PySimplex Installation Manual

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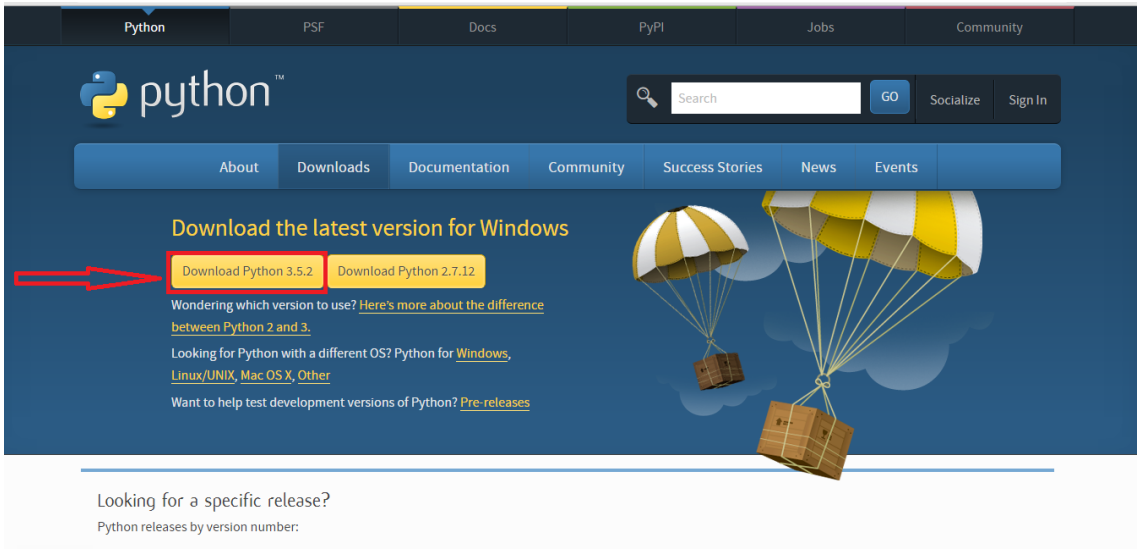
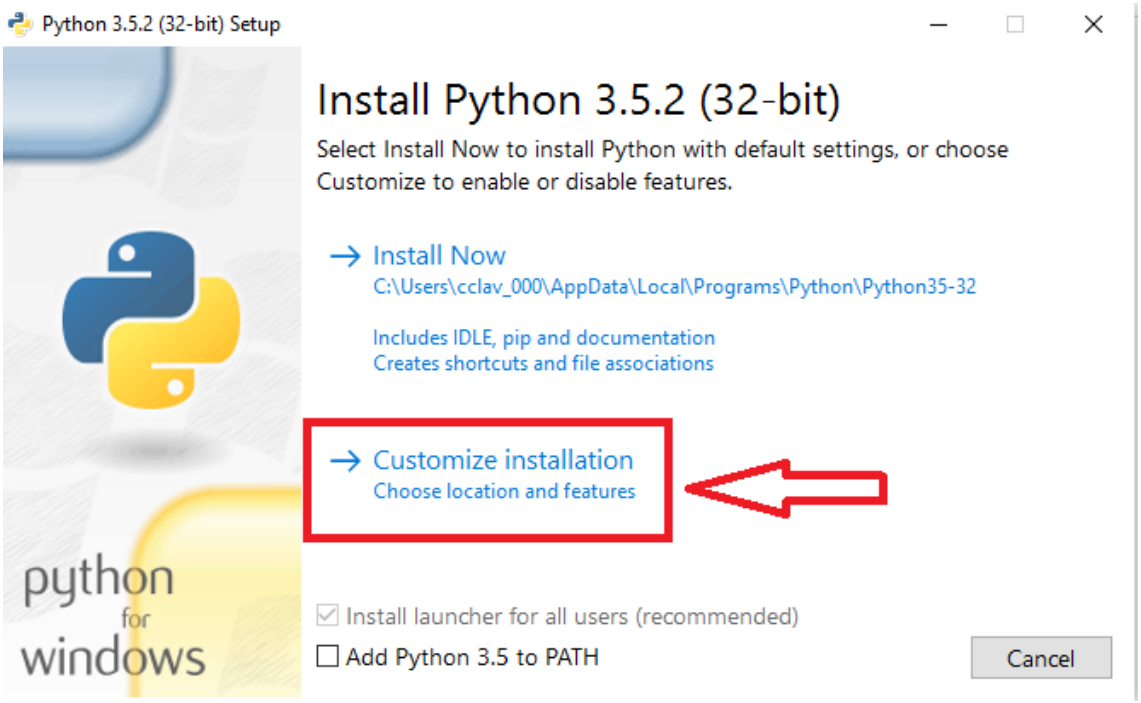
This manual explains every step in order to install PySimplex module which contains math services to solve linear programming problems.

