```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import zscore
```

```
df = pd.read_csv('/kaggle/input/unemployment-by-county-us/output.csv')
df.head()
```

```
   Year     Month        State          County  Rate
0  2015  February  Mississippi  Newton County   6.1
1  2015  February  Mississippi  Panola County   9.4
2  2015  February  Mississippi  Monroe County   7.9
3  2015  February  Mississippi   Hinds County   6.1
4  2015  February  Mississippi  Kemper County  10.6
```

****Year unique values****

```
df.Year.unique()
```

```
array([2015, 2014, 2016, 2011, 2010, 2013, 2012, 1991, 1990, 1993,
1992,
       1995, 1994, 1997, 1996, 1999, 1998, 2002, 2003, 2000, 2001,
2006,
       2007, 2004, 2005, 2008, 2009])
```

****Count of unique counties****

```
len(df.County.unique())
```

```
1752
```

****Count of unique states****

```
len(df.State.unique())
```

```
47
```

****Shape of Dataframe****

```
df.shape
```

```
(885548, 5)
```

****Column Names****

```
df.columns
```

```
Index(['Year', 'Month', 'State', 'County', 'Rate'], dtype='object')
```

****Info of Dataframe****

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 885548 entries, 0 to 885547
Data columns (total 5 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   Year    885548 non-null  int64  
 1   Month   885548 non-null  object 
 2   State   885548 non-null  object 
 3   County  885548 non-null  object 
 4   Rate    885548 non-null  float64
dtypes: float64(1), int64(1), object(3)
memory usage: 33.8+ MB
```

****Dropping Duplicates****

```
df.drop_duplicates()
```

```
        Year     Month        State              County  Rate
0       2015  February  Mississippi       Newton County   6.1
1       2015  February  Mississippi       Panola County   9.4
2       2015  February  Mississippi       Monroe County   7.9
3       2015  February  Mississippi        Hinds County   6.1
4       2015  February  Mississippi       Kemper County  10.6
...      ...       ...          ...                 ...   ...
885543  2009  November        Maine     Somerset County  10.5
885544  2009  November        Maine       Oxford County  10.5
885545  2009  November        Maine         Knox County   7.5
885546  2009  November        Maine  Piscataquis County  11.3
885547  2009  November        Maine    Aroostook County   9.0

[885548 rows x 5 columns]
```

****Unique month values****

```
df.Month.unique()
```

```
array(['February', 'October', 'March', 'August', 'May', 'January',
'June',
       'September', 'April', 'December', 'July', 'November'],
dtype=object)
```

****Creating Quarter Column****

```
def get_quarter(month):
    if month in ["January","February","March"]:
        return 1
    elif month in ["April","May","June"]:
        return 2
    elif month in ["July","August","September"]:
        return 3
    else:
        return 4
```

```
df['Quarter'] = df.Month.apply(lambda x: get_quarter(x))
df.head()
```

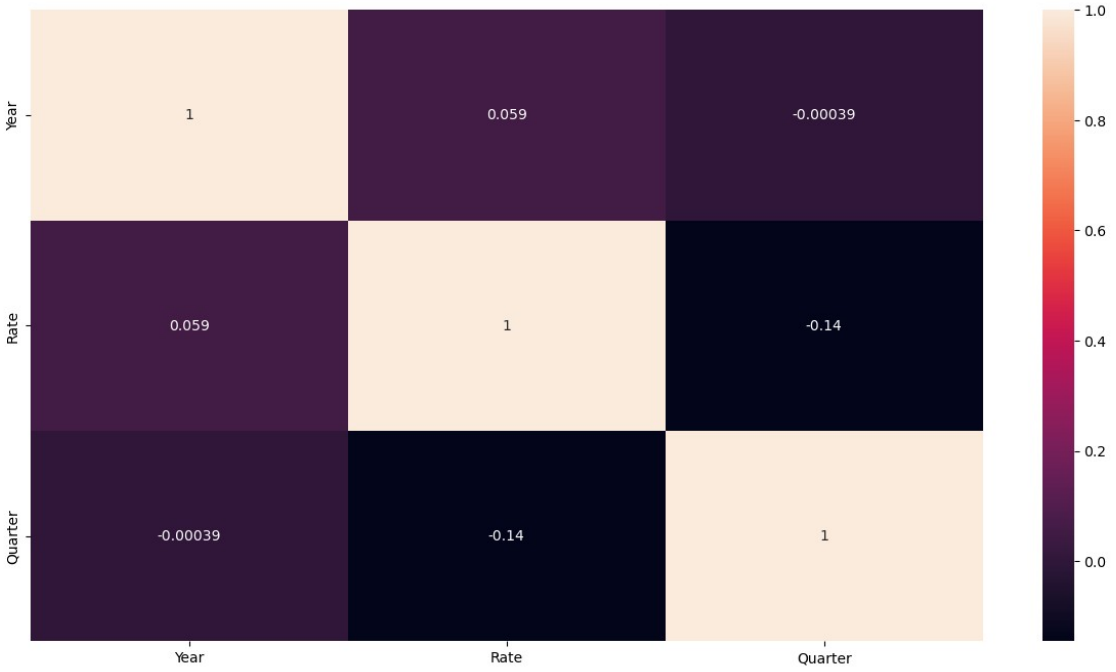
```
   Year     Month        State          County  Rate  Quarter
0  2015  February  Mississippi  Newton County   6.1        1
1  2015  February  Mississippi  Panola County   9.4        1
2  2015  February  Mississippi  Monroe County   7.9        1
3  2015  February  Mississippi   Hinds County   6.1        1
4  2015  February  Mississippi  Kemper County  10.6        1
```

****Correlation between Columns****

```
plt.figure(figsize=(15,8))
sns.heatmap(df.corr(),annot=True)
```

```
/tmp/ipykernel_32/832035378.py:2: FutureWarning: The default value of
numeric_only in DataFrame.corr is deprecated. In a future version, it
will default to False. Select only valid columns or specify the value
of numeric_only to silence this warning.
  sns.heatmap(df.corr(),annot=True)
```

```
<Axes: >
```



```
df.describe()
```

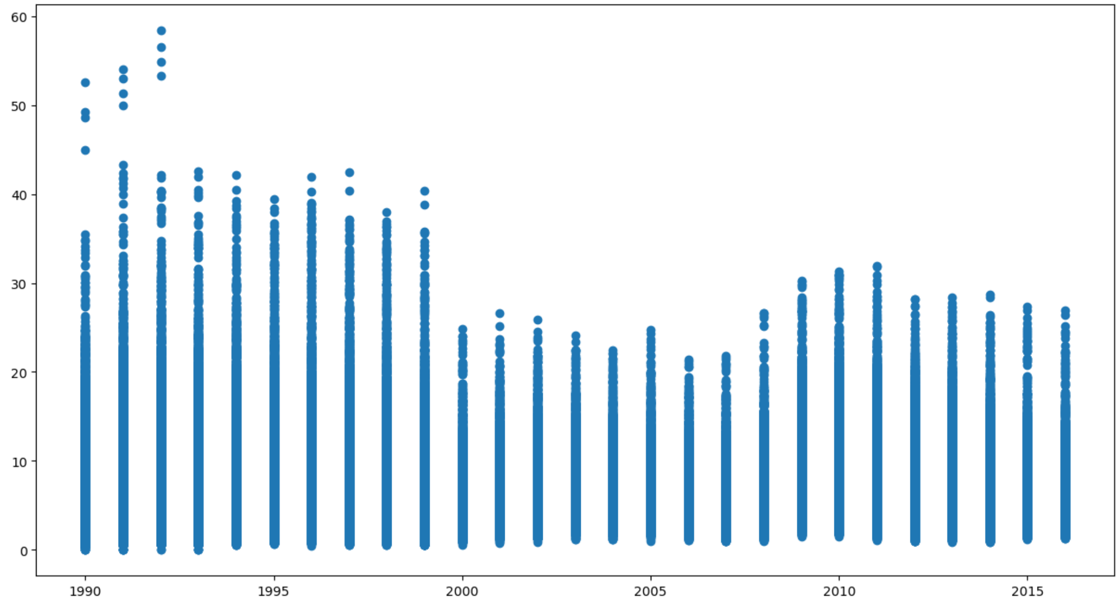
```
                Year           Rate        Quarter
count  885548.000000  885548.000000  885548.000000
mean     2003.000017       6.175010       2.498442
std         7.824893       3.112535       1.118418
min      1990.000000       0.000000       1.000000
25%      1996.000000       4.000000       1.000000
```

```
50%      2003.000000      5.500000      2.000000
75%      2010.000000      7.700000      3.000000
max      2016.000000     58.400000      4.000000
```

****Year by Rate Scatter****

