ch5

2019년 7월 20일

1 응용 작업 - CSV 파일에서 카테고리별 통계치 계산하기

```
In [3]: import csv
        from datetime import date, datetime

        def date_diff(date1, date2):
            try:
                diff = str(datetime.strptime(date1, '%m/%d/%Y') - \
                           datetime.strptime(date2, '%m/%d/%Y')).split()[0]
            except:
                diff = 0
            if diff == '0:00:00':
                diff = 0
            return diff

        input_file = 'customer_category_history.csv'
        output_file = 'customer_category_history_summary.csv'

        packages = {}
        previous_name = 'N/A'
        previous_package = 'N/A'
        previous_package_date = 'N/A'
        first_row = True
        today = date.today().strftime('%m/%d/%Y')

        with open(input_file, 'r', newline='') as input_csv_file:
            filereader = csv.reader(input_csv_file)
```

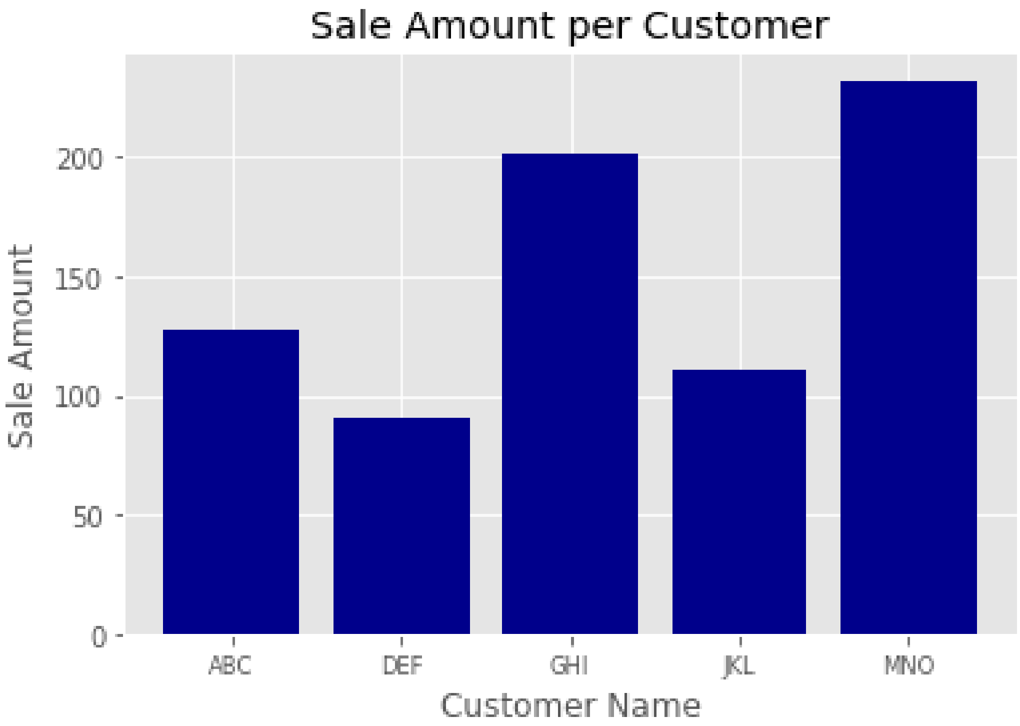
```
    header = next(filereader)
    for row in filereader:
        current_name = row[0]
        current_package = row[1]
        current_package_date = row[3]
        if current_name not in packages:
            packages[current_name] = {}
        if current_package not in packages[current_name]:
            packages[current_name][current_package] = 0
        if current_name != previous_name:
            if first_row:
                first_row = False
            else:
                diff = date_diff(today, previous_package_date)
                if previous_package not in packages[previous_name]:
                    packages[previous_name][previous_package] = int(diff)
                else:
                    packages[previous_name][previous_package] += int(diff)
        else:
            diff = date_diff(current_package_date, previous_package_date)
            packages[previous_name][previous_package] += int(diff)
        previous_name = current_name
        previous_package = current_package
        previous_package_date = current_package_date

header = ['Customer Name', 'Category', 'Total Time (in days)']
with open(output_file, 'w', newline='') as output_csv_file:
    filewriter = csv.writer(output_csv_file)
    filewriter.writerow(header)
    for customer_name, customer_name_value in packages.items():
        for package_category, package_category_value in packages[customer_name].items(
            row_of_output = []
            print(customer_name, package_category, package_category_value)
            row_of_output.append(customer_name)
            row_of_output.append(package_category)
            row_of_output.append(package_category_value)
```

```
                    filewriter.writerow(row_of_output)
```

```
John Smith Bronze 70
John Smith Silver 39
John Smith Gold 1896
Mary Yu Silver 72
Mary Yu Gold 1921
Wayne Thompson Bronze 167
Wayne Thompson Silver 1847
Bruce Johnson Bronze 77
Bruce Johnson Silver 60
Bruce Johnson Gold 1850
Annie Lee Bronze 26
Annie Lee Silver 44
Annie Lee Gold 1882
Priya Patel Silver 99
Priya Patel Gold 54
```

