IPythonNotebookPolyglot

February 21, 2015

1 Getting started with Python and the IPython notebook

To make R users feel at ease, you can always use R from within the IPython notebook if you install the rpy2 package

```
pip install rpy2
```

```
In [10]: %load_ext rpy2.ipython
```

```
The rpy2.ipython extension is already loaded. To reload it, use:
  %reload_ext rpy2.ipython
```

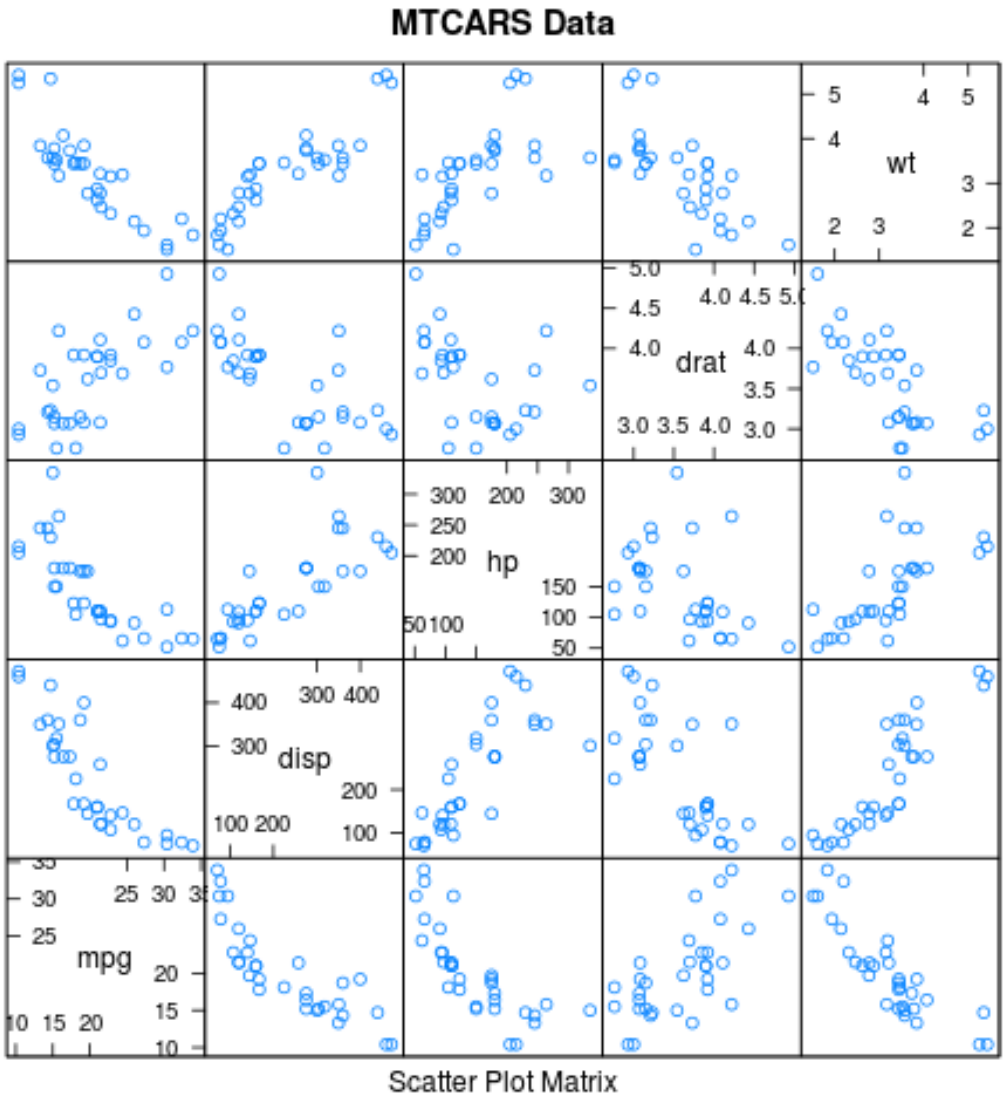
```
In [11]: %matplotlib inline
```

```
In [12]: %%R
         library(lattice)
         attach(mtcars)

         # scatterplot matrix
         splom(mtcars[c(1,3,4,5,6)], main="MTCARS Data")
```

```
The following objects are masked from mtcars (pos = 3):

    am, carb, cyl, disp, drat, gear, hp, mpg, qsec, vs, wt
```