```
plt.figure(figsize=(15,8))
plt.scatter(df['Year'],df['Rate'])
```

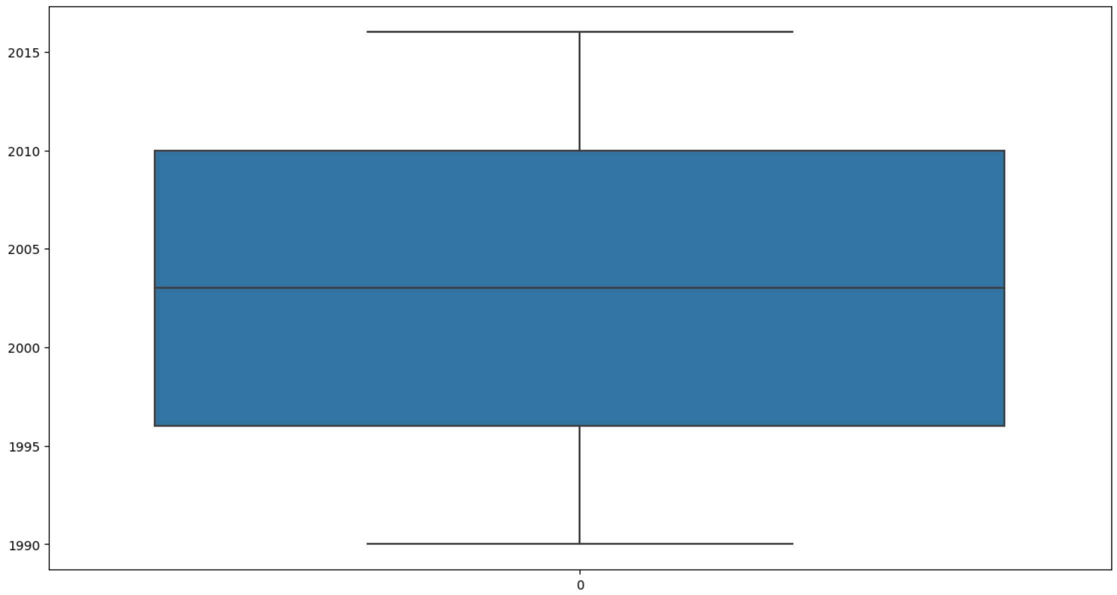
```
<matplotlib.collections.PathCollection at 0x7c8de5060040>
```



****Check Outliers for year****

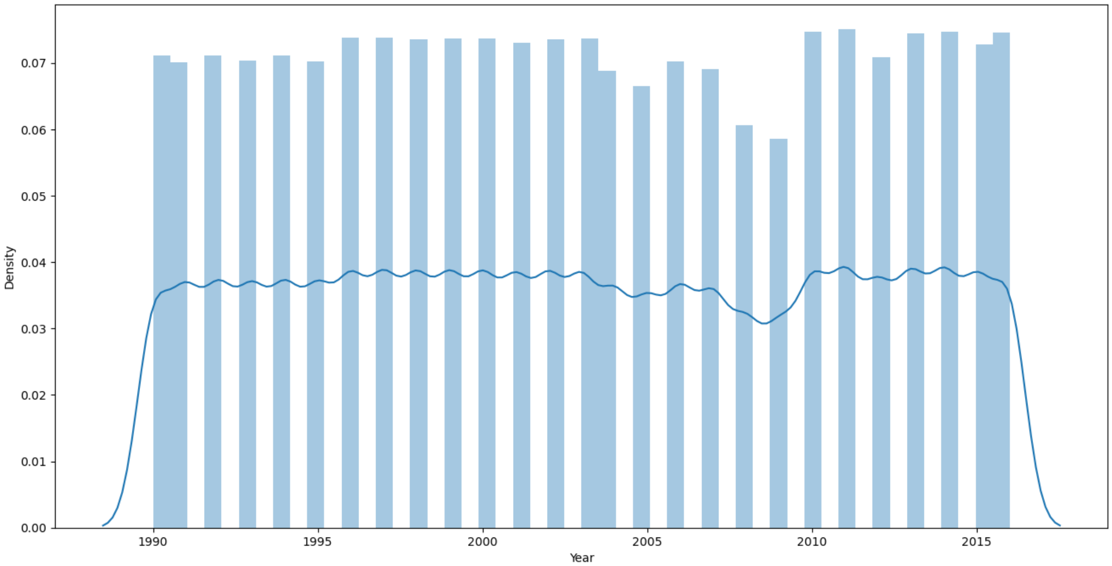
```
plt.figure(figsize=(15,8))
sns.boxplot(df['Year'])
```

```
<Axes: >
```



```
plt.figure(figsize=(16,8))
# plt.subplot(1,2,1)
sns.distplot(df['Year'])
plt.show()
```

```
/tmp/ipykernel_32/1202410964.py:3: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn
v0.14.0.

Please adapt your code to use either `displot` (a figure-level
function with
similar flexibility) or `histplot` (an axes-level function for
histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(df['Year'])
```



```
df['year_z_score'] = zscore(df['Year'])
df.head()
```

```
   Year     Month        State          County  Rate  Quarter
year_z_score
0  2015  February  Mississippi  Newton County   6.1        1
1.533566
1  2015  February  Mississippi  Panola County   9.4        1
1.533566
2  2015  February  Mississippi  Monroe County   7.9        1
1.533566
3  2015  February  Mississippi   Hinds County   6.1        1
1.533566
4  2015  February  Mississippi  Kemper County  10.6        1
1.533566
```

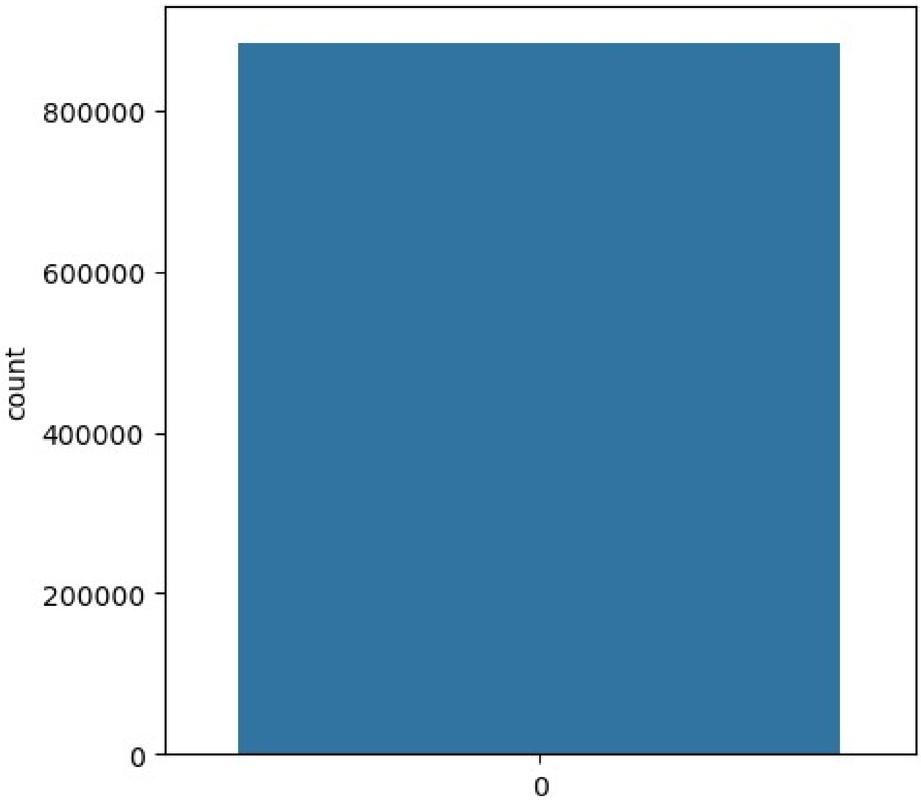
```
outliers = df[(df['year_z_score']>3) | (df['year_z_score']<-3)]
outliers
```