2 데이터 시각화 - 막대그래프

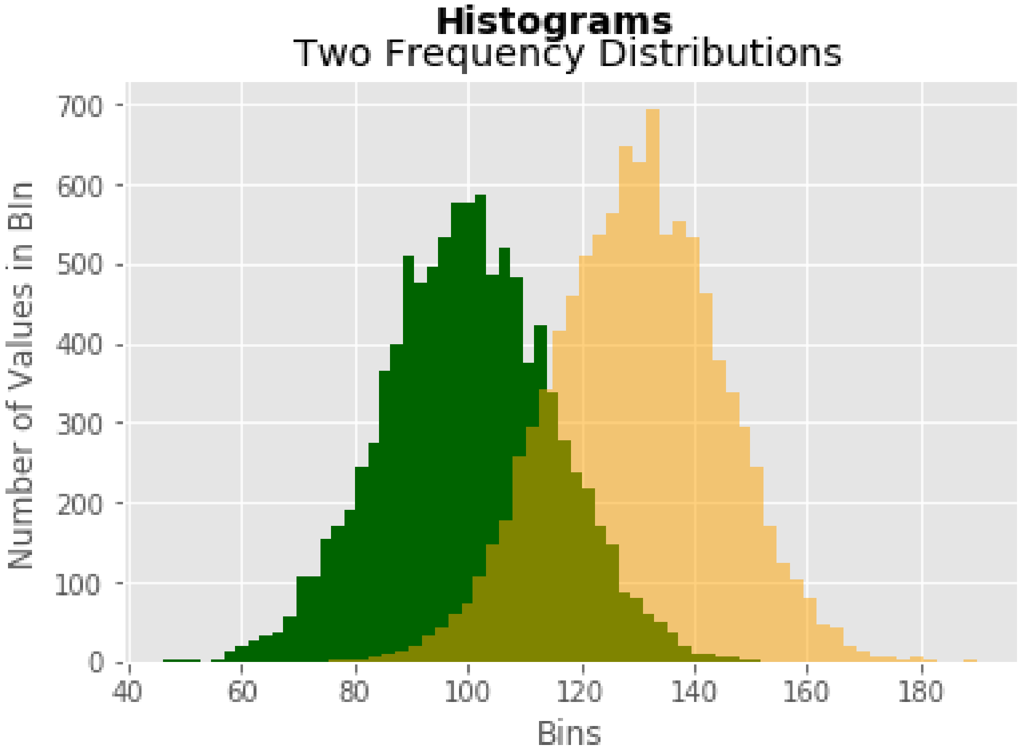
```
In [4]: import matplotlib.pyplot as plt
        %matplotlib inline
        plt.style.use('ggplot')
        customers = ['ABC', 'DEF', 'GHI', 'JKL', 'MNO']
        customers_index = range(len(customers))
        sale_amounts = [127, 90, 201, 111, 232]
        fig = plt.figure()
        ax1 = fig.add_subplot(1,1,1) # ax1이 유일한 하위 그래프 (1행, 1열, 1개)
        ax1.bar(customers_index, sale_amounts, align='center', color='darkblue')
        ax1.xaxis.set_ticks_position('bottom')
        ax1.yaxis.set_ticks_position('left')
        plt.xticks(customers_index, customers, rotation=0, fontsize='small')
        plt.xlabel('Customer Name')
        plt.ylabel('Sale Amount')
        plt.title('Sale Amount per Customer')
        plt.savefig('bar_plot.png', dpi=400, bbox_inches='tight')
        plt.show()
```



3 데이터 시각화 - 히스토그램

```
In [6]: import numpy as np
        import matplotlib.pyplot as plt
        %matplotlib inline
        plt.style.use('ggplot')
        mu1, mu2, sigma = 100, 130, 15 # 평균/표준편차 설정
        x1 = mu1 + sigma*np.random.randn(10000) # 난수 생성
        x2 = mu2 + sigma*np.random.randn(10000) # 난수 생성
        fig = plt.figure()
        ax1 = fig.add_subplot(1,1,1)
        n, bins, patches = ax1.hist(x1, bins=50, density=False, color='darkgreen')
        # 수치 구간 50개, 확률밀도가 아닌 빈도 표시
        n, bins, patches = ax1.hist(x2, bins=50, density=False, color='orange', alpha=0.5)
```

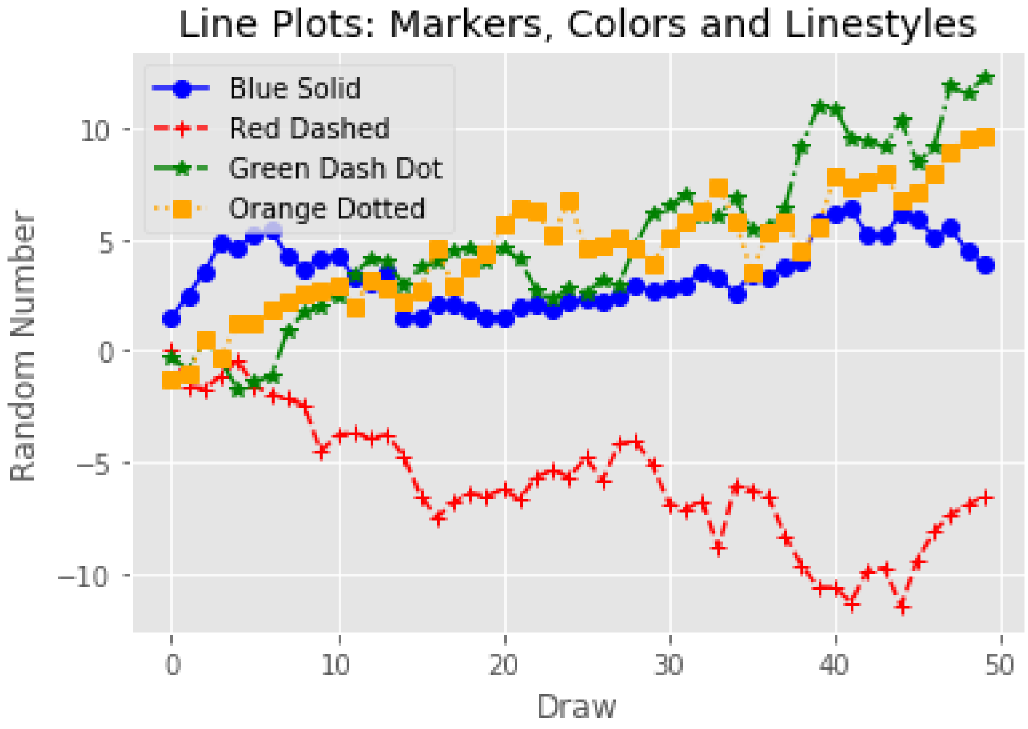
```
# 수치 구간 50개, 확률밀도가 아닌 빈도 표시
ax1.xaxis.set_ticks_position('bottom')
ax1.yaxis.set_ticks_position('left')
plt.xlabel('Bins')
plt.ylabel('Number of Values in BIn')
fig.suptitle('Histograms', fontsize=14, fontweight='bold')
ax1.set_title('Two Frequency Distributions')
plt.savefig('histogram.png', dpi=400, bbox_inches='tight')
plt.show()
```



4 데이터 시각화 - 선 그래프

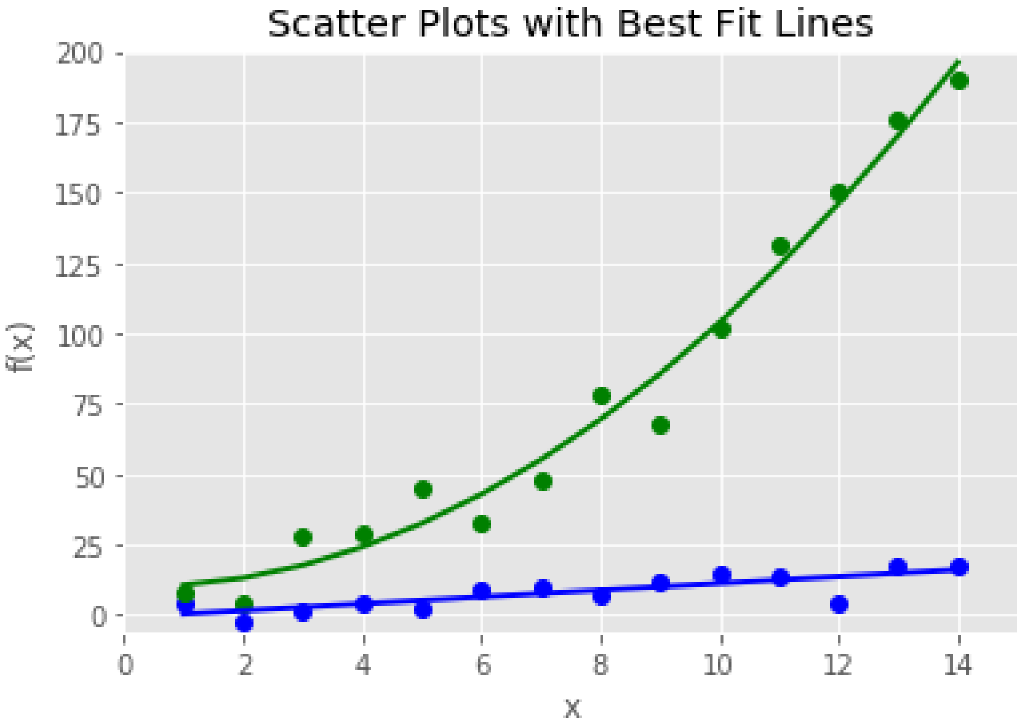
```
In [9]: from numpy.random import randn
        import matplotlib.pyplot as plt
        %matplotlib inline
        plt.style.use('ggplot')
```

```
plot_data1 = randn(50).cumsum()
plot_data2 = randn(50).cumsum()
plot_data3 = randn(50).cumsum()
plot_data4 = randn(50).cumsum()
fig = plt.figure()
ax1 = fig.add_subplot(1,1,1)
ax1.plot(plot_data1, marker=r'o', color=u'blue', linestyle='-', label='Blue Solid')
ax1.plot(plot_data2, marker=r'+', color=u'red', linestyle='--', label='Red Dashed')
ax1.plot(plot_data3, marker=r'*', color=u'green', linestyle='-.', label='Green Dash Do
ax1.plot(plot_data4, marker=r's', color=u'orange', linestyle=':', label='Orange Dotted
ax1.xaxis.set_ticks_position('bottom')
ax1.yaxis.set_ticks_position('left')
ax1.set_title('Line Plots: Markers, Colors and Linestyles')
plt.xlabel('Draw')
plt.ylabel('Random Number')
plt.legend(loc='best')
plt.savefig('line_plot.png', dpi=400, bbox_inches='tight')
plt.show()
```



