NPRs Python Notes

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Abstract

The is my (NPR's) set of `matplotlib` notes.

You will be able to find the latest version of these notes and indeed the .tex file at:
`https://github.com/d80b2t/Research_Notes`.

1 Avoid-overlapping-in-scatterplot-with-2d-density

From:: Python Graph Gallery.

```
# Libraries
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import kde

# Create data: 200 points
data = np.random.multivariate_normal([0, 0], [[1, 0.5], [0.5, 3]],
    200)
x, y = data.T

# Create a figure with 6 plot areas
fig, axes = plt.subplots(ncols=6, nrows=1, figsize=(21, 5))

# Everything sarts with a Scatterplot
axes[0].set_title('Scatterplot')
axes[0].plot(x, y, 'ko')
# As you can see there is a lot of overplottin here!

# Thus we can cut the plotting window in several hexbins
nbins = 20
axes[1].set_title('Hexbin')
axes[1].hexbin(x, y, gridsize=nbins, cmap=plt.cm.BuGn_r)

# 2D Histogram
axes[2].set_title('2D Histogram')
axes[2].hist2d(x, y, bins=nbins, cmap=plt.cm.BuGn_r)
```

```
# Evaluate a gaussian kde on a regular grid of nbins x nbins over
    data extents
k = kde.gaussian_kde(data.T)
xi, yi = np.mgrid[x.min():x.max():nbins*1j,
    y.min():y.max():nbins*1j]
zi = k(np.vstack([xi.flatten(), yi.flatten()]))

# plot a density
axes[3].set_title('Calculate Gaussian KDE')
axes[3].pcolormesh(xi, yi, zi.reshape(xi.shape), cmap=plt.cm.BuGn_r)

# add shading
axes[4].set_title('2D Density with shading')
axes[4].pcolormesh(xi, yi, zi.reshape(xi.shape), shading='gouraud',
    cmap=plt.cm.BuGn_r)

# contour
axes[5].set_title('Contour')
axes[5].pcolormesh(xi, yi, zi.reshape(xi.shape), shading='gouraud',
    cmap=plt.cm.BuGn_r)
axes[5].contour(xi, yi, zi.reshape(xi.shape) )
```