Seaborn pairplot

Macrodata

In [12]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

In [13]:

```
macro = pd.read_csv('data/macrodata.csv')
macro.head()
```

Out[13]:

	year	quarter	realgdp	realcons	realinv	realgovt	realdpi	cpi	
0	1959.0	1.0	2710.349	1707.4	286.898	470.045	1886.9	28.98	1
1	1959.0	2.0	2778.801	1733.7	310.859	481.301	1919.7	29.15	1
2	1959.0	3.0	2775.488	1751.8	289.226	491.260	1916.4	29.35	1
3	1959.0	4.0	2785.204	1753.7	299.356	484.052	1931.3	29.37	1
4	1960.0	1.0	2847.699	1770.5	331.722	462.199	1955.5	29.54	1

cpi - a Consumer Price Index, measures changes in the price level of market basket of consumer goods and services purchased by households.

m1 - the money supply is the entire stock of currency and other liquid instruments circulating in a country's economy as of a particular time. The money supply can include cash, coins and balances held in checking and savings accounts.

tbilrate. A Treasury Bill is a short-term debt obligation backed by the Treasury Department of the U.S. government with a maturity of less than one year. Treasury yield is the return on investment, expressed as a percentage, on the U.S. government's debt obligations.

unemp - unemployment rate for the nation is the number of unemployed as a percentage of the labor force (the sum of the employed and unemployed).

In [14]:

```
data = macro[['cpi', 'm1', 'tbilrate', 'unemp']]
data.head()
```

Out[14]:

	cpi	m1	tbilrate	unemp
0	28.98	139.7	2.82	5.8
1	29.15	141.7	3.08	5.1
2	29.35	140.5	3.82	5.3
3	29.37	140.0	4.33	5.6
4	29.54	139.6	3.50	5.2

numpy.log() is the natural logarithm is logarithm in base e, element-wise.

In [15]:

```
trans_data = np.log(data).diff().dropna()
trans_data[-5:]
```

Out[15]:

	cpi	m1	tbilrate	unemp
198	-0.007904	0.045361	-0.396881	0.105361
199	-0.021979	0.066753	-2.277267	0.139762
200	0.002340	0.010286	0.606136	0.160343
201	0.008419	0.037461	-0.200671	0.127339
202	0.008894	0.012202	-0.405465	0.042560

Pairplot

pairplot is a special kind of FacetGrid.

Pairwise relationships between all variables in the input DataFrame will be visualized as scatter plots.