```
Empty DataFrame
Columns: [Year, Month, State, County, Rate, Quarter, year_z_score]
Index: []
```

****Check outliers for Rate****

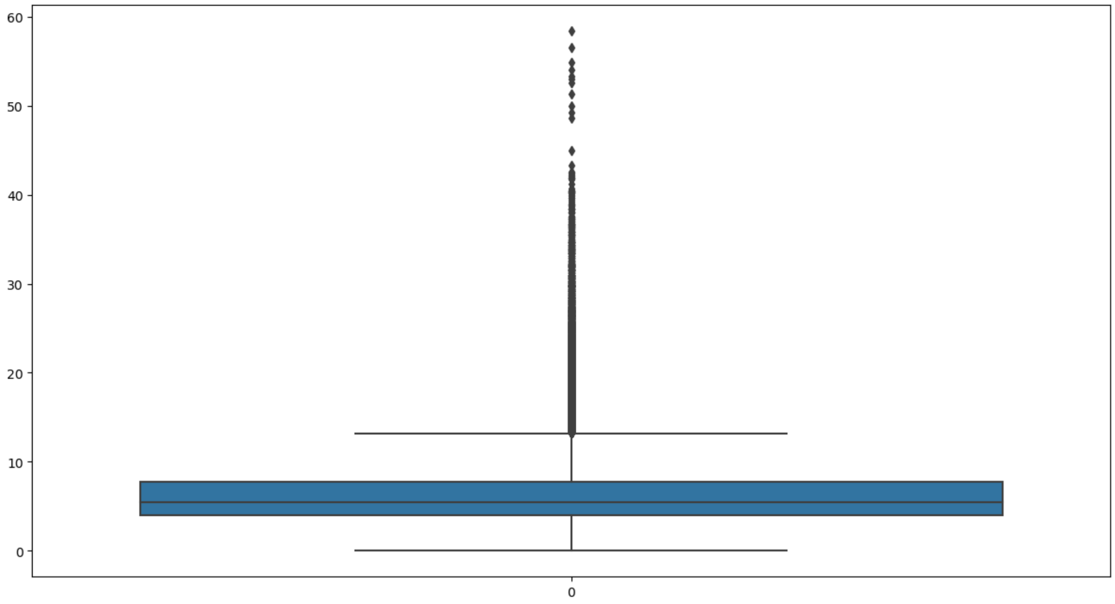
```
plt.figure(figsize=(5,5))
sns.countplot(df.Rate)
```

```
<Axes: ylabel='count'>
```



```
plt.figure(figsize=(15,8))
sns.boxplot(df['Rate'])
```

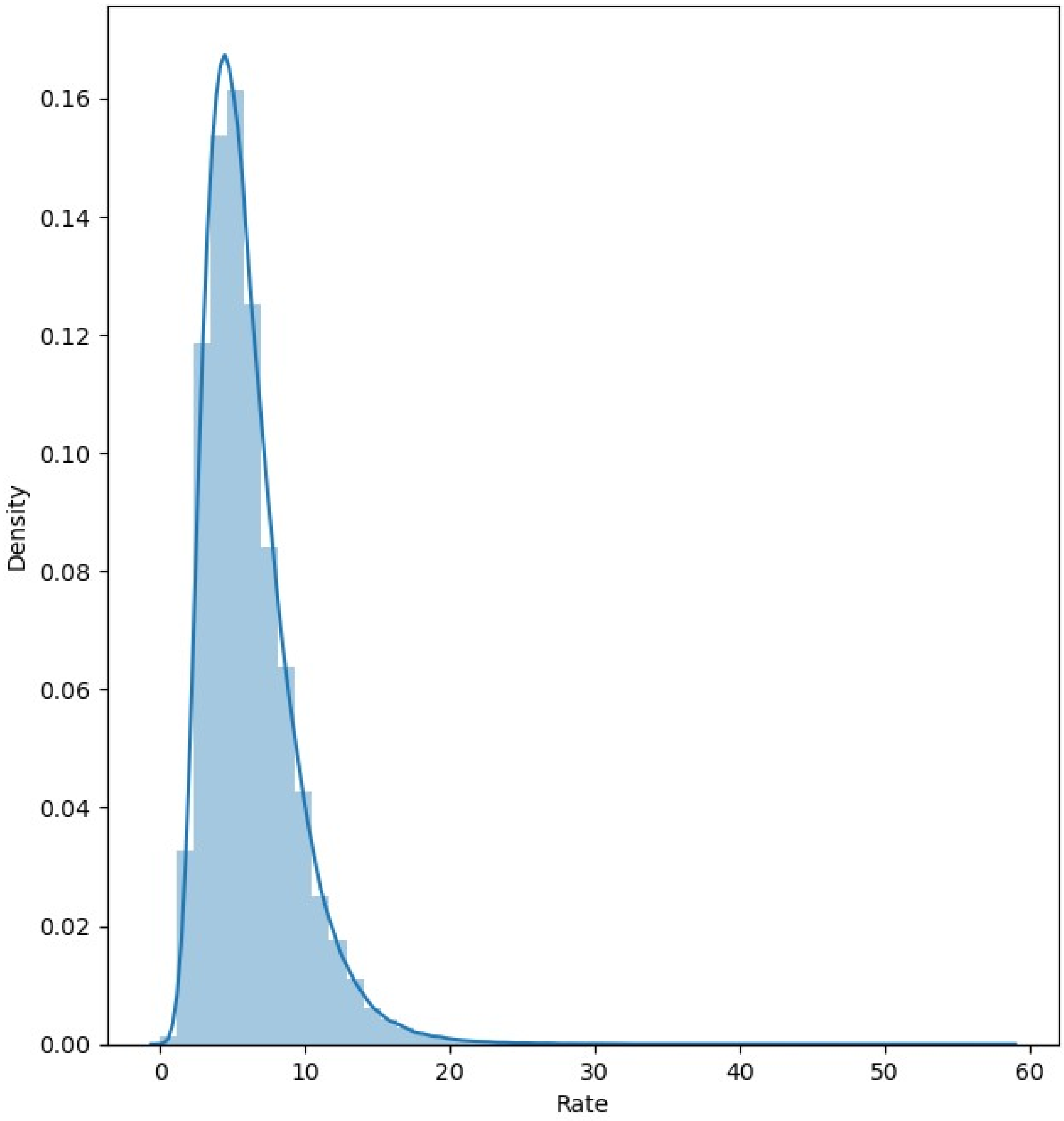
```
<Axes: >
```



```
plt.figure(figsize=(16,8))
plt.subplot(1,2,1)
```

```
sns.distplot(df['Rate'])
plt.show()
```

```
/tmp/ipykernel_32/2133488489.py:3: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn
v0.14.0.

Please adapt your code to use either `displot` (a figure-level
function with
similar flexibility) or `histplot` (an axes-level function for
histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(df['Rate'])
```



****The distribution is right-skewed because it’s longer on the right side of its peak****

```
df['Rate'].mean(),df['Rate'].median()
```

```
(6.175009711500675, 5.5)
```

****Here mean > median, so its right-skewed****

****Removing ouliers from Rate column****

```
df['rate_z_score'] = zscore(df['Rate'])
df.head()
```

```
   Year     Month        State         County  Rate  Quarter
year_z_score  \
0  2015  February  Mississippi  Newton County   6.1        1
```

```
1.533566
1  2015  February  Mississippi  Panola County   9.4         1
1.533566
2  2015  February  Mississippi  Monroe County   7.9         1
1.533566
3  2015  February  Mississippi   Hinds County   6.1         1
1.533566
4  2015  February  Mississippi  Kemper County  10.6         1
1.533566

   rate_z_score
0     -0.024099
1      1.036130
2      0.554208
3     -0.024099
4      1.421669
```

```
outliers = df[(df['rate_z_score']>3) | (df['rate_z_score']<-3)]
outliers
```

```
        Year     Month           State               County  Rate
Quarter  \
68      2015  February     Mississippi     Issaquena County  21.5
1
436     2015  February      New Mexico          Luna County  21.2
1
567     2015  February        Maryland     Worcester County  15.6
1
604     2015  February       Louisiana  East Carroll Parish  16.0
1
606     2015  February       Louisiana  West Carroll Parish  16.1
1
...      ...       ...             ...                  ...   ...
...
885384  2009  November  North Carolina     Edgecombe County  16.2
4
885394  2009  November  North Carolina      Scotland County  16.4
4
885411  2009  November  North Carolina    Rutherford County  16.2
4
885435  2009  November  North Carolina        Graham County  16.6
4
885527  2009  November          Nevada          Lyon County  15.8
4

        year_z_score  rate_z_score
68          1.533566      4.923639
436         1.533566      4.827255
567         1.533566      3.028077
604         1.533566      3.156590
```

```
606         1.533566      3.188718
...              ...           ...
885384      0.766782      3.220846
885394      0.766782      3.285103
885411      0.766782      3.220846
885435      0.766782      3.349359
885527      0.766782      3.092334

[11656 rows x 8 columns]
```

****Highest Rate Year wise****

```
df_years = df.groupby('Year')
df_years['Rate'].mean().sort_values(ascending=False)
```

```
Year
2010    9.189580
2009    8.883838
2011    8.523477
2012    7.657544
1992    7.464904
2013    7.211610
1991    7.142391
1993    6.924037
1994    6.186649
2014    6.096365
1990    6.093021
2003    6.027990
1996    5.912081
1995    5.893411
2008    5.759990
2002    5.720915
2004    5.695817
1997    5.474520
2005    5.438981
2015    5.401873
2016    5.160680
1998    5.114221
2001    4.985591
2006    4.979263
2007    4.896069
1999    4.873476
2000    4.321123
Name: Rate, dtype: float64
```