These are the steps to get a full installation of the module (if any part of the following is already installed in your system, it is not necessary to reinstall it):

- **Step 1**: Download and install *Python*. For this, go to https://www.python.org/downloads/ and download the 3.5 version of *Python*.



Then, execute the .exe file downloaded. It is recommended to select "Customize installation" option to be able to indicate the location in where *Python* will be kept. You only have to pulse "Next" until you have to indicate the location. It is recommended the location will be as shorter as it can.



- **Step 2**: Now every necessary package is installed. In all of them, it is followed the same proccess.

  First module is *Numpy*. These are the steps:

  - You have to access to location where *Python* is installed.
  - Then, you have to access to "*Scripts*" directory.
  - Now, you have to execute "*pip install numpy*".

```
C:\Python35-32\Scripts>pip install numpy
```

  In this example and in all manual, you consider *Python* was installed in *C:\Python35-32*, therefore, every time this location appears in the manual, you must change it for the location where *Python* is in your system.

  Now, the rest of modules are installed, using the same instruction. Execute:

  - "pip install matplotlib"

```
C:\Python35-32\Scripts>pip install matplotlib
```

  - "pip install "ipython[notebook]""

```
C:\Python35-32\Scripts>pip install "ipython[notebook]"
```

- **Step 3**: Finally, *PySimplex* is installed. Please, follow these steps:

  - You have to access to location where *PySimplex* is downloaded.
  - Execute "*C:/Python35-32/python setup.py install".*

```
C:\workspacePython\PySimplex>C:\Python35-32\python setup.py install
```

  You have to consider *PySimplex* was kept in *C:/workspacePython/*, therefore, every time this location appears in the manual, you must change it for the location where *PySimplex* is in your system.

Once all is installed, it is not necessary that *SimplexSolver.py* (it is the class which contains the solver to solve problems) is in the same location that *Simplex.py* (it is the library which contains every service to apply *Simplex* method, graphic method and other math services). Likewise, any develop which needs any service of the library or of the rational class (it is the class that implements the rational numbers) might be whatever you want. In order to use them, you only have to include in your develop:

from PySimplex import Simplex

from PySimplex import rational

If you want to know more about the service of *Simplex* library and *SimplexSolver*, there are two manuals which explain carefully all their features. To see them, you have to:

- Access to *Documentation* location of *PySimplex* module.
- Execute "ipython notebook"

```
C:\workspacePython\PySimplex\Documentation>C:\Python35-32\Scripts\ipython notebook
```

Now, in your browser will appear a web page where we can access to manuals:

As a summary, these are the steps to execute *SimplexSolver*:

- Firstly, you must write the problem in a txt file.

  An example of problem is:

$$\begin{gathered} min\, Z = -2x_1 - x_2 + 3x_3 - 5x_4 \\ x_1 + 2x_2 + 2x_3 + 4x_4 \leq 40 \\ -2x_1 + x_2 - x_3 - 2x_4 \geq -8 \\ 4x_1 - 2x_2 + x_3 - x_4 \leq 10 \\ x \geq 0 \end{gathered}$$

  In a file, the format of the problem above would be:

```
min -2 -1 3 -5
1 2 2 4 <= 40
-2 1 -1 -2 >= -8
4 -2 1 -1 <= 10
```

- To solve the problem, the file must be in the same location *SimplexSolver* or you must introduce full location of the file. These are the parameters that you can use in a *SimplexSolver* execution:
  - --input + name of the file: this attribute is necessary in any execution and it is the way to introduce the file with the problem.
  - --dual: this attribute lets us obtain dual solution of the problem.
  - --expl: this attribute lets us show every step of *Simplex* method in a problem.
  - --graphic: this attribute lets us obtain graphic solution of a problem. The problem must have only two variables.
  - --output + name of the file: this attribute lets us keep the solution of the problem (*Simplex* and graphic solution) in a file with the indicated name.

This is an example of execution with all parameters (only the file with the problem is mandatory):

```
C:\workspacePython\PySimplex>C:\Python35-32\python SimplexSolver --input archivo5.txt --dual --expl --graphic --output out.txt
```

In the location *File*, you can file some files with different kind of problems that you can use to execute *SimplexSolver*.