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Task: Exercise 1

Project: Histogram Pythonization

Improve Python Interface for Histograms

Exercise 1 - Write Python code to fill ROOT histogram

After having familiarized with ROOT and ROOT histograms, provide some Python code doing the following, using the less code possible and being most efficient in term of computations (CPU time).

Generate a vector of data (e.g. numpy) normally distributed with mean 10 and standard deviation 3. Fill a ROOT histogram with the obtained data.

```
ROOT session
PS C:\Users\shardul\root\tutorials\pyroot>> ROOT
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| Welcome to ROOT 6.33/01                                     https://root.cern |
| (c) 1995-2024, The ROOT Team; conception: R. Brun, F. Rademakers |
| Built for win64 on Apr 09 2024, 10:34:09 |
| From heads/master@ab82426d10 |
| With MSVC 19.39.33523.0 |
| Try '.help'/'?', '.demo', '.license', '.credits', '.quit'/'.' |
-----
root [0] pyroot
input line 0:2:2: error: use of undeclared identifier 'pyroot'
```

```
File Edit Selection ... Search
test1.py 1
C: > Users > shardul > root > builddir > tutorials > test1.py > ...
1 from ROOT import TH1F, TCanvas
2 import numpy as np
3
4 # Generate data (efficiently using vectorized operations)
5 num_data = 10000
6 data = np.random.normal(loc=10, scale=3, size=num_data)
7 weights = np.random.rand(num_data)
8
9 # Create ROOT histogram (using efficient TH1D constructor)
10 hist = TH1F("my_hist", "Normally Distributed Data", 50, 4, 16) # 50 bins from 4 to 16
11 for i in range(num_data):
12     hist.Fill(data[i], weights[i])
13 # Fill the histogram (efficient vectorized filling)
14 c1=TCanvas()
15 # Optional: Draw the histogram (using efficient TH1D::Draw)
16 hist.Draw()
17 # ROOT.gApplication.Run()
18 input()
```

Normally Distributed Data

