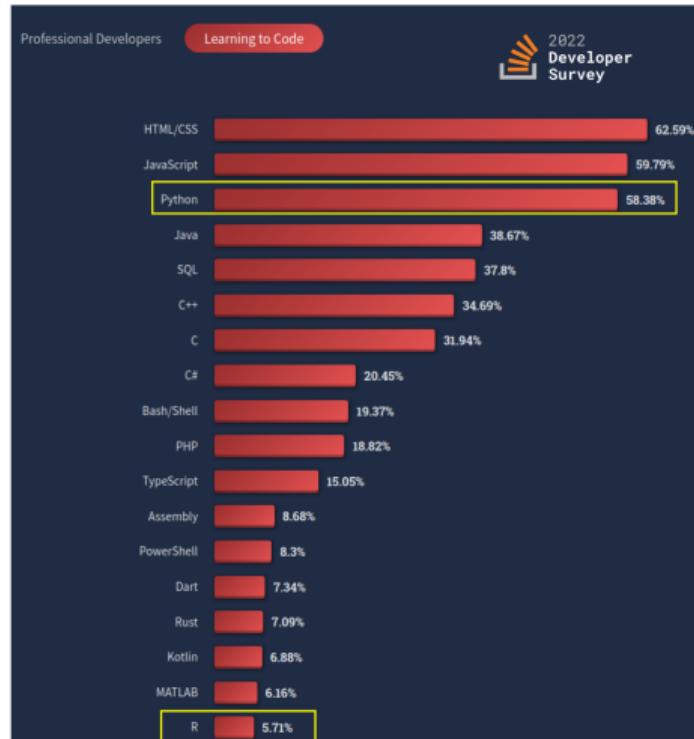
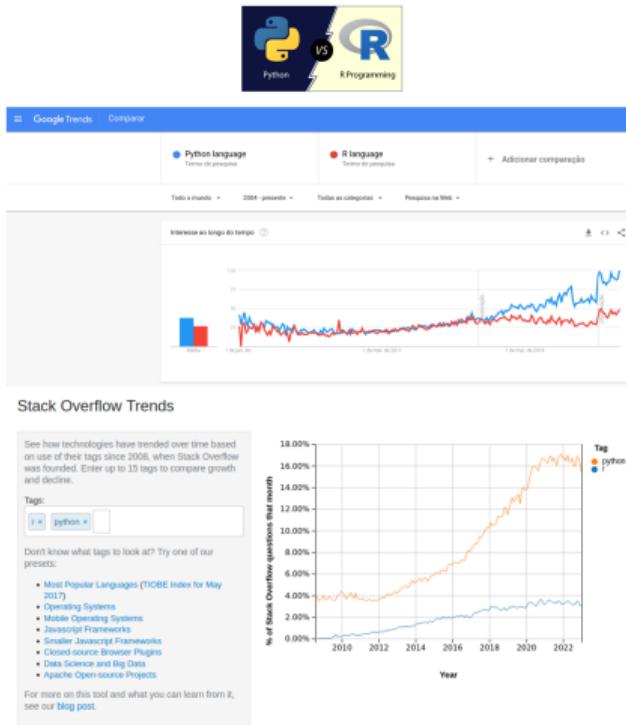
The screenshot shows a terminal window titled "Terminal - Gaugeversus". The user is running a Python session on a Linux system (Ubuntu 22.04 LTS). The user has defined variables for Pi (GPT), hours per day (hora), days per year (dia), and years per century (ano). They then calculate the total number of laptops required by dividing the global power consumption (GPT) by the product of the number of hours in a day, the number of days in a year, and the number of years in a century. Finally, they exit the session.

```
(base) fiorini@xps:~$ python
Python 3.10.8 (main, Nov 24 2022, 14:13:03) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> GPT = 314e6 * 1e15
>>> hora = 3600
>>> dia = 24
>>> ano = 365
>>> laptop = 27e9
>>> GPT / laptop / hora / dia / ano
368773.13640378066
>>> exit()
(base) fiorini@xps:~$
```

História dos computadores



R vs Python



R vs Python em Ecologia

Discussion

Started 2nd Apr, 2019

ResearchGate



Eduardo R. Cunha
Texas A&M University

Can Python become as popular as R in Ecology?

Nowadays, R play an outstanding role in Ecological research. It provides a free to use platform for innumerous statistical analysis and a huge collaborative community of developers and users that share codes and help each other with programming and statistical issues.

For many technical reasons, R is not a computational efficient language and, because R is not much popular among computer scientists, progress in computational efficiency is slow. Differently, Python is very popular among computer scientists, it experiences constant computational efficiency improvements and it is much more efficient than R in many aspects. Also, Python has gained some attention in Ecological research similarly to R.

So here is my question, with the increasing computational requirements of current analyses (e.g., Heavy Monte Carlos resampling procedures), will Python become as popular as R in Ecology?



Somnath Paramanik
Indian Institute of Technology Kharagpur

6th Aug, 2019

As R has been using in Ecology field from the long days, it became popular and already so many functions or packages are developed. So, when researcher are applying any methods who are not programmer or those who are doing only application part, they are getting already developed packages and using it. That is why day by days R is becoming more popular on that field.

But, Python is more flexible and more capable in any field.

So, its depend on your purpose of application. R is little slower when you will use loop, it used to lag but Python is very smooth. And sometimes you will feel that R is more easier than Python because for some operations and application the syntax length is little bit larger. Now, you can run your R code in Python platform, that means Python is more diversified.

Algoritmos

- Algoritmo é uma sequência de passos, precisos e bem definidos, para a realização de uma tarefa.
- Algoritmos podem ser especificados de várias formas, inclusive em português.

Exemplo

Receita culinária.

Programas

- Programa é uma sequência de instruções que descrevem uma tarefa a ser realizada por um computador.
- Programas são dependentes da configuração da máquina e do sistema operacional.
- Nesta disciplina, a linguagem Python será utilizada para codificar os algoritmos em programas.

Primeiro Programa em Python

Um programa em Python é um arquivo texto, contendo declarações e operações da linguagem. Este arquivo também é chamado de código fonte.

```
1 print("Hello World")
```

Você pode salvar este arquivo como hello.py.

Como executar um programa

Para executar um programa a partir do seu código fonte, você deve usar o seguinte comando em um terminal:

```
1 $ python hello.py
2 Hello World
```

Erros de Execução

Erros de execução ocorrem quando o comportamento do programa diverge do esperado.

```
1 print("Hello World")
```

```
1 $ python hello.py
2     File "<stdin >", line 1
3         print("Hello World")
4                         ^
5 SyntaxError: EOL while scanning string literal
```

Um programa mais elaborado

```
1 x = float(input("Qual o valor de x? "))
2 y = float(input("Qual o valor de y? "))
3 if (x == y):
4     print("Os dois valores são iguais: x = y =", x)
5 else:
6     if (x > y):
7         print("O maior valor é x =", x)
8     else:
9         print("O maior valor é y =", y)
```

Replit



<https://replit.com/>