Demo document with computer code

HPL

Apr 7, 2015

1 Data file

Suppose we have some data in a file:

```
# A  B  C  D  E
  -0.5253 -0.9315 -0.3427 -0.1613 -0.8472
  -0.9740 -0.2558 -0.5622 -0.7635 -0.0914
   0.9216 0.7702 -0.4818 0.2155 0.2967
   0.6217 0.6100 -0.3846 -0.7904 0.9166
   0.1006 -0.3162 0.3841 0.5241 -0.6530
   0.6207 -0.9299 0.4837 0.5755 -0.6024
   0.4278 -0.0014 0.8184 0.9382 -0.1449
  -0.9178 0.2612 -0.7532 0.3901 -0.0075
   0.2134 0.6217 0.0545 0.6980 -0.2172
  -0.9529 0.8989 -0.1969 -0.3079 0.0389
   0.8311 0.0145 0.4215 -0.5451 -0.3415
```

2 Program

The following program (which breaks a page) reads the data in the file and performs analysis:

```
#!/usr/bin/env python

import numpy as np

def readfile(filename):
    """Read tabular data from file and return as numpy array."""
    f = open(filename, 'r')
    data = [] # list of rows in table
    for line in f:
        if line.startswith('#'):
            continue # drop comment lines
        numbers = [float(w) for w in line.split()]
        data.append(numbers)
```

```
    return np.array(data)

def analyze(data):
    """Return statistical measures of an array data."""
    return np.mean(data), \
           np.std(data), \
           np.corrcoef(data)

if __name__ == '__main__':
    data = readfile('mydat.txt')
    # Treat each column as a variable
    m, s, c = analyze(data.transpose())
    print """
mean=%f
st.dev=%f
correlation matrix:
%s
""" % (m, s, c)
```

The output becomes

```
Terminal> python fileread.py

mean=-0.006005
st.dev=0.583542
correlation matrix:
[[ 1. 0.0509676 0.52406366 0.20964645 0.1574504 ]
 [ 0.0509676 1. -0.30920845 -0.12129049 0.7611538 ]
 [ 0.52406366 -0.30920845 1. 0.49355806 -0.42263817]
 [ 0.20964645 -0.12129049 0.49355806 1. -0.38286589]
 [ 0.1574504 0.7611538 -0.42263817 -0.38286589 1. ]]
```

3 Fortran example

Here is an example of a Fortran 77 snippet:

```
      subroutine process(a, n, c, r)
C Return array r = c*a
      integer n
      real*8 a(n), c, r(n)
      integer i
      do i = 1,n
         r(i) = c*a(i)
      end do
      return
      end
```