Matlab users are also covered with

```
pip install pymatbridge
```

```
In [13]: import pymatbridge as pymat
         ip = get_ipython()
         pymat.load_ipython_extension(ip)
```

```
In [14]: %%matlab
         xgv = -1.5:0.1:1.5;
         ygv = -3:0.1:3;
         [X,Y] = ndgrid(xgv,ygv);
         V = exp(-(X.^2 + Y.^2));
         surf(X,Y,V)
         title('Gridded Data Set', 'fontweight','b');
```

```
RuntimeError                              Traceback (most recent call last)

    <ipython-input-14-8ef3de53fe4f> in <module>()
----> 1 get_ipython().run_cell_magic(u'matlab', u'', u"\nxgv = -1.5:0.1:1.5;\nygv = -3:0.1:3;\n[X,Y]


    /home/bitnami/anaconda/lib/python2.7/site-packages/IPython/core/interactiveshell.pyc in run_cell
   2160             magic_arg_s = self.var_expand(line, stack_depth)
   2161             with self.builtin_trap:
-> 2162                 result = fn(magic_arg_s, cell)
   2163             return result
   2164


    /home/bitnami/anaconda/lib/python2.7/site-packages/pymatbridge/matlab_magic.pyc in matlab(self,


    /home/bitnami/anaconda/lib/python2.7/site-packages/IPython/core/magic.pyc in <lambda>(f, *a, **
    191     # but it's overkill for just that one bit of state.
    192     def magic_deco(arg):
--> 193         call = lambda f, *a, **k: f(*a, **k)
    194
    195         if callable(arg):


    /home/bitnami/anaconda/lib/python2.7/site-packages/pymatbridge/matlab_magic.pyc in matlab(self,
    215             e_s += "\n-----------------------"
    216             e_s += "\nAre you sure Matlab is started?"
--> 217             raise RuntimeError(e_s)
    218
    219


    RuntimeError: There was an error running the code:

    xgv = -1.5:0.1:1.5;
    ygv = -3:0.1:3;
    [X,Y] = ndgrid(xgv,ygv);
    V = exp(-(X.^2 + Y.^2));
    surf(X,Y,V)
    title('Gridded Data Set', 'fontweight','b');
    -----------------------
    Are you sure Matlab is started?
```

And it is also OK if you prefer Octave. Just type

```
pip install oct2py
```

```
In [15]: %load_ext octavemagic
```

```
In [16]: %%octave
         A = reshape(1:4,2,2)';
         b = [36; 88];
         A\b
```

```
[L,U,P] = lu(A)
[Q,R] = qr(A)
[V,D] = eig(A)
```

```
---------------------------------------------------------------------------
IndexError                                Traceback (most recent call last)

    <ipython-input-16-290bbde86e1b> in <module>()
----> 1 get_ipython().run_cell_magic(u'octave', u'', u"\nA = reshape(1:4,2,2)'; \nb = [36; 88];\nA\\

    /home/bitnami/anaconda/lib/python2.7/site-packages/IPython/core/interactiveshell.pyc in run_cell
   2160             magic_arg_s = self.var_expand(line, stack_depth)
   2161             with self.builtin_trap:
-> 2162                 result = fn(magic_arg_s, cell)
   2163             return result
   2164

    /home/bitnami/anaconda/lib/python2.7/site-packages/IPython/extensions/octavemagic.pyc in octave

    /home/bitnami/anaconda/lib/python2.7/site-packages/IPython/core/magic.pyc in <lambda>(f, *a, **
    191     # but it's overkill for just that one bit of state.
    192     def magic_deco(arg):
--> 193         call = lambda f, *a, **k: f(*a, **k)
    194
    195         if callable(arg):

    /home/bitnami/anaconda/lib/python2.7/site-packages/IPython/extensions/octavemagic.pyc in octave
    327         except (oct2py.Oct2PyError) as exception:
    328             msg = exception.message
--> 329             msg = msg.split('# ___<end_pre_call>___ #')[1]
    330             msg = msg.split('# ___<start_post_call>___ #')[0]
    331             raise OctaveMagicError('Octave could not complete execution.  '

    IndexError: list index out of range
```

1.0.1 We will redo these examples in Python

In [17]:
```
import pandas as pd
import numpy as np
import statsmodels.api as sm
from pandas.tools.plotting import scatter_matrix
```

In []:
```
# First we will load the mtcars dataset and do a scatterplot matrix

mtcars = sm.datasets.get_rdataset('mtcars')
df = pd.DataFrame(mtcars.data)
scatter_matrix(df[[0,2,3,4,5]], alpha=0.3, figsize=(8, 8), diagonal='kde', marker='o');
```

In []:
```
# Next we will do the 3D mesh

xgv = np.arange(-1.5, 1.5, 0.1)
ygv = np.arange(-3, 3, 0.1)
[X,Y] = np.meshgrid(xgv, ygv)
V = np.exp(-(X**2 + Y**2))

import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
fig = plt.figure(figsize=(10,6))
ax = fig.add_subplot(111, projection='3d')
ax.plot_surface(X, Y, V, rstride=1, cstride=1, cmap=plt.cm.jet, linewidth=0.25)
plt.title('Gridded Data Set');
```

In []:
```
# And finally, the matrix manipulations

import scipy

A = np.reshape(np.arange(1, 5), (2,2))
b = np.array([36, 88])
ans = scipy.linalg.solve(A, b)
P, L, U = scipy.linalg.lu(A)
Q, R = scipy.linalg.qr(A)
D, V = scipy.linalg.eig(A)
print 'ans =\n', ans, '\n'
print 'L =\n', L, '\n'
print "U =\n", U, '\n'
print "P = \nPermutation Matrix\n", P, '\n'
print 'Q =\n', Q, '\n'
print "R =\n", R, '\n'
print 'V =\n', V, '\n'
print "D =\nDiagonal matrix\n", np.diag(abs(D)), '\n'
```

1.1 Julia

In []: