Assignment

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1 Homework

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1.1 Library

```
In [1]: import csv; import numpy as np
        from matplotlib import cm
        import matplotlib.pyplot as plt
        from mpl_toolkits import mplot3d
        from textblob import TextBlob as tb
```

1.2 Function

```
In [2]: def feature_addition(row):
            t_zone = row[1]
            if t_zone in asia:
                row.append("Asia")
            elif t_zone in america:
                row.append("America")
            elif t_zone in europe:
                row.append("Europe")
            elif t_zone in africa:
                row.append("Africa")
            elif t_zone in oceania:
                row.append("Oceania")
            else:
                row.append("None")
            return(row)
```

```
In [3]: def normalize(data):
            d_min = data.min()
            d_max = data.max()
            n = (data - d_min) / (d_max - d_min)
            return(n)
```

1.3 General variable

```
In [4]: raw = []; data = []; num_line = 0
        continent_list = {'Asia':0, 'America':0, 'Europe':0, 'Africa':0, 'Oceania':0, 'None':0
        p_sentiment = {"America/Chicago":0, "America/Denver":0,"America/Detroit":0,
                       "America/Halifax":0, "America/Los_Angeles":0, "America/New_York":0,
                       "America/Phoenix":0, "Alaska":0, "Arizona":0, "Hawaii":0,
                       "Indiana (East)":0, "Midway Island":0, "Monterrey":0, "Hobart":0}
        n_sentiment = {"America/Chicago":0, "America/Denver":0,"America/Detroit":0,
                       "America/Halifax":0, "America/Los_Angeles":0, "America/New_York":0,
                       "America/Phoenix":0, "Alaska":0, "Arizona":0, "Hawaii":0,
                       "Indiana (East)":0, "Midway Island":0, "Monterrey":0, "Hobart":0}

        usa =["America/Chicago", "America/Denver","America/Detroit", "America/Halifax",
              "America/Los_Angeles", "America/New_York", "America/Phoenix", "Alaska",
              "Arizona", "Hawaii", "Hobart", "Indiana (East)", "Midway Island", "Monterrey"]
        asia = ["Asia/Bangkok", "Asia/Calcutta", "Asia/Kuala_Lumpur", "Asia/Manila",
                "Asia/Tokyo", "Tokyo", "Hanoi", "Osaka", "Baghdad",  "Bangkok", "Beijing",
                "Dhaka", "Hong Kong", "Seoul", "Singapore", "New Delhi", "Yerevan", "Urumqi",
                "Tehran", "Taipei",  "Sri Jayawardenepura", "Riyadh", "Chennai", "Islamabad",
                "Jakarta", "Jerusalem", "Kabul", "Karachi", "Kuala Lumpur", "Kuwait", "Mumbai"
                "Muscat", "Abu Dhabi", "Almaty", "Baghdad", "Baku"]
        america = ["Alaska", "America/Bahia_Banderas", "America/Chicago", "America/Denver",
                   "America/Detroit", "America/Edmonton", "America/Glace_Bay", "America/Halifa
                   "America/Los_Angeles", "America/Manaus", "America/Mexico_City",
                   "America/New_York", "America/Phoenix", "America/Sao_Paulo", "America/Toront
                   "America/Vancouver", "Arizona", "Atlantic Time (Canada)", "Central America"
                   "Central Time (US & Canada)", "Eastern Time (US & Canada)", "EST",
                   "CST", "Mountain Time (US & Canada)", "Pacific Time (US & Canada)",
                   "Hawaii", "Indiana (East)", "Lima", "Mazatlan", "Newfoundland",
                   "Mexico City", "Midway Island", "Monterrey", "Tijuana", "EDT", "PST",
                   "PDT", "Bogota", "Saskatchewan", "Santiago", "Quito", "Chihuahua",
                   "Hobart", "Mid-Atlantic", "Monterrey", "Brasilia", "Buenos Aires" , "Caraca
        europe = ["Amsterdam", "Athens", "Berlin", "Europe/Lisbon", "Europe/London",
                  "Europe/Paris", "London", "Paris", "Azores", "Edinburgh", "Moscow", "Rome",
                  "Stockholm", "Ekaterinburg", "Greenland",  "Kyiv", "La Paz",  "Lisbon", "Lju
                  "Madrid", "Novosibirsk", "Volgograd", "Warsaw", "Sarajevo", "Zagreb", "Yakut
                  "Wellington", "Tallinn", "Dublin", "Guadalajara", "Helsinki", "Perth", "Cope
                  "Irkutsk", "Belgrade", "Istanbul", "Krasnoyarsk", "New Caledonia", "Bern",
                  "Bratislava", "Brussels", "Bucharest", "Budapest"]
        africa = ["Africa/Dar_es_Salaam", "Africa/Johannesburg", "Pretoria", "West Central Afr
        oceania = ["Pacific/Auckland", "Sydney", "Nuku'alofa", "Vienna", "Brisbane", "Melbourn
```

1.4 Data collection

This process is done by the professor, I just use cleaned data

1.5 Data Load & Data Processing

I found that there are missing values. In addition, I thought that I could add new features. 3 values were missing, Time Zone, Timestamp, and Y-M-D-H(PST). Before inserting the data, I checked the other value. After that, I set a Timestamp as same as the other, made Y-M-D-H value using other data (Year, Month, Day, and Hour) I could not guarantee the time zone value, so I assigned "None". 1. Pass the header 2. Remove noise 3. Add new feature 4. Save data

```
In [5]: with open('GoodDoctorWeek1_clean.csv', encoding="UTF-8") as csv_file:
            # using csv_reader
            csv_reader = csv.reader(csv_file, delimiter=',')
            for row in csv_reader:
                # pass the header
                if num_line == int(0):
                    num_line += 1
                    row.append("Continent"); raw.append(row)
                    continue

                # check the noise & Fix it
                if row[1] == '2017':
                    row.pop(); row.pop(); row.pop()
                    row.insert(1,"1510000000000"); row.insert(1, "None")
                    row.insert(3, row[3] + '-' + row[4] + '-' + row[5] + '-'  + row[6])

                # Add new feature - continent information
                row = feature_addition(row)

                raw.append(row); num_line += 1

In [6]: f = open('GoodDoctor_processed.csv', 'a', encoding="UTF-8")
        out = csv.writer(f, delimiter=',',quoting=csv.QUOTE_ALL)
        for i in range(num_line):
            out.writerow(raw[i])
        f.close()
```

1.6 Load processed data

```
In [7]: num_line = 0
        with open('GoodDoctor_processed.csv', encoding="UTF-8") as csv_file:
            # using csv_reader
            csv_reader = csv.reader(csv_file, delimiter=',')
            for row in csv_reader:
                # pass the header
                if num_line == int(0):
                    num_line += 1
                    continue
                data.append(row)
                num_line += 1
```

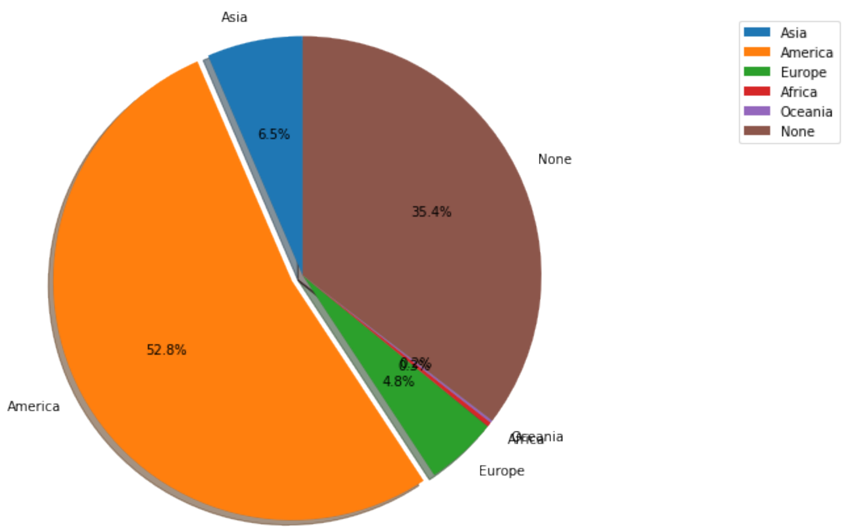
1.7 Data Analysis

Based on the clean data, I tried to analysis 3 things. 1. Which continents show more attention? 2. How was the data trend? 3. Which of state more like this drama?

1.7.1 1. Continent based comparison

First I hope to check the interest from each continent. In my case, I divided it into 6 one, but there is no information about the Antarctic. Finally, I counted the number of frequency of the tweet.

```
In [8]: for i in range(num_line-1):
            continent_list[data[i][8]] += 1
        # Pie chart
        plt.figure(figsize=(12, 6))
        sizes = []
        labels = ['Asia', 'America', 'Europe', 'Africa', 'Oceania', 'None']
        for i in range(6):
            sizes.append(continent_list[labels[i]])
        explode = (0, 0.05, 0, 0, 0, 0)
        patches, _, _  = plt.pie(sizes, explode=explode, labels=labels, autopct='%1.1f%%', sha
        plt.legend(patches, labels, loc="best")
        plt.axis('equal')
        plt.tight_layout()
        plt.show()
```

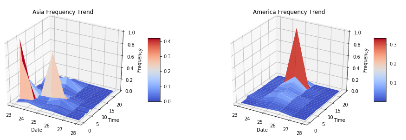


1.7.2 2. Time based frequency trend

At first, choose 2 continents, America and Asia. Each of continent show high-interest about K-drama. I hope to analysis trend during the data collection duration. So I made a 3d chart, x: date, y: time, z: frequency.

```
In [9]: asia_trend = np.zeros((6,24))
        america_trend = np.zeros((6,24))

        x = [23, 24, 25, 26, 27, 28]
        y = [0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 ,13, 14, 15, 16, 17, 18, 19, 20, 21, 22,
        X, Y = np.meshgrid(x, y)

        for i in range(num_line-1):
            if 'America' in data[i][8]:
                america_trend[int(data[i][6])-23][int(data[i][7])] += 1

            if 'Asia' in data[i][8]:
                asia_trend[int(data[i][6])-23][int(data[i][7])] += 1

        n_asia_trend = normalize(asia_trend)
        n_america_trend = normalize(america_trend)
```

```
In [10]: fig = plt.figure(figsize=(16, 5))
         ax0 = fig.add_subplot(1, 2, 1, projection='3d', title='Asia Frequency Trend')
         ax0.set_xlabel('Date'); ax0.set_ylabel('Time'); ax0.set_zlabel('Frequency')
         surf0 = ax0.plot_surface(X, Y, n_asia_trend.T, cmap=cm.coolwarm)
         fig.colorbar(surf0, shrink=0.5, aspect=5)

         ax1 = fig.add_subplot(1, 2, 2, projection='3d', title='America Frequency Trend')
         ax1.set_xlabel('Date'); ax1.set_ylabel('Time'); ax1.set_zlabel('Frequency')
         surf1 = ax1.plot_surface(X, Y, n_america_trend.T, cmap=cm.coolwarm)
         fig.colorbar(surf1, shrink=0.5, aspect=5)
         plt.show()
```

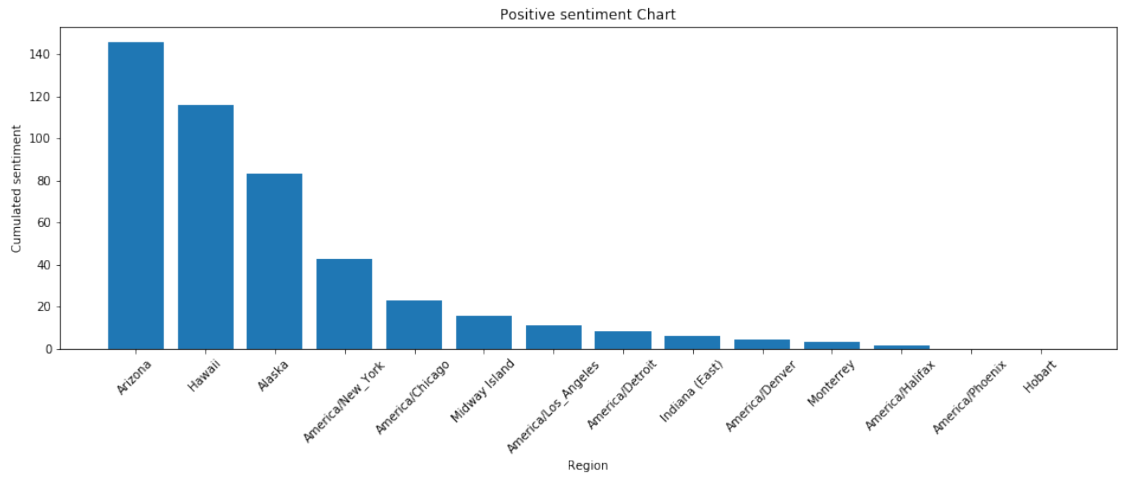


1.7.3 3. Compare sentiment between states cities

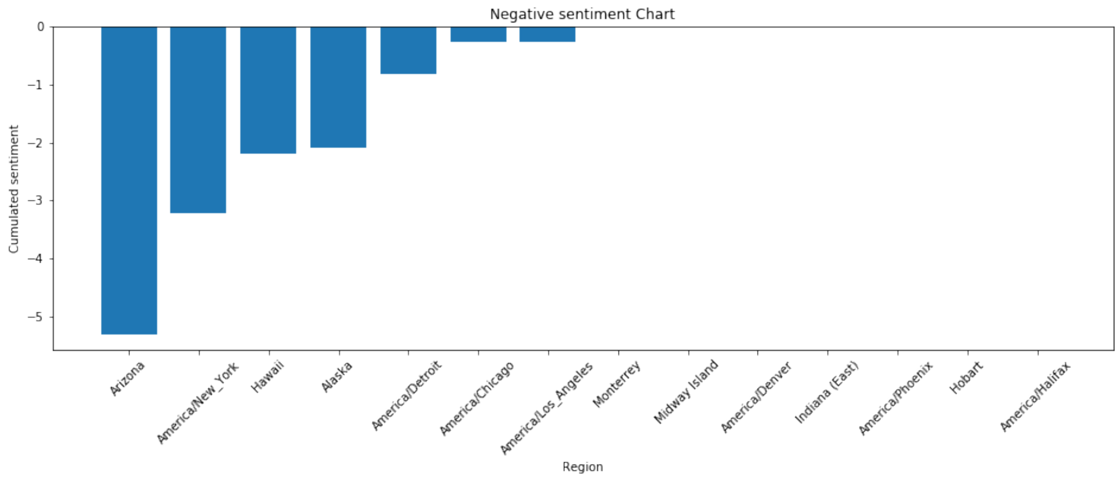
As you know, 53% of tweet data was collected from the United States of America. I hope to check which states or cities more like this drama. Because it can be a good data to start new buisness.

```
In [11]: num_line = 0
         with open('GoodDoctor_processed.csv', encoding="UTF-8") as csv_file:
             # using csv_reader
             csv_reader = csv.reader(csv_file, delimiter=',')
             for row in csv_reader:
                 # pass the header
                 if num_line == int(0):
                     num_line += 1
                     continue

                 if row[1] in usa:
                     txt = row[0]
                     sentiment = tb(txt).polarity
                     if sentiment < 0:
                         n_sentiment[row[1] ] += sentiment
                     else:
                         p_sentiment[row[1] ] += sentiment
         p_sentiment = np.array(sorted(p_sentiment.items(), key=lambda t: t[1], reverse=True))
         n_sentiment = np.array(sorted(n_sentiment.items(), key=lambda t: t[1])).T
```

```
In [12]: x = p_sentiment[0]
         y = p_sentiment[1].astype(np.float)

         plt.figure(figsize=(16, 5))
         plt.bar(x, y, align='center')
         plt.xlabel('Region')
         plt.xticks(rotation=45)
         plt.ylabel('Cumulated sentiment')
         plt.title('Positive sentiment Chart')
         plt.show()
```



```
In [13]: x = n_sentiment[0]
         y = n_sentiment[1].astype(np.float)

         plt.figure(figsize=(16, 5))
         plt.bar(x, y, align='center')
         plt.xlabel('Region')
         plt.xticks(rotation=45)
         plt.ylabel('Cumulated sentiment')
         plt.title('Negative sentiment Chart')
         plt.show()
```


Negative sentiment Chart
Cumulated sentiment
Arizona
America/New_York
Hawaii
Alaska
America/Detroit
America/Chicago
America/Los_Angeles
Monterrey
Midway Island
America/Denver
Indiana (East)
America/Phoenix
Hobart
America/Halifax
Region