5 데이터 시각화 - 산점도

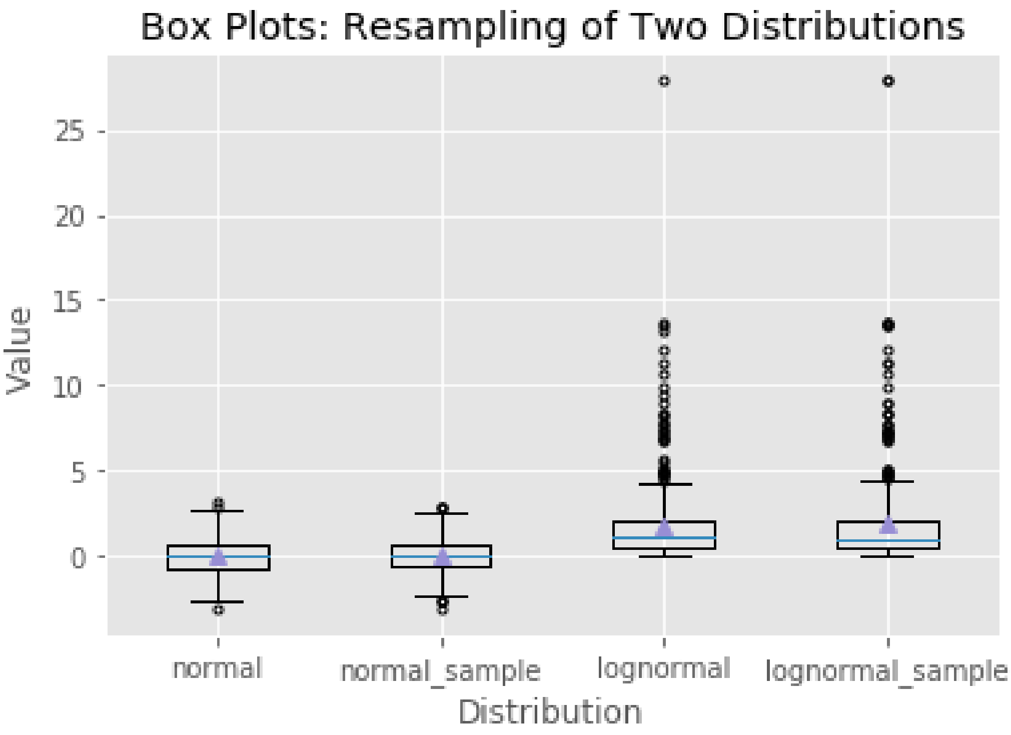
```
In [15]: import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         plt.style.use('ggplot')
         x = np.arange(start=1., stop=15., step=1.)
         y_linear = x+5. * np.random.randn(14)
         y_quadratic = x**2 + 10. * np.random.randn(14)
         fn_linear = np.poly1d(np.polyfit(x, y_linear, deg=1))
         fn_quadratic = np.poly1d(np.polyfit(x, y_quadratic, deg=2))
         fig = plt.figure()
         ax1 = fig.add_subplot(1,1,1)
         ax1.plot(x, y_linear, 'bo', x, y_quadratic, 'go', \
                 x, fn_linear(x), 'b-', x, fn_quadratic(x), 'g-', linewidth=2.)
         ax1.xaxis.set_ticks_position('bottom')
         ax1.yaxis.set_ticks_position('left')
         ax1.set_title('Scatter Plots with Best Fit Lines')
         plt.xlabel('x')
         plt.ylabel('f(x)')
         plt.xlim((min(x)-1., max(x)+1.))
         plt.ylim((min(y_quadratic)-10., max(y_quadratic)+10.))
         plt.savefig('scatter_plot.png', dpi=400, bbox_inches='tight')
         plt.show()
```



6 데이터 시각화 - boxplot

```
In [17]: import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline
         plt.style.use('ggplot')
         N = 500
         normal = np.random.normal(loc=0.0, scale=1.0, size=N)
         lognormal = np.random.lognormal(mean=0.0, sigma=1.0, size=N)
         index_value = np.random.random_integers(low=0, high=N-1, size=N)
         normal_sample=normal[index_value]
         lognormal_sample=lognormal[index_value]
         box_plot_data = [normal, normal_sample, lognormal, lognormal_sample]
         fig = plt.figure()
         ax1 = fig.add_subplot(1,1,1)
         box_labels = ['normal', 'normal_sample', 'lognormal', 'lognormal_sample']
         ax1.boxplot(box_plot_data, notch=False, sym='.', vert=True, whis=1.5, \
                     showmeans=True, labels=box_labels)
         ax1.xaxis.set_ticks_position('bottom')
         ax1.yaxis.set_ticks_position('left')
         ax1.set_title('Box Plots: Resampling of Two Distributions')
         ax1.set_xlabel('Distribution')
         ax1.set_ylabel('Value')
         plt.savefig('box_plot.png', dpi=400, bbox_inches='tight')
         plt.show()
```

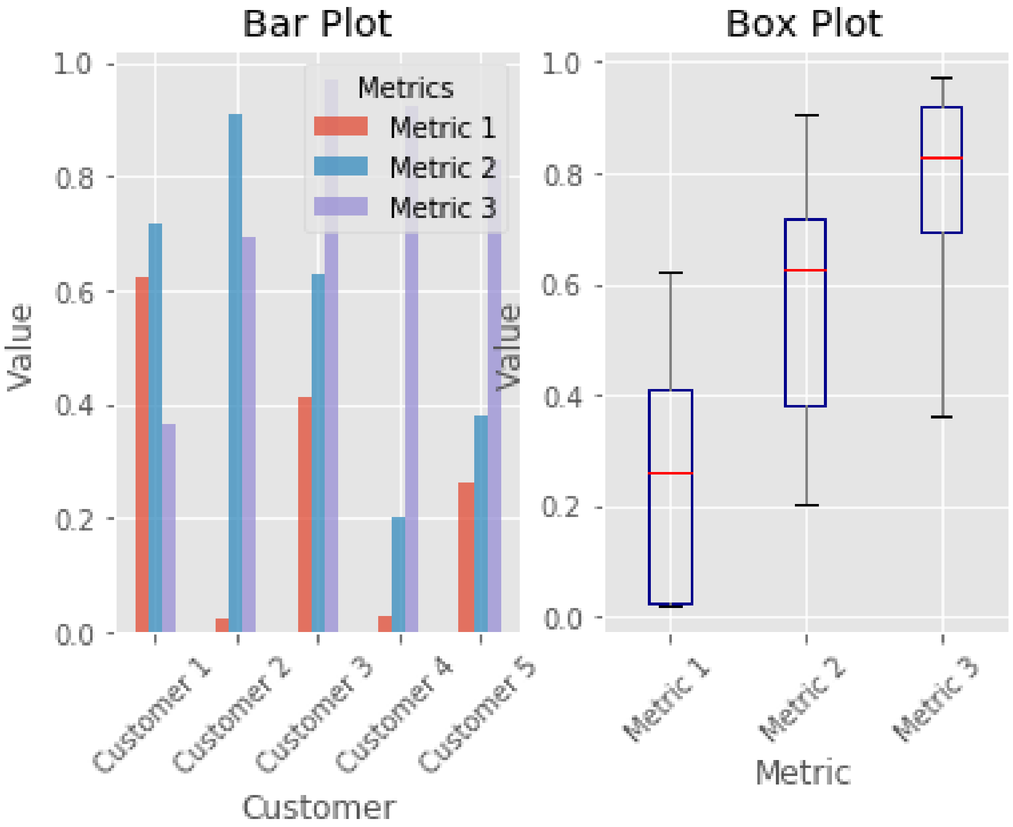
~~/anaconda3/lib/python3.7/site-packages/ipykernel_launcher.py:8: DeprecationWarning: This funct~~