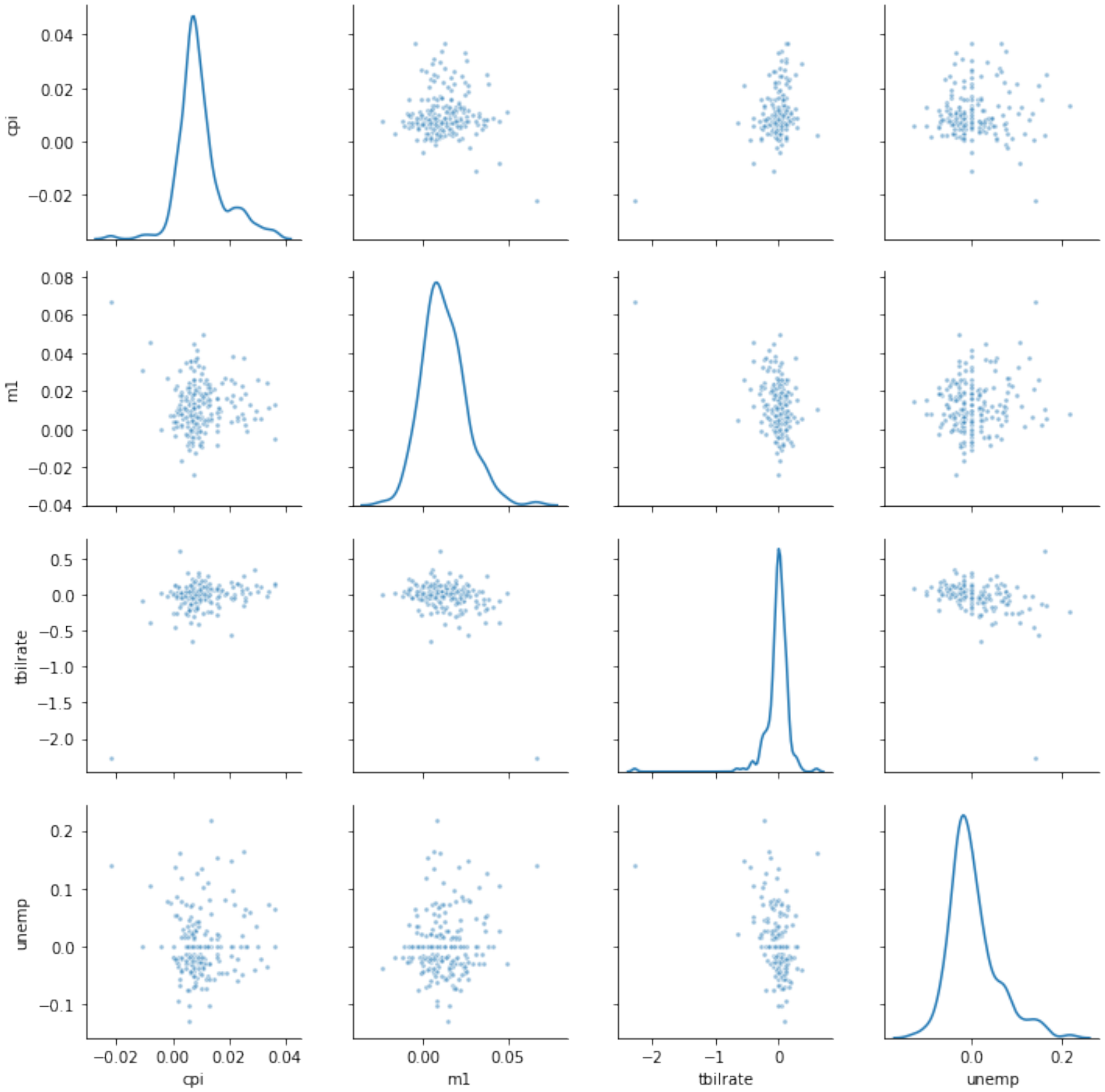
By default, a series of histograms will be displayed along the diagonal axes to show the distribution of the variable in that column/

In [16]:

```
sns.pairplot(trans_data,
             diag_kind='kde',
             plot_kws={'alpha': 0.5, 's': 10})
```

Out[16]:

```
<seaborn.axisgrid.PairGrid at 0x1a2468c710>
```



Learn more:
[http://seaborn.pydata.org/generated/seaborn.pairplot.html?highlight=plot (http://seaborn.pydata.org/generated/seaborn.pairplot.html?highlight=plot)](http://seaborn.pydata.org/generated/seaborn.pairplot.html?highlight=plot)

Quandl pairplot

End-of-Day (EOD) stock data

This example is from the book 'Numerical Computing with Python' by Aldrin Yim; Pratap Dangeti; Claire Chung; Allen Yu. Published by Packt Publishing, 2018.

In [17]:

```
from urllib.request import urlopen
import json
```

In [18]:

```
def get_quandl_dataset(api_key, code, start_date, end_date):
    """Obtain and parse a quandl dataset in Pandas DataFrame format

    Quandl returns dataset in JSON format, where data is stored as
    list of lists in response['dataset']['data'], and column header
    stored in response['dataset']['column_names'].

    Args:
        api_key: Quandl API key
        code: Quandl dataset code

    Returns:
        df: Pandas DataFrame of a Quandl dataset

    """
    base_url = "https://www.quandl.com/api/v3/datasets/"
    url_suffix = ".json?api_key="
    date = "&start_date={}&end_date={}".format(start_date, end_date

    # Fetch the JSON response
    u = urlopen(base_url + code + url_suffix + api_key + date)
    response = json.loads(u.read().decode('utf-8'))

    # Format the response as Pandas Dataframe
    df = pd.DataFrame(response['dataset']['data'], columns=response
    ['column_names'])

    return df
    return df

# Input your own API key here
api_key = ""

# Quandl code for six US companies: Apple, Procter & Gamble, Johnso
codes = ["EOD/AAPL", "EOD/PG", "EOD/JNJ", "EOD/XOM", "EOD/IBM", "EO
start_date = "2017-01-01"
end_date = "2017-06-30"

dfs = []
# Get the DataFrame that contains the EOD data for each company
for code in codes:
    df = get_quandl_dataset(api_key, code, start_date, end_date)
    df["Company"] = code[4:]
    dfs.append(df)

# Concatenate all dataframes into a single one
stock_df = pd.concat(dfs)

# Sort by ascending order of Company then Date
stock_df = stock_df.sort_values(["Company","Date"])

# Calculate percentage change versus the previous close
stock_df["Close_change"] = stock_df["Close"].pct_change()
# Since the DataFrame contain multiple companies' stock data,
# the first record in the "Close_change" should be changed to
# NaN in order to prevent referencing the price of incorrect compan
stock_df.loc[stock_df["Date"]=="2017-01-03", "Close_change"] = np.N
stock_df.head()
```

