Demo document with computer code

HPL

Feb 1, 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
```

```python
    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
```