7 데이터 시각화 - pandas

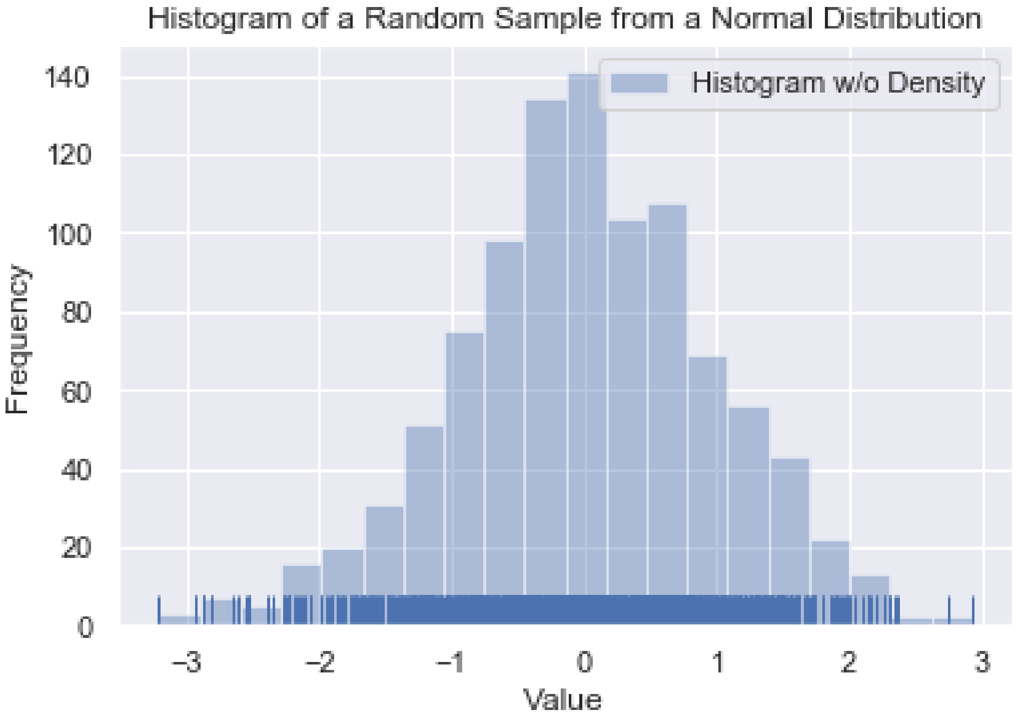
```
In [18]: import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
```

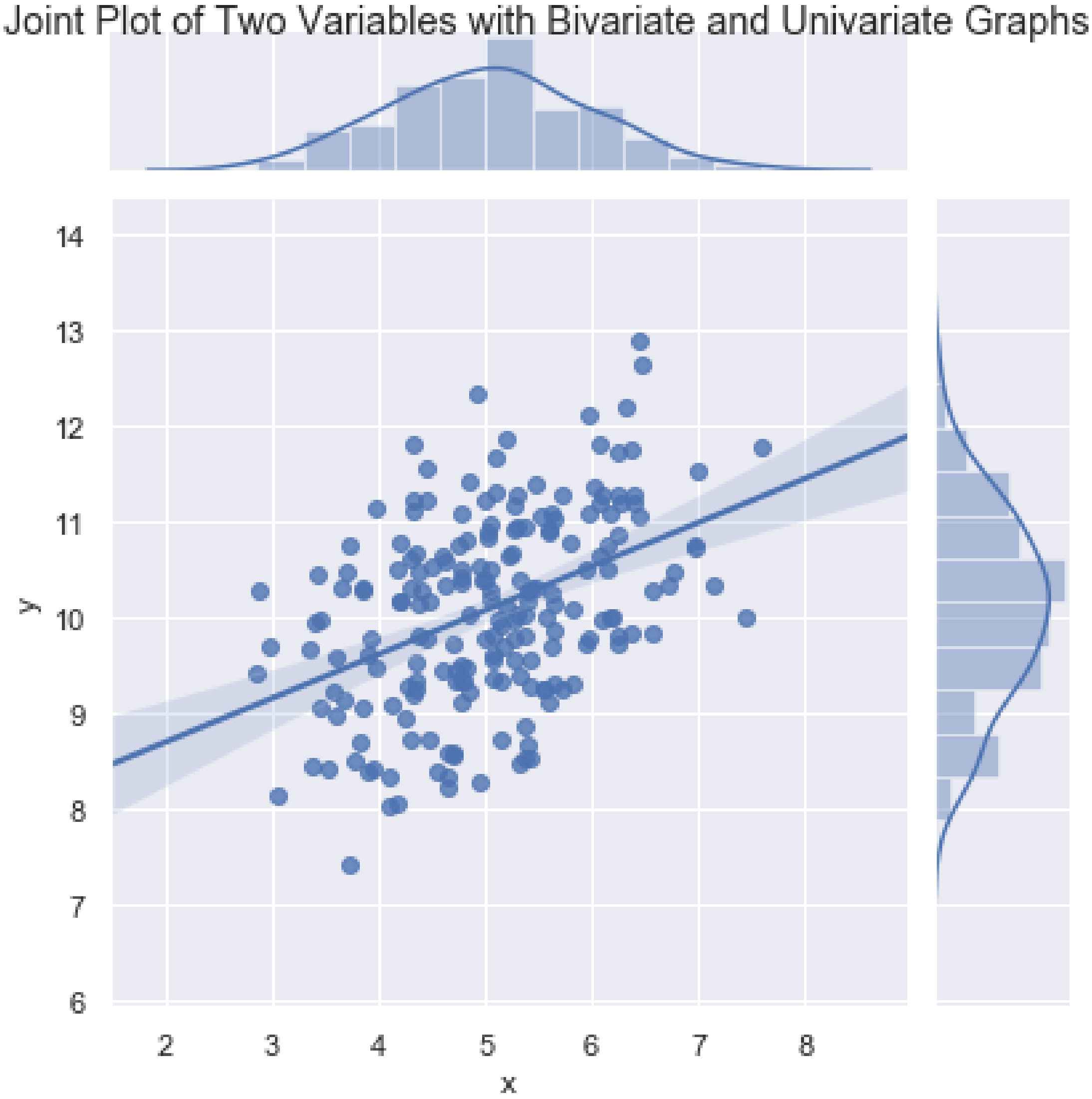
```
%matplotlib inline
plt.style.use('ggplot')
fig, axes = plt.subplots(nrows=1, ncols=2)
ax1, ax2 = axes.ravel()
data_frame = pd.DataFrame(np.random.rand(5,3),
                         index = ['Customer 1', 'Customer 2', 'Customer 3', 'Customer
                         columns=pd.Index(['Metric 1', 'Metric 2', 'Metric 3'], name=
data_frame.plot(kind='bar', ax=ax1, alpha=0.75, title='Bar Plot')
plt.setp(ax1.get_xticklabels(), rotation=45, fontsize=10)
plt.setp(ax1.get_yticklabels(), rotation=0, fontsize=10)
ax1.set_xlabel('Customer')
ax1.set_ylabel('Value')
ax1.xaxis.set_ticks_position('bottom')
ax1.yaxis.set_ticks_position('left')

colors=dict(boxes='Darkblue', whiskers='Gray', medians='Red', caps='Black')
data_frame.plot(kind='box', color=colors, sym='r.', ax=ax2, title='Box Plot')
plt.setp(ax2.get_xticklabels(), rotation=45, fontsize=10)
plt.setp(ax2.get_yticklabels(), rotation=0, fontsize=10)
ax2.set_xlabel('Metric')
ax2.set_ylabel('Value')
ax2.xaxis.set_ticks_position('bottom')
ax2.yaxis.set_ticks_position('left')

plt.savefig('pandas_plots.png', dpi=400, bbox_inches='tight')
plt.show()
```