Out[18]:

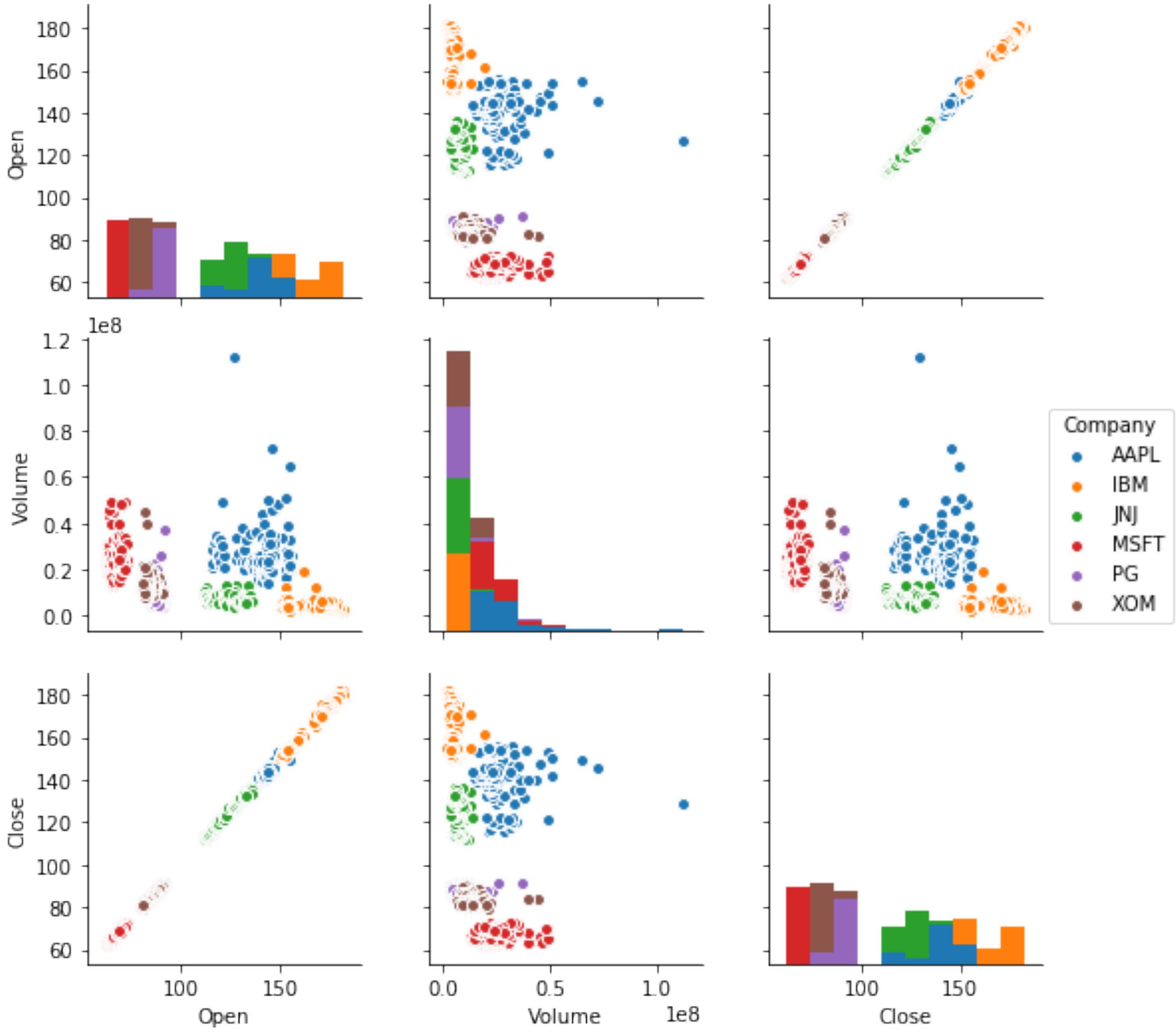
	Date	Open	High	Low	Close	Volume	Dividend	Split
124	2017-01-03	115.80	116.3300	114.76	116.15	28781865.0	0.0	1.0
123	2017-01-04	115.85	116.5100	115.75	116.02	21118116.0	0.0	1.0
122	2017-01-05	115.92	116.8642	115.81	116.61	22193587.0	0.0	1.0
121	2017-01-06	116.78	118.1600	116.47	117.91	31751900.0	0.0	1.0
	2017-							

```
120   01-09   117.95   119.4300   117.94   118.99   33561948.0          0.0     1.0
```