```
new_order = ['January', 'February', 'March', 'April', 'May', 'June',
'July', 'August', 'September', 'October', 'November', 'December']
```

```
# # df.groupby(['Year', 'Month'])['Rate'].max()
highest_values = df.groupby(['Year', 'Month'])['Rate'].mean()
```

```
# # Reset the index to convert the result into a DataFrame
highest_values = highest_values.reset_index()

highest_rows = highest_values.loc[highest_values.groupby('Year')
['Rate'].idxmax()]
highest_rows
```

```
     Year     Month       Rate
3    1990  February   7.123685
15   1991  February   8.315527
27   1992  February   8.954110
40   1993   January   8.453421
52   1994   January   7.842644
64   1995   January   7.007012
76   1996   January   7.325594
88   1997   January   7.011060
100  1998   January   6.226196
112  1999   January   5.996668
124  2000   January   5.145622
134  2001  December   5.556292
148  2002   January   6.695604
160  2003   January   6.827418
172  2004   January   6.743432
183  2005  February   6.513790
196  2006   January   5.812739
208  2007   January   5.759914
218  2008  December   7.156567
230  2009  December   9.301748
244  2010   January  10.600035
256  2011   January   9.751924
268  2012   January   8.575389
280  2013   January   8.557835
291  2014  February   7.306586
304  2015   January   6.328016
316  2016   January   5.894870
```

****Monthwise Average Unemployment Rate****

```
highest_values = df.groupby(['Month'])['Rate'].mean()
highest_values
```

```
Month
April        6.011266
August       5.853476
December     6.037602
February     7.108245
January      7.215534
July         6.160219
June         6.262862
March        6.787332
May          5.868393
```

```
November     5.762969
October      5.465816
September    5.558903
Name: Rate, dtype: float64
```

```
highest_values = highest_values.reset_index()
highest_values.index=pd.CategoricalIndex(highest_values['Month'],categ
ories=new_order,ordered=True)
highest_values=highest_values.sort_index().reset_index(drop=True)
highest_values
```

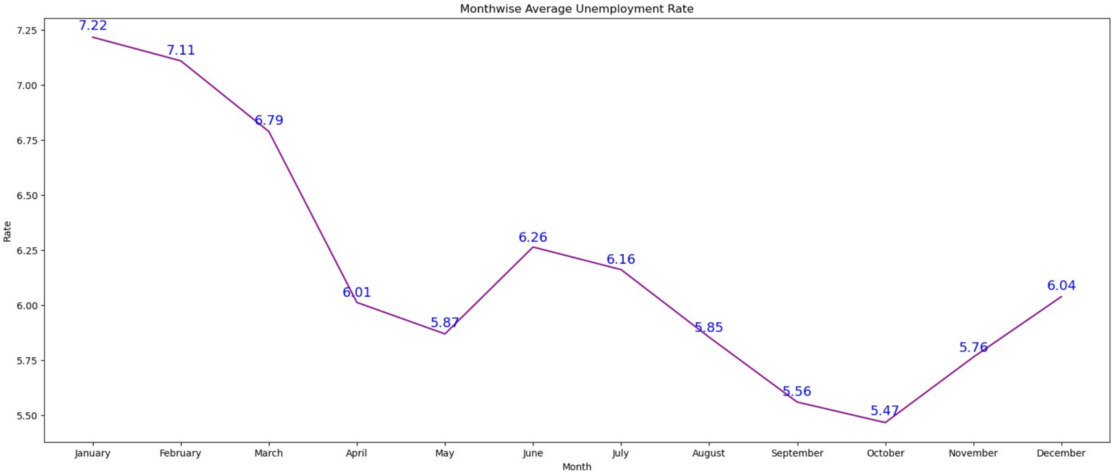
```
        Month      Rate
0     January  7.215534
1    February  7.108245
2       March  6.787332
3       April  6.011266
4         May  5.868393
5        June  6.262862
6        July  6.160219
7      August  5.853476
8   September  5.558903
9     October  5.465816
10   November  5.762969
11   December  6.037602
```

```
highest_values.set_index('Month',inplace=True)
highest_values
```

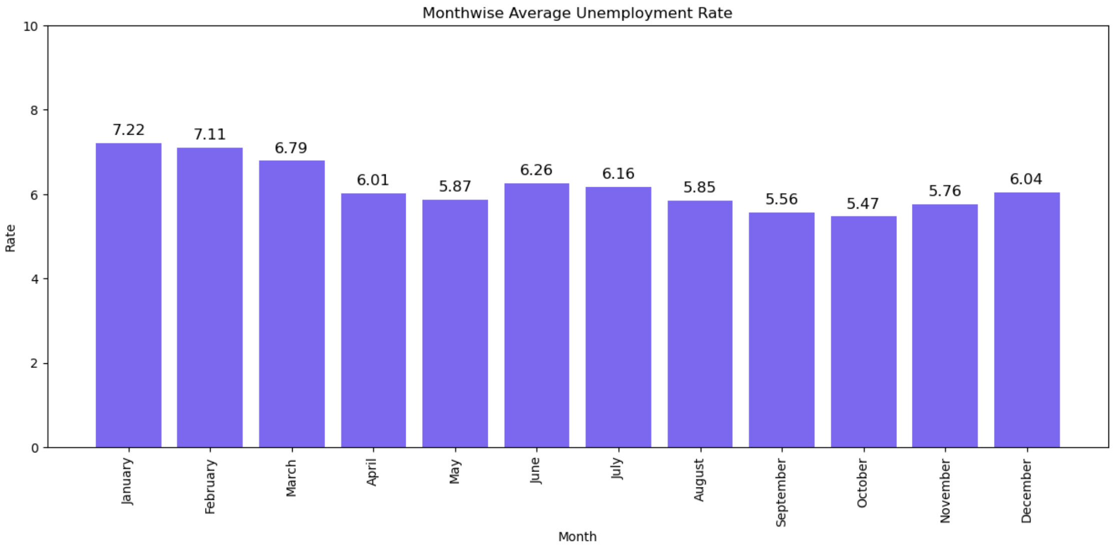
```
               Rate
Month
January    7.215534
February   7.108245
March      6.787332
April      6.011266
May        5.868393
June       6.262862
July       6.160219
August     5.853476
September  5.558903
October    5.465816
November   5.762969
December   6.037602
```

```
plt.figure(figsize=(20,8))
plt.plot(highest_values.index,
highest_values['Rate'],color="darkmagenta")

plt.xlabel('Month')
plt.ylabel('Rate')
plt.title('Monthwise Average Unemployment Rate')
```

```
for x, y in zip(highest_values.index, highest_values.values):
    y= round(float(y),2)
    plt.text(x, y+0.03, str(y), ha='center',color='blue',fontsize=14)
```



```
plt.figure(figsize=(15,6))
plt.bar(highest_values.index,
highest_values['Rate'],color='mediumslateblue')

