Name : Jann Moises Nyll B. De los Reyes

Section : CPE22S3

Submitted to: Engr. Roman Richard

Date : March 28, 2024

Instructions:

- Create a Python notebook to answer all shown procedures, exercises and analysis in this section.

Resources:

Download the following datasets: fb_stock_prices_2018.csv, earthquakes-1.csv

Procedures:

- 9.4 Introduction to Seaborn
- 9.5 Formatting Plots
- 9.6 Customizing Visualizations

Data Analysis:

- Provide comments on output from the procedures.

Supplementary Activity:

Using the CSV files provided and what we have learned so far in this module complete the following exercises:

1. Using seaborn, create a heatmap to visualize the correlation coefficients between earthquake magnitude and whether there was a tsunami with the magType of mb.
2. Create a box plot of Facebook volume traded and closing prices, and draw reference lines for the bounds of a Tukey fence with a multiplier of 1.5. The bounds will be at Q1 - 1.5 * IQR and Q3 + 1.5 * IQR. Be sure to use the quantile() method on the data to make this easier. (Pick whichever orientation you prefer for the plot, but make sure to use subplots.)
3. Fill in the area between the bounds in the plot from exercise #2.
4. Use axvspan() to shade a rectangle from '2018-07-25' to '2018-07-31', which marks the large decline in Facebook price on a line plot of the closing price.
5. Using the Facebook stock price data, annotate the following three events on a line plot of the closing price:

- Disappointing user growth announced after close on July 25, 2018
- Cambridge Analytica story breaks on March 19, 2018 (when it affected the market)
- FTC launches investigation on March 20, 2018

6. Modify the reg_resid_plots() function to use a matplotlib colormap instead of cycling between two colors. Remember, for this use case, we should pick a qualitative colormap or make our own.

Setup

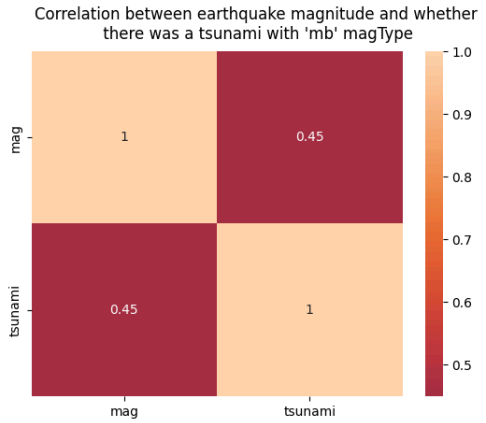
```
%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
import seaborn as sns

fb = pd.read_csv('/content/drive/MyDrive/Module 9: Data Visualization using Pandas, Matplotlib and Seaborn/fb_stock_prices_2018.csv',
                 index_col = 'date', parse_dates = True)
quakes = pd.read_csv ('/content/drive/MyDrive/Module 9: Data Visualization using Pandas, Matplotlib and Seaborn/earthquakes.csv')
```

Using seaborn, create a heatmap to visualize the correlation coefficients between earthquake magnitude and whether or not there is a tsunami with the `'mb' magType`.

```
sns.heatmap(
    quakes.query('magType == "mb"')[['mag','tsunami',]].corr(),
    annot = True, center = 0
)
plt.suptitle('Correlation between earthquake magnitude and whether\n there was a tsunami with \'mb\' magType')
```

```
Text(0.5, 0.98, "Correlation between earthquake magnitude and whether\n there was a tsunami with 'mb' magType")
```



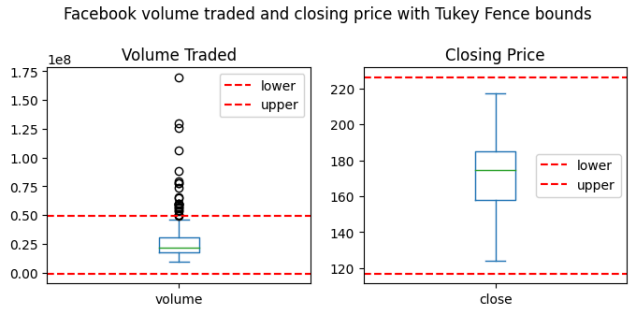
Create a box plot of Facebook volume traded and closing prices, and draw reference lines for the bounds of a Tukey fence with a multiplier of 1.5. The bounds will be at Q1 - 1.5 * IQR and Q3 + 1.5 * IQR. Be sure to use the quantile() method on the data to make this easier. (Pick whichever orientation you prefer for the plot, but make sure to use subplots.)

```
cols = ['volume', 'close']
subset = fb[cols]

quantiles = subset.quantile([0.25, 0.75])
quantiles.loc['iqr',:] = quantiles.loc[0.75,:] - quantiles.loc[0.25,:]

axes = subset.plot(kind='box', subplots=True, figsize=(8, 3), title=['Volume Traded', 'Closing Price'])
for ax, col in zip(axes, cols):
    stats = quantiles[col]
    lower = stats.loc[0.25] - 1.5 * stats['iqr']
    upper = stats.loc[0.75] + 1.5 * stats['iqr']
    for bound, name in zip([lower, upper], ['lower', 'upper']):
        ax.axhline(
            bound,
            color='red',
            linestyle='dashed',
            label=name
        )
        ax.legend()
plt.suptitle('Facebook volume traded and closing price with Tukey Fence bounds', y=1.1)
```

```
Text(0.5, 1.1, 'Facebook volume traded and closing price with Tukey Fence bounds')
```