In [19]:

```
# Show a pairplot of three selected variables (vars=["Open", "Volum
g = sns.pairplot(stock_df,
                 hue="Company",
                 vars=["Open", "Volume", "Close"])

plt.show()
```



1e8 is standard scientific notion, here it indicates an overall scale factor for the y-axis. That is, if there's a 2 on the y-axis and a 1e8 at the top, the value at 2 actually indicates 2*1e8 = 2e8 = 2 * 10^8 = 200,000,000.

Increase aspect ratio - a proportional relationship between an image's width and height.

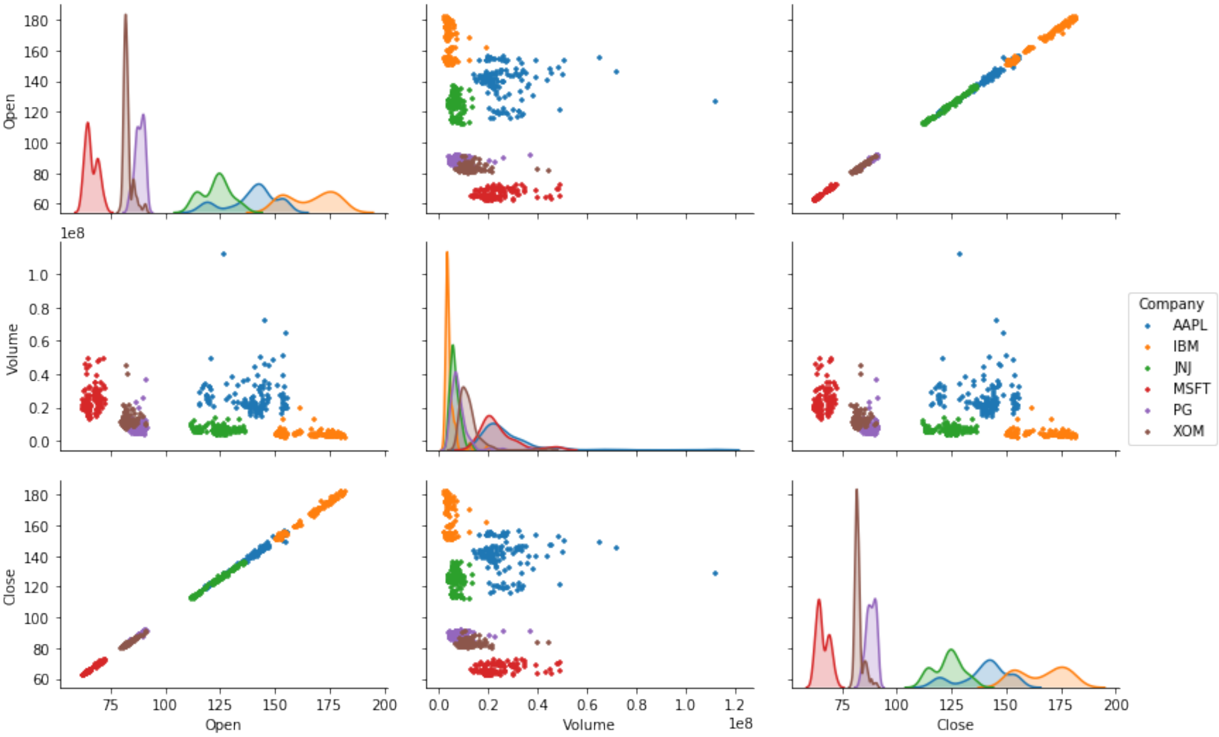
Adjust the aesthetics of the plots using keyword arguments:

In [20]:

```
sns.pairplot(stock_df,
             hue="Company",
             aspect=1.5,
             diag_kind="kde",
             diag_kws={'shade': True},
             plot_kws={'s': 15, 'marker': "+"},
             vars=["Open", "Volume", "Close"])
```

Out[20]:

```
<seaborn.axisgrid.PairGrid at 0x1a25a69cf8>
```



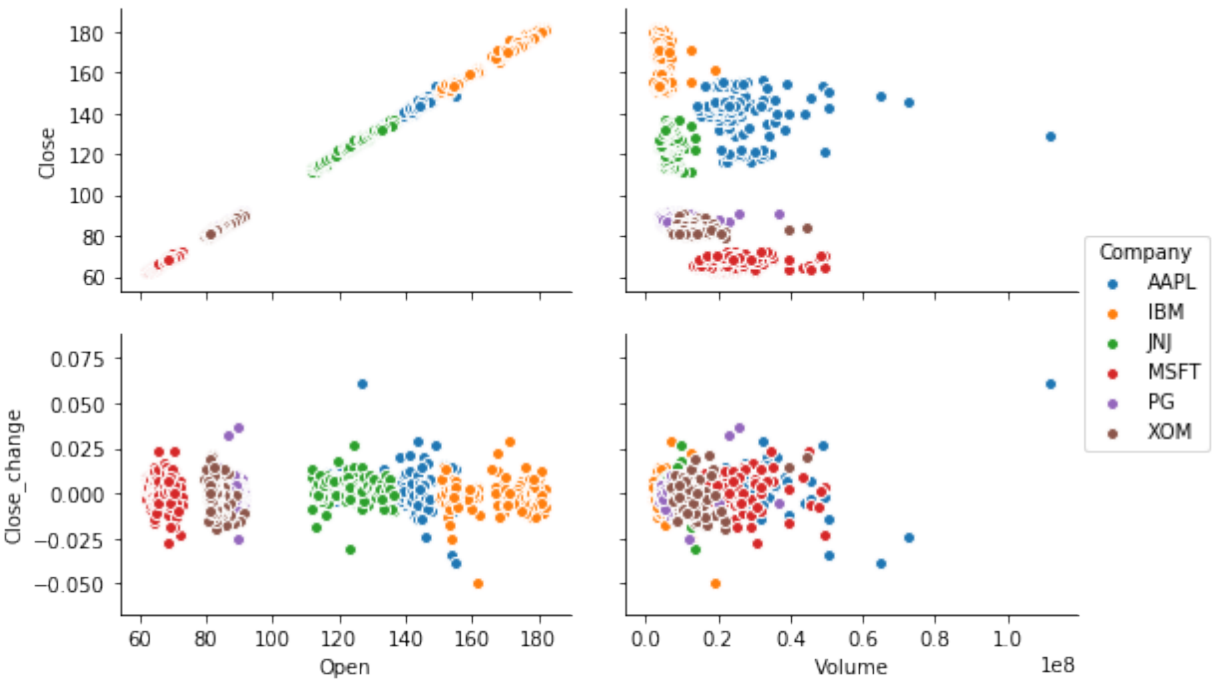
Manually define the comparisons that matter to us instead of an all-versus-all comparison by setting the x_vars and y_vars parameters.

```
In [21]:
```

```python
# Manually defining the comparisons of interest
sns.pairplot(stock_df,
             hue="Company",
             aspect=1.5,
             x_vars=["Open", "Volume"],
             y_vars=["Close", "Close_change"])
```

```
Out[21]:

<seaborn.axisgrid.PairGrid at 0x1a2325e198>
```



Seaborn pairplot

Macrodata

```
In [12]:
```