# set the axis labels and title
plt.xlabel('Month')
plt.ylabel('Rate')
plt.title('Monthwise Average Unemployment Rate')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,10))
for i, v in enumerate(highest_values['Rate']):
    plt.text(highest_values.index[i], v+0.2, str(round(v,2)),
fontsize=12, color='black', ha='center')
# show the plot
plt.show()
```

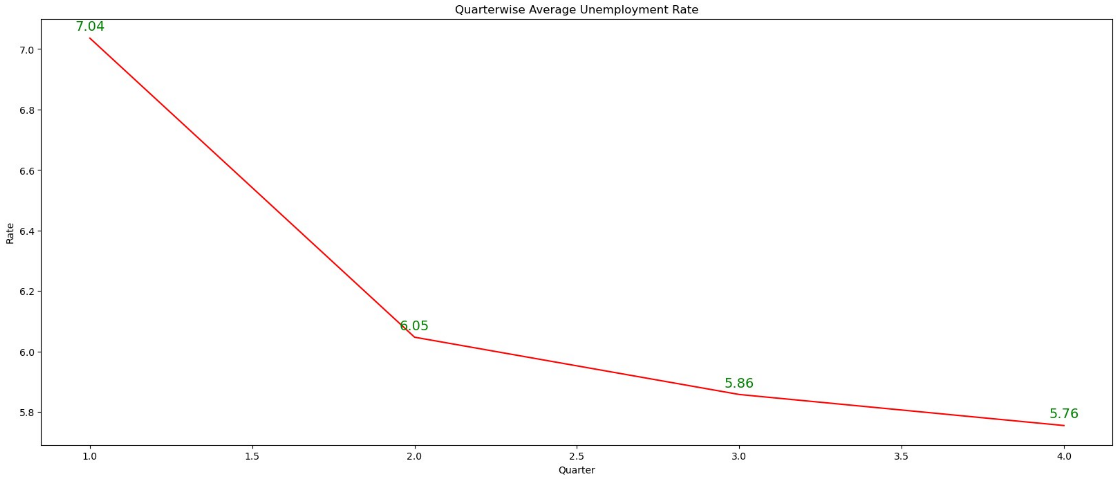


****Quarterwise Average Unemployment Rate****

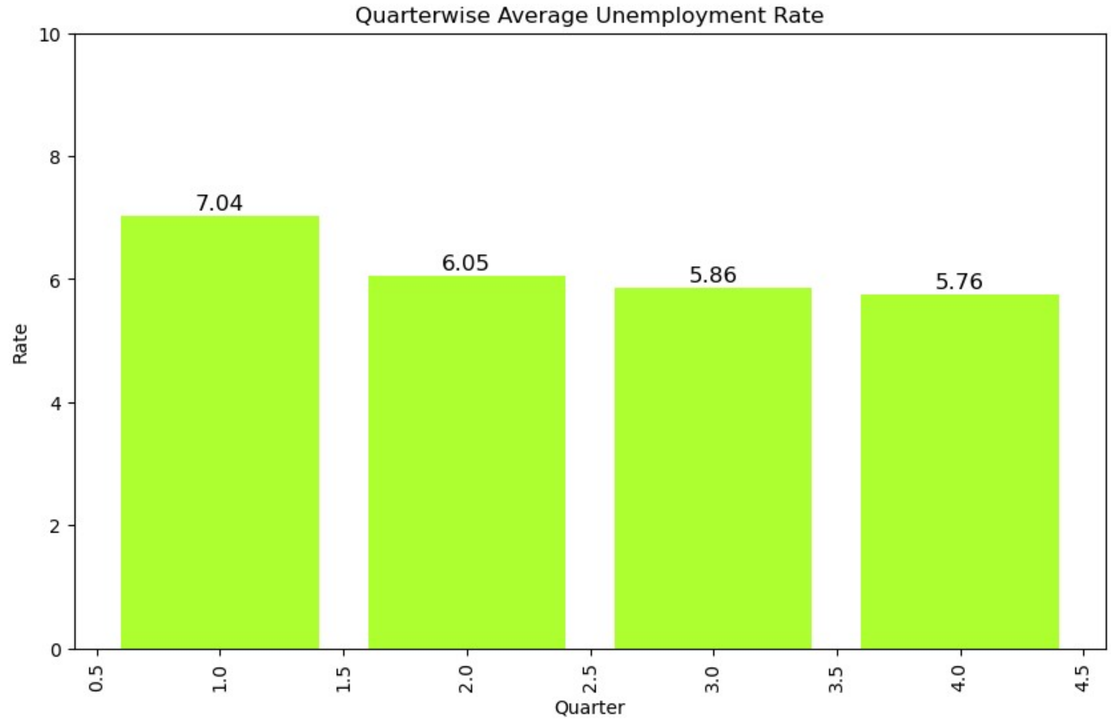
```
highest_values = df.groupby(['Quarter'])['Rate'].mean()
highest_values
```

```
Quarter
1    7.036077
2    6.047512
3    5.858108
4    5.755461
Name: Rate, dtype: float64
```

```
plt.figure(figsize=(20,8))
plt.plot(highest_values.index, highest_values.values,color="red")

plt.xlabel('Quarter')
plt.ylabel('Rate')
plt.title('Quarterwise Average Unemployment Rate')

for x, y in zip(highest_values.index, highest_values.values):
    y= round(float(y),2)
    plt.text(x, y+0.021, str(y),
ha='center',color='green',fontsize=14)
```



```
plt.figure(figsize=(10,6))
plt.bar(highest_values.index,
highest_values.values,color="greenyellow")

# set the axis labels and title
plt.xlabel('Quarter')
plt.ylabel('Rate')
plt.title('Quarterwise Average Unemployment Rate')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,10))
for i, v in enumerate(highest_values.values):
    plt.text(highest_values.index[i], v+0.1, str(round(v,2)),
fontsize=12, color='black', ha='center')
# show the plot
plt.show()
```



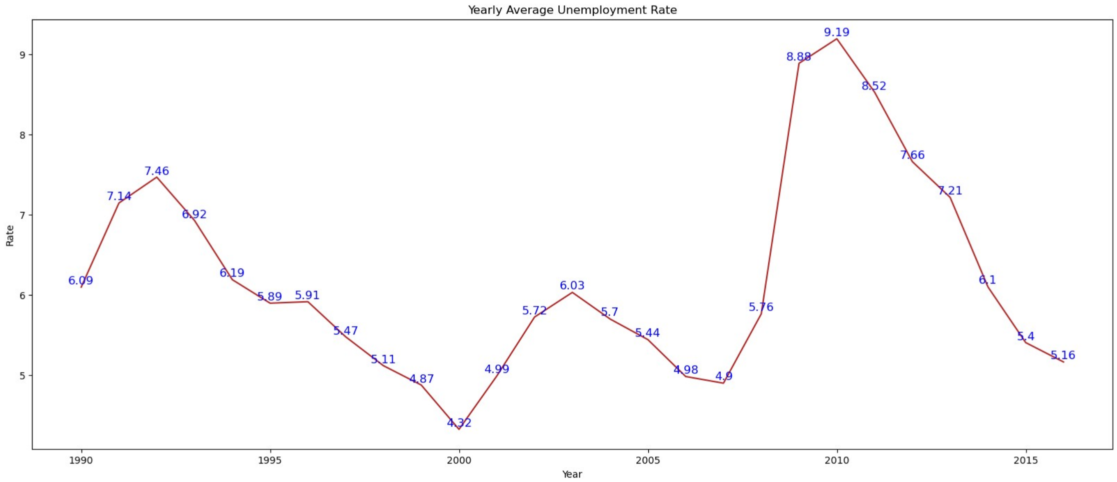
****Yearly Average Unemployment Rate****

```
highest_values = df.groupby(['Year'])['Rate'].mean()
highest_values
```

```
Year
1990    6.093021
1991    7.142391
1992    7.464904
1993    6.924037
1994    6.186649
1995    5.893411
1996    5.912081
1997    5.474520
1998    5.114221
1999    4.873476
2000    4.321123
2001    4.985591
2002    5.720915
2003    6.027990
2004    5.695817
2005    5.438981
2006    4.979263
2007    4.896069
2008    5.759990
2009    8.883838
2010    9.189580
2011    8.523477
```

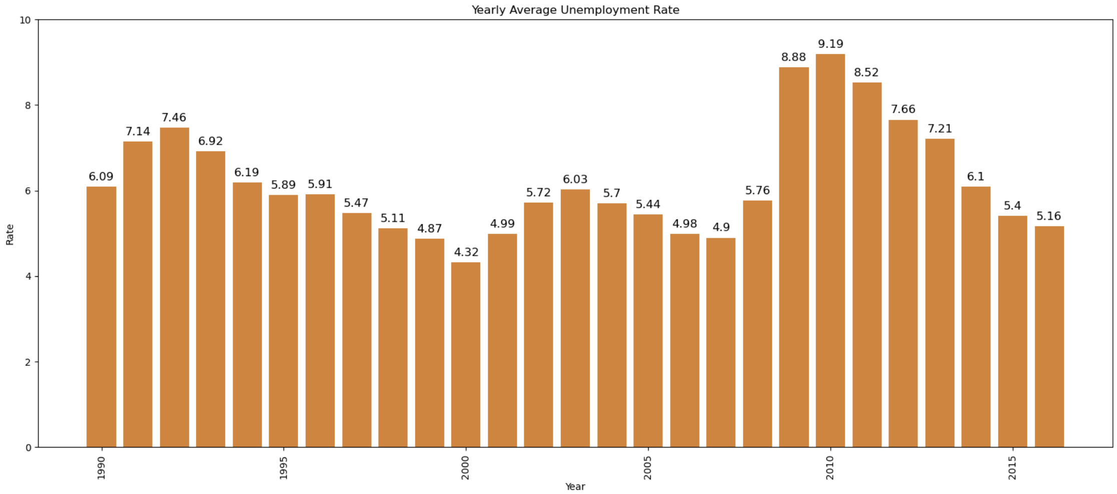
```
2012    7.657544
2013    7.211610
2014    6.096365
2015    5.401873
2016    5.160680
Name: Rate, dtype: float64
```

```
plt.figure(figsize=(20,8))
plt.plot(highest_values.index, highest_values.values,
color="firebrick")

plt.xlabel('Year')
plt.ylabel('Rate')
plt.title('Yearly Average Unemployment Rate')

for x, y in zip(highest_values.index, highest_values.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='blue',fontsize=12)
```



```
plt.figure(figsize=(20,8))
plt.bar(highest_values.index, highest_values.values,color="peru")

# set the axis labels and title
plt.xlabel('Year')
plt.ylabel('Rate')
plt.title('Yearly Average Unemployment Rate')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,10))
for i, v in enumerate(highest_values.values):
    plt.text(highest_values.index[i], v+0.15, str(round(v,2)),
fontsize=12, color='black', ha='center')
```

```
# show the plot
plt.show()
```



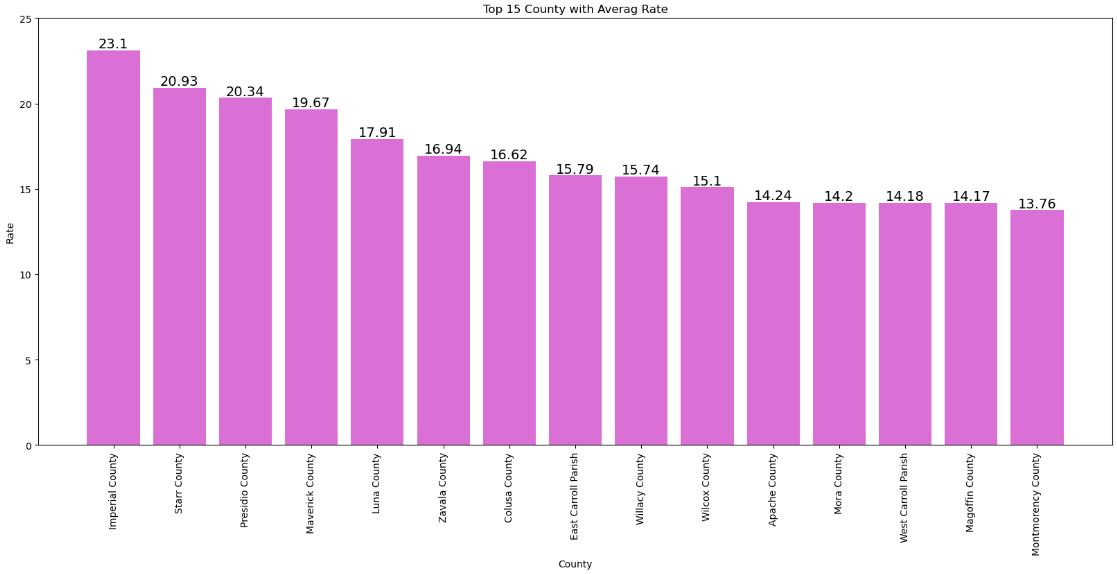
****Top 15 County with Average Rate****

```
highest_values = df.groupby(['County'])['Rate'].mean()
highest_values =highest_values.sort_values(ascending=False)[:15]
highest_values
```

```
County
Imperial County       23.102749
Starr County          20.932159
Presidio County       20.335683
Maverick County       19.669604
Luna County           17.909877
Zavala County         16.937004
Colusa County         16.622337
East Carroll Parish   15.788119
Willacy County        15.736123
Wilcox County         15.100926
Apache County         14.242901
Mora County           14.199074
West Carroll Parish   14.180198
Magoffin County       14.174587
Montmorency County    13.763014
Name: Rate, dtype: float64
```

```
top_15_county = highest_values.index
top_15_county
```

```
Index(['Imperial County', 'Starr County', 'Presidio County', 'Maverick
County',
       'Luna County', 'Zavala County', 'Colusa County', 'East Carroll
Parish',
       'Willacy County', 'Wilcox County', 'Apache County', 'Mora
County',
       'West Carroll Parish', 'Magoffin County', 'Montmorency
County'],
      dtype='object', name='County')

plt.figure(figsize=(20,8))
plt.bar(highest_values.index, highest_values.values,color="orchid")

# set the axis labels and title
plt.xlabel('County')
plt.ylabel('Rate')
plt.title('Top 15 County with Averag Rate')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,25))
for i, v in enumerate(highest_values.values):
    plt.text(highest_values.index[i], v+0.15, str(round(v,2)),
fontsize=14, color='black', ha='center')

# show the plot
plt.show()
```



****Top 10 Sates with Average Rate****

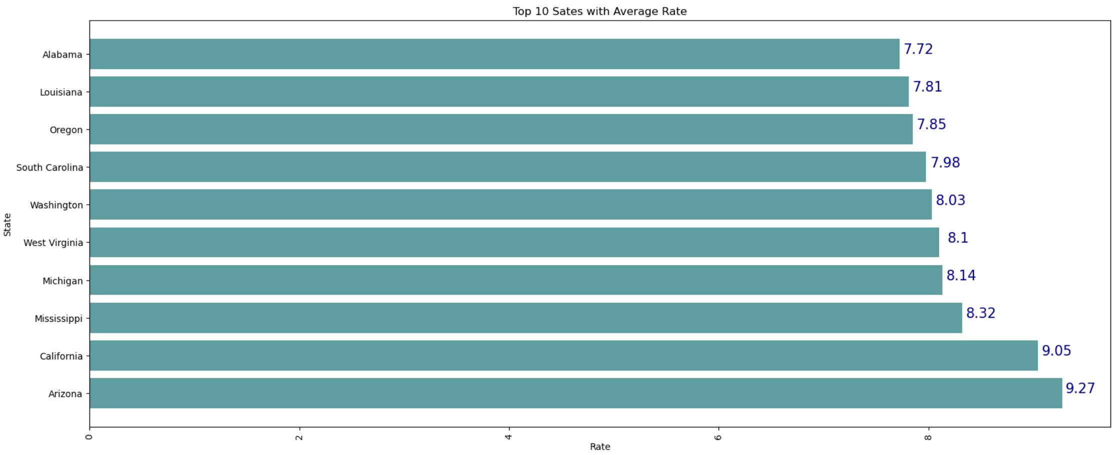
```
highest_values = df.groupby(['State'])['Rate'].mean()
highest_values =highest_values.sort_values(ascending=False)[:10]
highest_values

State
Arizona          9.274588
California       9.045005
Mississippi      8.320517
Michigan         8.136136
```

```
West Virginia     8.104809
Washington        8.031513
South Carolina    7.978737
Oregon            7.849271
Louisiana         7.812949
Alabama           7.723844
Name: Rate, dtype: float64
```

```
top_10_states = highest_values.index
top_10_states
```

```
Index(['Arizona', 'California', 'Mississippi', 'Michigan', 'West
Virginia',
       'Washington', 'South Carolina', 'Oregon', 'Louisiana',
'Alabama'],
      dtype='object', name='State')
```

```
plt.figure(figsize=(20,8))
plt.barh(highest_values.index,
highest_values.values,color="cadetblue")

# set the axis labels and title
plt.xlabel('Rate')
plt.ylabel('State')
plt.title('Top 10 Sates with Average Rate')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
# for i, v in enumerate(highest_values.values):
#     plt.text(highest_values.index[i], v+0.15, str(round(v,2)),
fontsize=14, color='red', ha='center')
for i, v in enumerate(highest_values.values):
    plt.text(v+0.18,highest_values.index[i],str(round(v,2)),
fontsize=15, color='darkblue', ha='center')
# show the plot
plt.show()
```



****Compairing Rate Century wise****

```
df_20_century = df[df.Year >= 2000]
df_20_century.head()
```

```
   Year     Month        State         County  Rate  Quarter
year_z_score  \
0  2015  February  Mississippi  Newton County   6.1        1
1.533566
1  2015  February  Mississippi  Panola County   9.4        1
1.533566
2  2015  February  Mississippi  Monroe County   7.9        1
1.533566
3  2015  February  Mississippi   Hinds County   6.1        1
1.533566
4  2015  February  Mississippi  Kemper County  10.6        1
1.533566

   rate_z_score
0     -0.024099
1      1.036130
2      0.554208
3     -0.024099
4      1.421669
```

```
df_19_century = df[df.Year < 2000]
df_19_century.head()
```

```
        Year     Month        State         County  Rate  Quarter  \
238076  1991  February  Mississippi  Newton County   6.9        1
238077  1991  February  Mississippi  Panola County  10.2        1
238078  1991  February  Mississippi  Monroe County  11.3        1
238079  1991  February  Mississippi   Hinds County   6.6        1
238080  1991  February  Mississippi  Kemper County  10.5        1

        year_z_score  rate_z_score
238076      -1.53357      0.232926
238077      -1.53357      1.293156
238078      -1.53357      1.646566
238079      -1.53357      0.136542
238080      -1.53357      1.389540
```

****Month Wise****

