Introductory Computer Science Course by Adopting Many Programming Languages

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Motivation

Literate Programming

 "The main idea is to treat a program as a piece of literature, addressed to human beings rather than to a computer" [Knuth 1984]

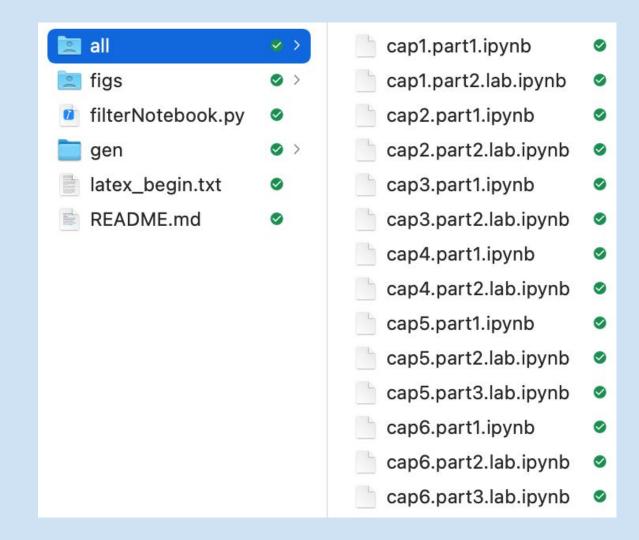
Using Google Colab or Jupyter

- In Didactic Material with Colab in six Language Programming
- Automatically convert notebooks into IPYNB, HTML, LATEX and PDF

Automatic Correction of Codes

MCTest+Moodle+VPL [SBIE-2020]

Method: Didactic Material in Colab



Method: Didactic Material in Colab

Table 2. Code cells before applying the filter. After executing <code>filterNotebook.py</code> the first line containing $\#[type_i]$ # will be removed. Moreover, cells whose first line indicate another PL will not appear in the notebooks created automatically.

code	compile/run	
<pre>#[py]# %%writefile cap0lexem01.py print("Hello, World!")</pre>	<pre>#[py]# !python cap01exem01.py</pre>	
<pre>#[r]# %%writefile cap0lexem01.r cat("Hello, World!")</pre>	#[r]# !Rscript cap0lexem01.r	
<pre>#[js]# %%writefile cap0lexem01.js console.log("Hello, World!")</pre>	<pre>#[js]# !node cap01exem01.js</pre>	
<pre>#[java]# %%writefile cap0lexem01.java class cap0lexem01 { public static void main (String[] args) { System.out.println("Hello, World!"); }}</pre>	<pre>#[java]# !javac cap01exem01.java !java cap01exem01</pre>	
<pre>#[c]# %%writefile cap0lexem01.c #include <stdio.h> int main(void) { printf("Hello, World!"); return 0; }</stdio.h></pre>	<pre>#[c]# !gcc cap01exem01.c -o output !./output</pre>	
<pre>#[cpp]# %%writefile cap0lexem01.cpp #include <iostream> using namespace std; int main(void) { cout << "Hello, World!" << endl; }</iostream></pre>	<pre>#[cpp]# !g++ cap01exem01.cpp -o output !./output</pre>	

Method: Conversions

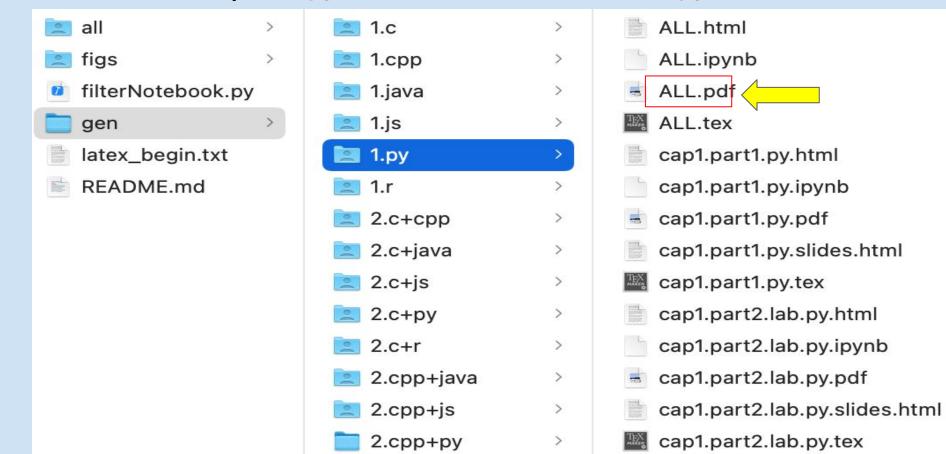
```
python filterNotebook.py file type format

file: can be a file as all/cap1.part1.ipynb or even the whole folder all;
type: can be one of the extensions py, js, java, c, cpp, r or even all (the six extensions). The user can also choose type1+...+typen as explained above, e.g. py+js, but they will come in alphabetical order js+py;
format: html, slides, latex, all or none (if omitted).
```

For example

python filterNotebook.py all all all

Method: Example - python filterNotebook.py all all all



2 Sumário

Processando a Informação: um livro prático de programação independente de linguagem

Rogério Perino de Oliveira Neves

Francisco de Assis Zampirolli

EDUFABC

editora.ufabc.edu.br

Notas de Aulas inspiradas no livro

Utilizando a(s) Linguagem(ns) de Programação:

PY

Exemplos adaptados para Correção Automática no Moodle+VPL

Francisco de Assis Zampirolli

5 de setembro de 2021

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Method: Free Access

- The reader may use this filterNotebook.py and other files to simulate examples like the one just presented here.
- Such files are available at:
 - https://github.com/fzampirolli/filterNotebook and
 - o https://editora.ufabc.edu.br/matematica-e-ciencias-da-computacao/58-processando-a-informacao
- Install:python3, latex, nbconvert, git
- Get filterNotebook:
 - git clone https://github.com/fzampirolli/filterNotebook or
 - https://github.com/fzampirolli/filterNotebook/archive/refs/heads/main.zip

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Method: Automatic Correction of Codes

- Weekly Lists with MCTest+Moodle+VPL
- Individualized through parametric questions
- Paper improvement <u>SBIE-2020</u>
- Lists are generated in PDF and emailed to each student automatically using MCTest (<u>vision.ufabc.edu.br</u>)
- Evaluation material was supplied in six PLs:
 - O Python, Java, JavaScript, C, C++ and R, at the student's choice.

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Experiments and Conclusions

- Applied in an Introductory Computer Science Course
- 223 matriculated students in five classes
- Weekly lectures (5h) synchronous or asynchronous
- Student's Feedback
 - 53 students responded to this questionnaire
- Average pass rate was 90%

Future Work

 Produce and publish more explanatory videos of the whole content of the course in many PLs

 We need to produce more didactic material compatible with the level of difficulty faced by the students during the evaluations

Using our method

- Get filterNotebook:
 - o git clone https://github.com/fzampirolli/filterNotebook or
 - https://github.com/fzampirolli/filterNotebook/archive/refs/heads/main.zip

Thanks!

Questions?

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