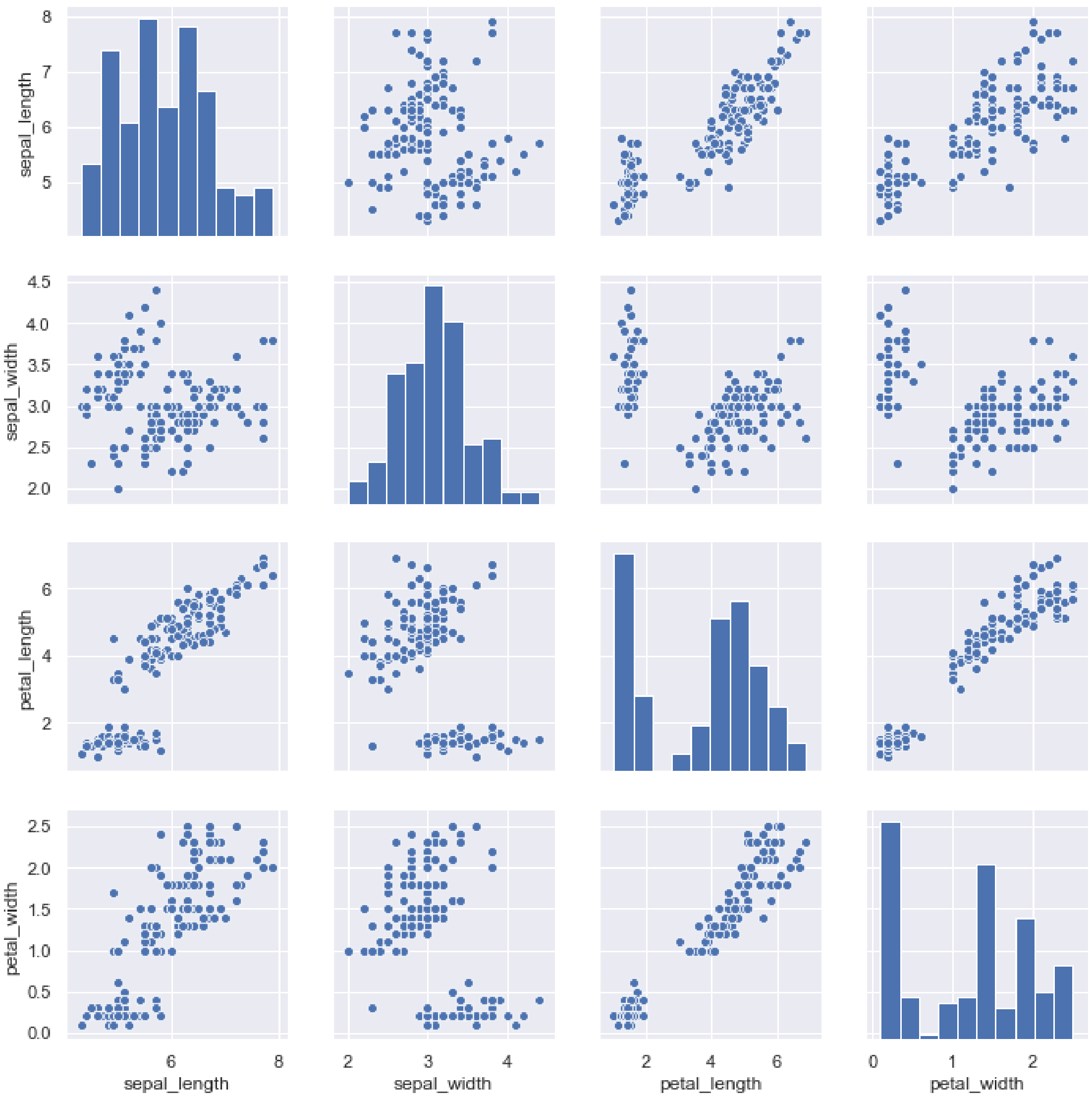


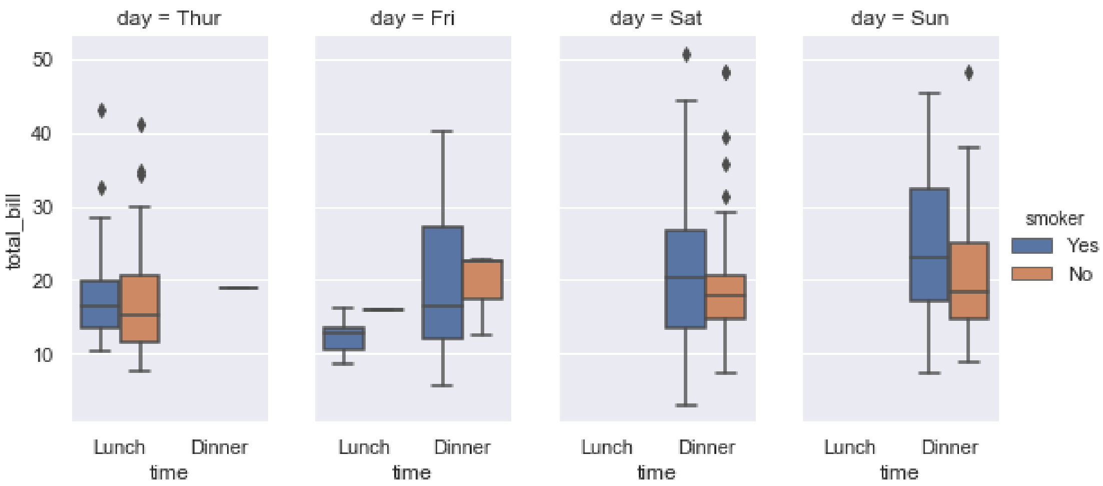
8 데이터 시각화 - seaborn

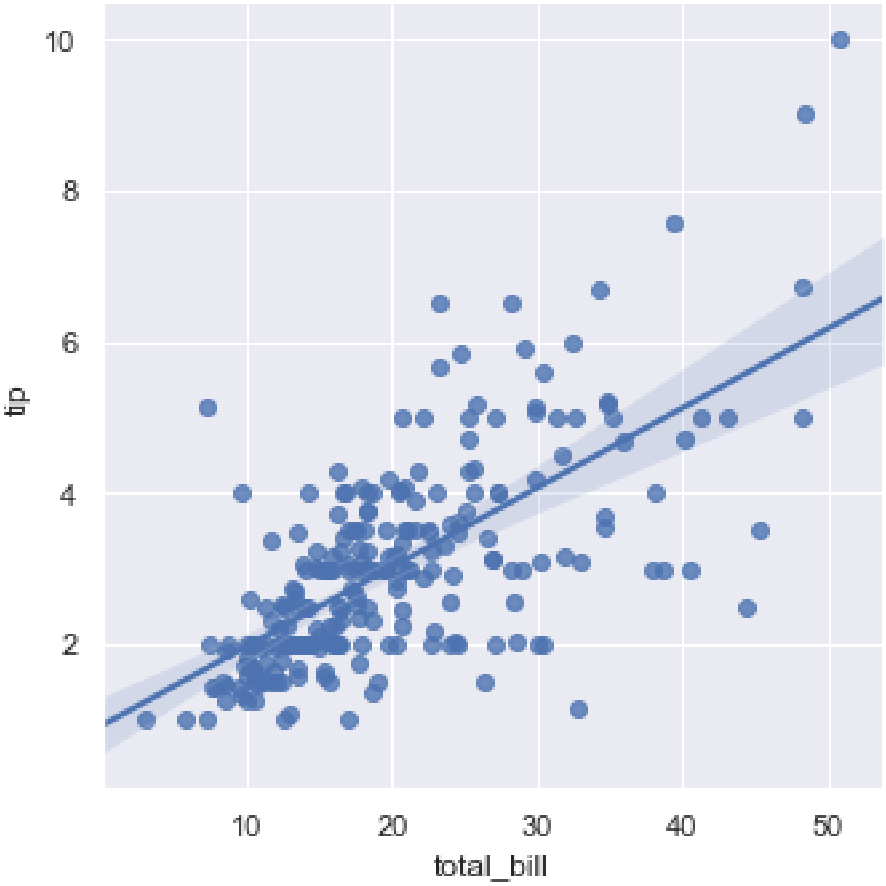
```
In [26]: import seaborn as sns
         import pandas as pd
         import numpy as np
         import matplotlib.pyplot as plt
         %matplotlib inline

         sns.set(color_codes=True)

         x=np.random.normal(size=1000)
         sns.distplot(x, bins=20, kde=False, rug=True, label='Histogram w/o Density')
         sns.utils.axlabel('Value', 'Frequency')
         plt.title('Histogram of a Random Sample from a Normal Distribution')
plt.legend()
plt.show()

mean, cov = [5, 10], [(1, .5), (.5, 1)]
data = np.random.multivariate_normal(mean, cov, 200)
data_frame = pd.DataFrame(data, columns=['x', 'y'])
sns.jointplot(x='x', y='y', data=data_frame, kind='reg').set_axis_labels('x', 'y')
plt.suptitle('Joint Plot of Two Variables with Bivariate and Univariate Graphs')
plt.show()

iris = sns.load_dataset('iris')
sns.pairplot(iris)
plt.show()

tips=sns.load_dataset('tips')
sns.catplot(x='time', y='total_bill', hue='smoker', col='day', data=tips, kind='box',
plt.show()

sns.lmplot(x='total_bill', y='tip', data=tips)
plt.show()

tips['big_tip'] = (tips.tip / tips.total_bill) > .15
sns.lmplot(x='total_bill', y='big_tip', data=tips, logistic=True,
          y_jitter=.03).set_axis_labels('Total Bill', 'Big Tip')
plt.title('Logistic Regression of Big Tip vs. Total Bill')
plt.show()
```

