Introductory Computer Science Course by Adopting Many Programming Languages

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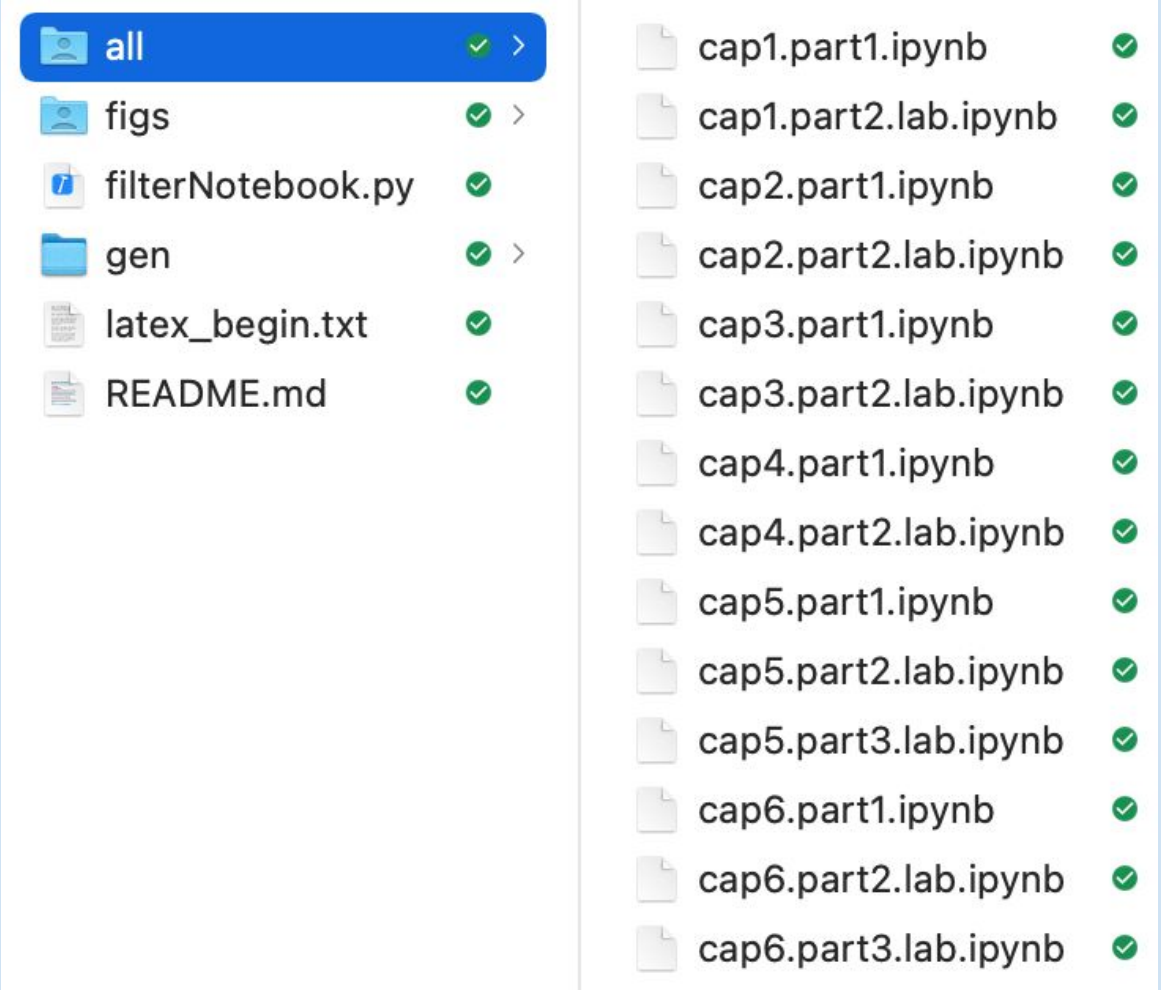
Contents

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 `filterNotebook.py` 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

`#[py]#`
`%%writefile cap01exem01.py`
`print("Hello, World!")`
	`#[py]#`
	`!python cap01exem01.py`

`#[r]#`
`%%writefile cap01exem01.r`
`cat("Hello, World!")`
	`#[r]#`
	`!Rscript cap01exem01.r`

`#[js]#`
`%%writefile cap01exem01.js`
`console.log("Hello, World!")`
	`#[js]#`
	`!node cap01exem01.js`

`#[java]#`
`%%writefile cap01exem01.java`
`class cap01exem01 {`
`  public static void main (String[] args) {`
`  System.out.println("Hello, World!"); }}`
	`#[java]#`
	`!javac cap01exem01.java`
	`!java cap01exem01`

`#[c]#`
`%%writefile cap01exem01.c`
`#include <stdio.h>`
`int main(void) {`
`  printf("Hello, World!"); return 0; }`
	`#[c]#`
	`!gcc cap01exem01.c -o output`
	`!./output`

`#[cpp]#`
`%%writefile cap01exem01.cpp`
`#include <iostream>`
`using namespace std;`
`int main(void) {`
`  cout << "Hello, World!" << endl; }`
	`#[cpp]#`
	`!g++ cap01exem01.cpp -o output`
	`!./output`

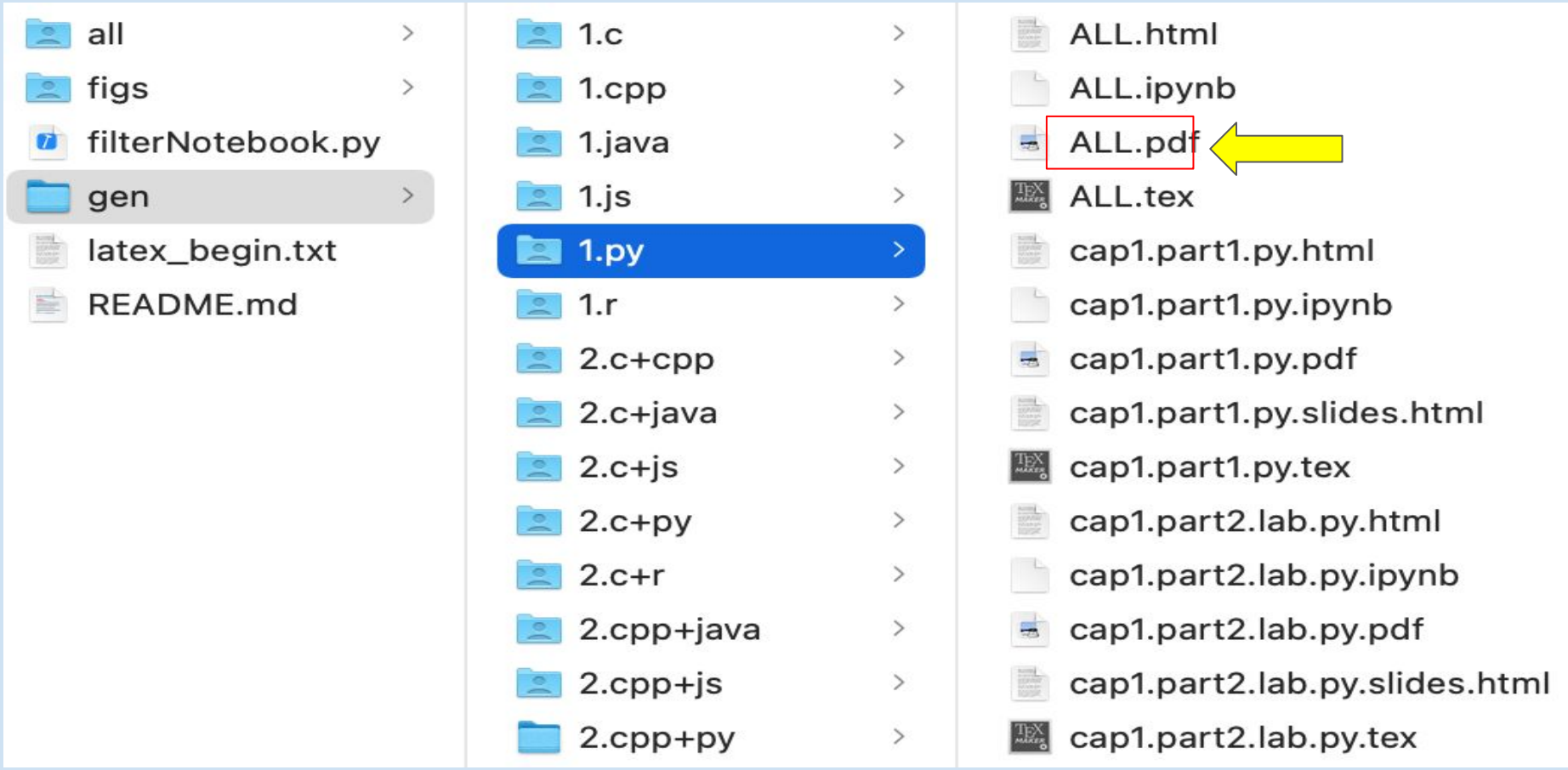
Method: Conversions

```
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 exten-
sions). The user can also choose type_1+···+type_n 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`



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

Sumário

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
  - 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 SBIE-2020
- Lists are generated in PDF and emailed to each student automatically using MCTest (vision.ufabc.edu.br)
- Evaluation material was supplied in six PLs:
  - Python, Java, JavaScript, C, C++ and R, at the student's choice.

Contents

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

Thanks!

Questions?

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