```
year_20_century = df_20_century.groupby(['Month'])['Rate'].mean()
year_20_century = year_20_century.reset_index()
year_20_century.index=pd.CategoricalIndex(year_20_century['Month'],cat
egories=new_order,ordered=True)
year_20_century=year_20_century.sort_index().reset_index(drop=True)
year_20_century= year_20_century.set_index("Month")
year_20_century
```

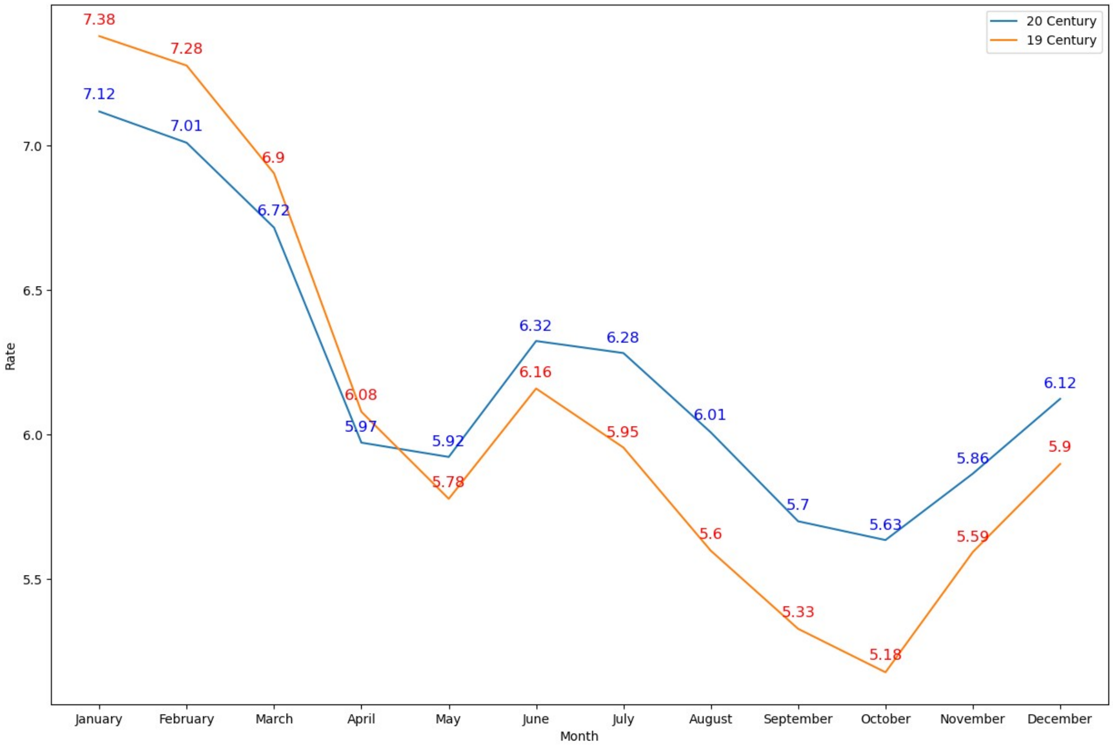
```
               Rate
Month
January    7.117721
February   7.009526
March      6.715785
April      5.971718
May        5.922215
June       6.323440
July       6.281733
August     6.007207
September  5.699531
October    5.634574
November   5.864494
December   6.123288
```

```
year_19_century = df_19_century.groupby(['Month'])['Rate'].mean()
year_19_century = year_19_century.reset_index()
year_19_century.index=pd.CategoricalIndex(year_19_century['Month'],cat
egories=new_order,ordered=True)
year_19_century=year_19_century.sort_index().reset_index(drop=True)
year_19_century= year_19_century.set_index("Month")
year_19_century
```

```
               Rate
Month
January    7.378556
February   7.276687
March      6.903517
April      6.078455
May        5.777284
June       6.158979
July       5.954647
August     5.597750
September  5.327330
October    5.176932
November   5.593072
December   5.897779
```

```
# Plotting columns from df1 and df2
plt.figure(figsize=(15, 10))

# Plotting column from df1
plt.plot(year_20_century.index, year_20_century.values, label='20
Century')
for x, y in zip(year_20_century.index, year_20_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='blue',fontsize=12)

# Plotting column from df2
plt.plot(year_19_century.index, year_19_century.values , label='19
Century')
```

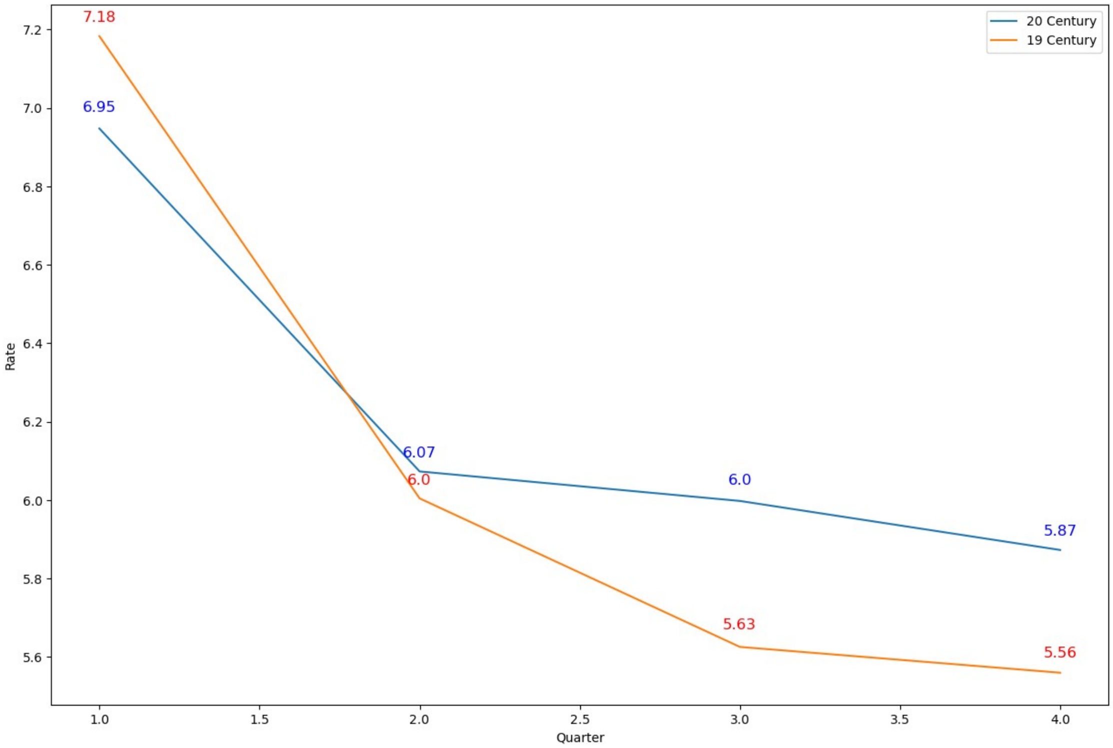
```
for x, y in zip(year_19_century.index, year_19_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='red',fontsize=12)

# Setting the axis labels
plt.xlabel('Month')
plt.ylabel('Rate')

# Adding a legend
plt.legend()

# Displaying the plot
plt.show()
```



****Quarter wise****

```
quarter_20_century = df_20_century.groupby(['Quarter'])['Rate'].mean()
quarter_19_century = df_19_century.groupby(['Quarter'])['Rate'].mean()