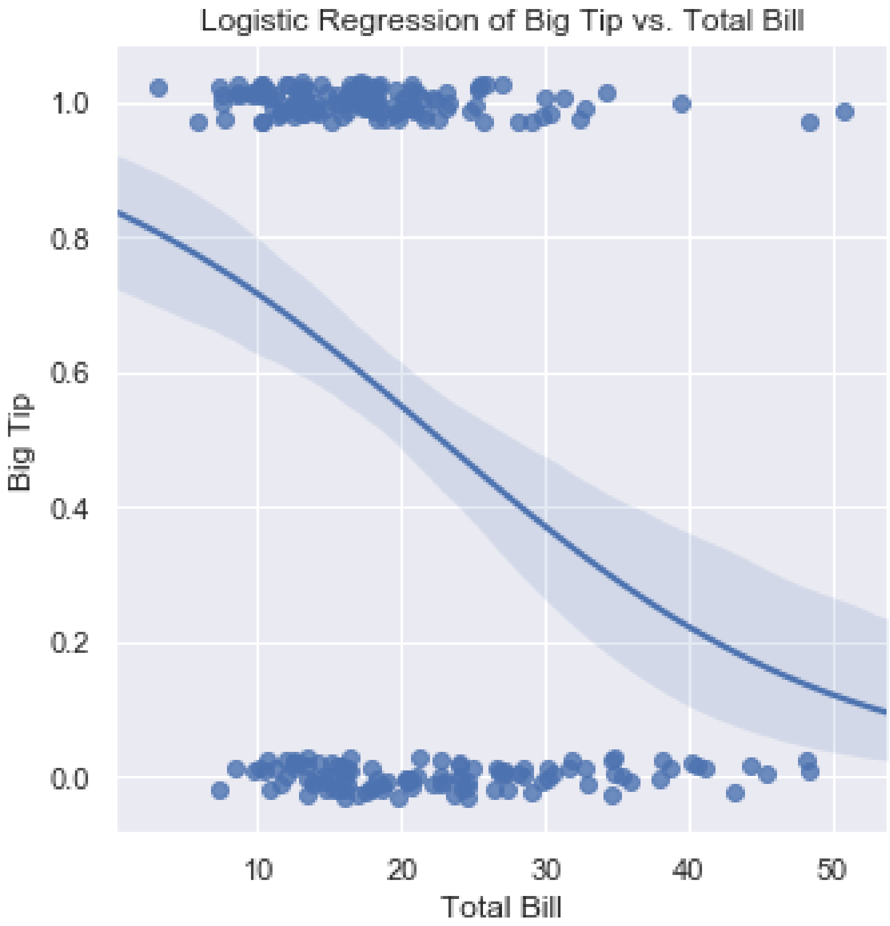

Histogram of a Random Sample from a Normal Distribution
Histogram w/o Density
Frequency
0
20
40
60
80
100
120
140
Value
−3
−2
−1
0
1
2
3


Joint Plot of Two Variables with Bivariate and Univariate Graphs
14
13
12
11
10
9
8
7
6
y
2
3
4
5
6
7
8
x


sepal_length
8
7
6
5
sepal_width
4.5
4.0
3.5
3.0
2.5
2.0
petal_length
6
4
2
petal_width
2.5
2.0
1.5
1.0
0.5
0.0
6
8
sepal_length
2
3
4
sepal_width
2
4
6
petal_length
0
1
2
petal_width


day = Thur
day = Fri
day = Sat
day = Sun
total_bill
50
40
30
20
10
Lunch
Dinner
time
smoker
Yes
No


tip
10
8
6
4
2
10
20
30
40
50
total_bill


Logistic Regression of Big Tip vs. Total Bill
Big Tip
1.0
0.8
0.6
0.4
0.2
0.0
10
20
30
40
50
Total Bill