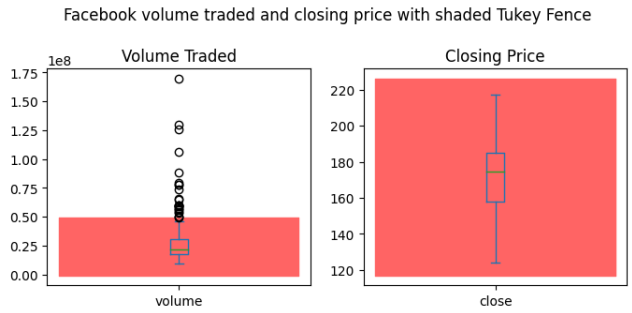
Fill in the area inside the bounds in the plot from exercise 2.

```
cols = ['volume', 'close']
subset = fb[cols]

quantiles = subset.quantile([0.25, 0.75])
quantiles.loc['iqr',:] = quantiles.loc[0.75,:] - quantiles.loc[0.25,:]

axes = subset.plot(kind='box', subplots=True, figsize=(8, 3), title=['Volume Traded', 'Closing Price'])
for ax, col in zip(axes, cols):
    stats = quantiles[col]
    lower = stats.loc[0.25] - 1.5 * stats['iqr']
    upper = stats.loc[0.75] + 1.5 * stats['iqr']
    ax.fill_between(
        [0,2],
        lower,
        upper,
        color='#ff6666'
    )
plt.suptitle('Facebook volume traded and closing price with shaded Tukey Fence', y=1.1)
```

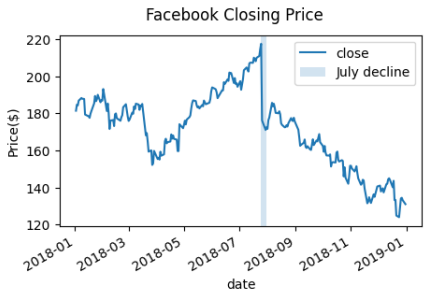
```
Text(0.5, 1.1, 'Facebook volume traded and closing price with shaded Tukey Fence')
```



Use axvspan() to shade a rectangle from '2018-07-25' to '2018-07-31' marking the large decline in Facebook price on a line graph of closing price.

```
fb.close.plot(kind='line', figsize=(5, 3))
plt.axvspan('2018-07-25', '2018-07-31', alpha=0.2, label='July decline')
plt.ylabel('Price($)')
plt.suptitle('Facebook Closing Price')
plt.legend()
```

```
<matplotlib.legend.Legend at 0x7965ea3feef0>
```

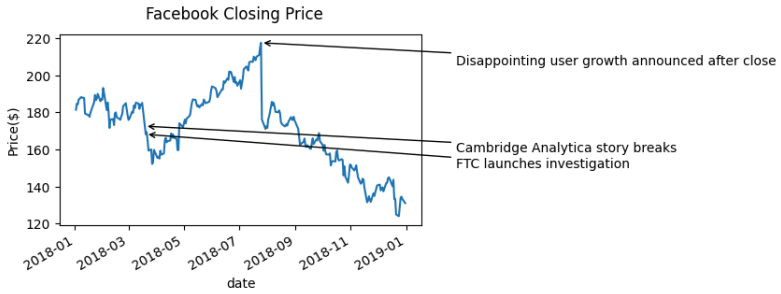


Using the Facebook stock data, annotate the following three events on a line graph of closing price:

- 'Disappointing user growth announced after close' on July 25, 2018
- 'Cambridge Analytica story breaks' on March 19, 2018 (when it affected the market)
- 'FTC launches investigation' on March 20, 2018

```
fb.close.plot(kind='line', figsize=(5, 3))
notes = [
    ('Disappointing user growth announced after close', '2018-07-25'),
    ('Cambridge Analytica story breaks', '2018-03-19'),
    ('FTC launches investigation', '2018-03-20')
]
for text, date in notes:
    y_value = fb.close[date]
    jitter = np.random.uniform(-20, -10, 1)
    plt.annotate(
        text,
        xy=(date, y_value),
        xytext=('2019-02-25', y_value + jitter),
        arrowprops=dict(arrowstyle='->')
    )
plt.ylabel('Price($)')
plt.suptitle('Facebook Closing Price')
```

```
Text(0.5, 0.98, 'Facebook Closing Price')
```



Modify the reg_resid_plot() function to use a matplotlib colormap instead of cycling between two colors. Remember, for this use case, you should pick a qualitative colormap or make your own.

```
import itertools

import matplotlib.pyplot as plt
from matplotlib import cm
import seaborn as sns

def reg_resid_plots(data):
    """
    Using seaborn, plot the regression and residuals
    plots side-by-side for every permutation of 2 columns
    in the data.

    Parameters:
        - data: A pandas DataFrame
    Returns:
        A matplotlib Figure object.
    """
    num_cols = data.shape[1]
    permutation_count = num_cols * (num_cols - 1)

    fig, ax = plt.subplots(
        permutation_count,
        2,
        figsize=(15, 4 * permutation_count)
    )

    for (x, y), axes, color in zip(
        itertools.permutations(data.columns, 2),
        ax,
        [cm.Dark2(i) for i in range(len(ax))]
    ):
        for subplot, func in zip(axes, (sns.regplot, sns.residplot)):
            func(
                x=x,
                y=y,
                data=data,
                ax=subplot,
                color=color
            )
    plt.close()
    return fig
```

```
1 reg_resid_plots(fb[['close', 'volume']])
```