# Plotting columns from df1 and df2
plt.figure(figsize=(15, 10))

# Plotting column from df1
plt.plot(quarter_20_century.index, quarter_20_century.values,
label='20 Century')
for x, y in zip(quarter_20_century.index, quarter_20_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='blue',fontsize=12)
```

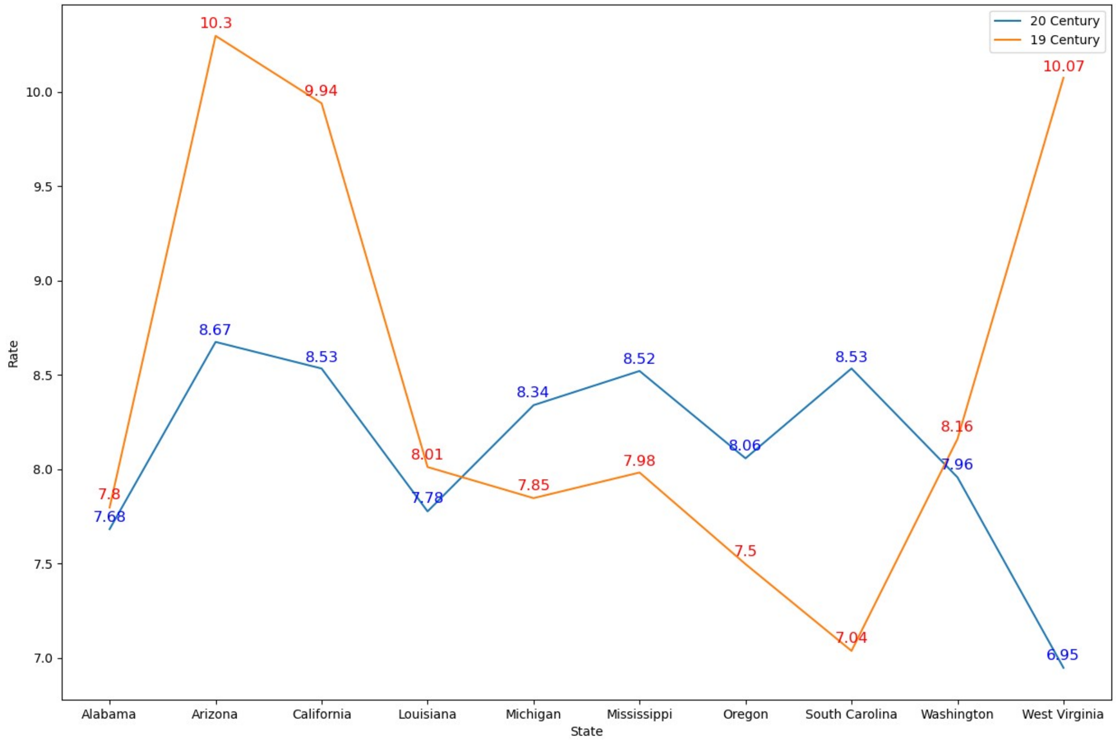
```
# Plotting column from df2
plt.plot(quarter_19_century.index, quarter_19_century.values ,
label='19 Century')
for x, y in zip(quarter_19_century.index, quarter_19_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='red',fontsize=12)

# Setting the axis labels
plt.xlabel('Quarter')
plt.ylabel('Rate')

# Adding a legend
plt.legend()

# Displaying the plot
plt.show()
```



****State wise****

```
def get_state_name(state):
    if state in top_10_states:
        return True
    else:
        return False

state_20_century = df_20_century[df_20_century.State.apply(lambda
x:get_state_name(x))]
```

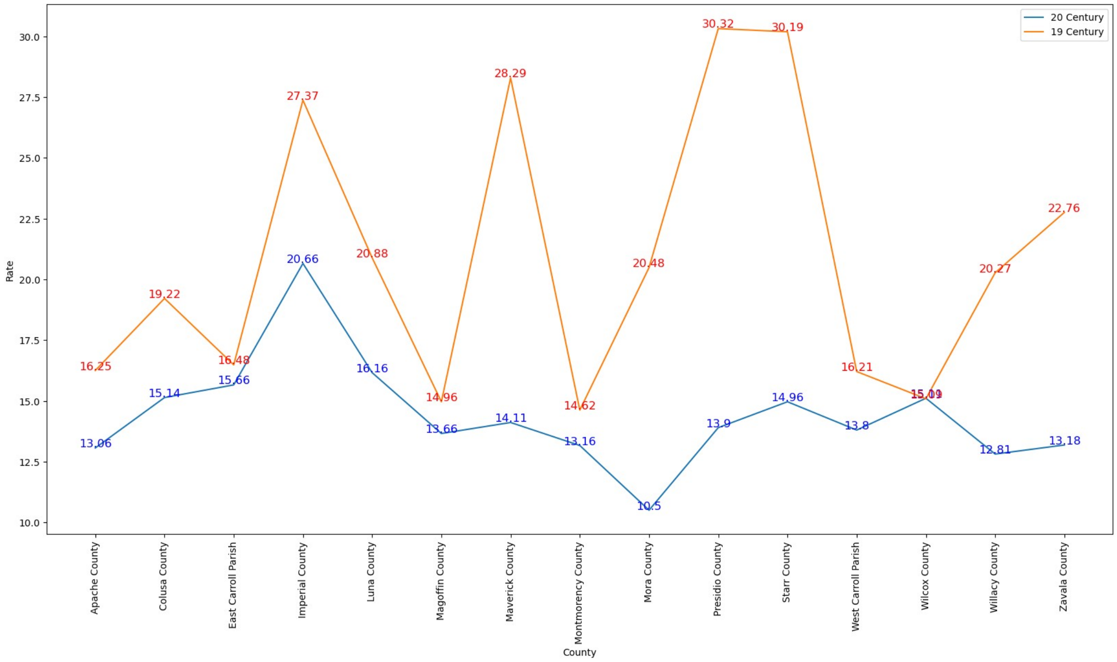
```python
top_10_state_20_century = state_20_century.groupby(['State'])
['Rate'].mean()

state_19_century = df_19_century[df_19_century.State.apply(lambda
x:get_state_name(x))]
top_10_state_19_century = state_19_century.groupby(['State'])
['Rate'].mean()

# Plotting columns from df1 and df2
plt.figure(figsize=(15, 10))

# Plotting column from df1
plt.plot(top_10_state_20_century.index,
top_10_state_20_century.values, label='20 Century')
for x, y in zip(top_10_state_20_century.index,
top_10_state_20_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='blue',fontsize=12)

# Plotting column from df2
plt.plot(top_10_state_19_century.index, top_10_state_19_century.values
, label='19 Century')
for x, y in zip(top_10_state_19_century.index,
top_10_state_19_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='red',fontsize=12)

# Setting the axis labels
plt.xlabel('State')
plt.ylabel('Rate')

# Adding a legend
plt.legend()

# Displaying the plot
plt.show()
```



****County wise****

```
def get_county_name(county):
    if county in top_15_county:
        return True
    else:
        return False

county_20_century = df_20_century[df_20_century.County.apply(lambda
x:get_county_name(x))]
top_15_county_20_century = county_20_century.groupby(['County'])
['Rate'].mean()

county_19_century = df_19_century[df_19_century.County.apply(lambda
x:get_county_name(x))]
top_15_county_19_century = county_19_century.groupby(['County'])
['Rate'].mean()

# Plotting columns from df1 and df2
plt.figure(figsize=(20, 10))

# Plotting column from df1
plt.plot(top_15_county_20_century.index,
top_15_county_20_century.values, label='20 Century')
for x, y in zip(top_15_county_20_century.index,
top_15_county_20_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='blue',fontsize=12)
```

```
# Plotting column from df2
plt.plot(top_15_county_19_century.index,
top_15_county_19_century.values , label='19 Century')
for x, y in zip(top_15_county_19_century.index,
top_15_county_19_century.values):
    y= round(float(y),2)
    plt.text(x, y+0.04, str(y), ha='center',color='red',fontsize=12)

# Setting the axis labels
plt.xlabel('County')
plt.ylabel('Rate')
plt.xticks(rotation=90)

# Adding a legend
plt.legend()

# Displaying the plot
plt.show()
```



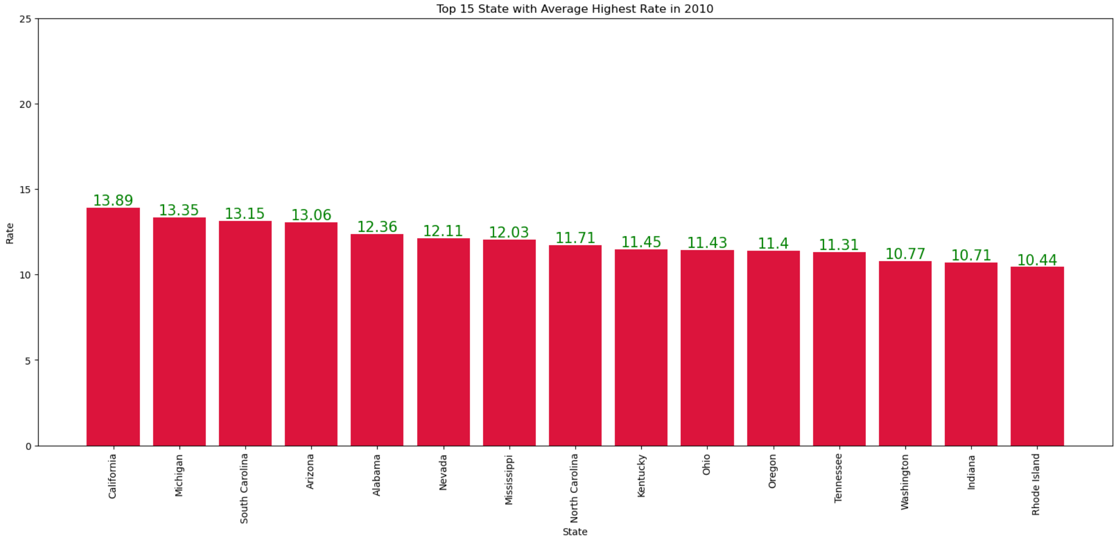
****Analzing Year with Highest Rate i.e. 2010****

```
df_2010 = df[df.Year==2010]
df_2010.head()
```

```
        Year     Month        State          County  Rate  Quarter  \
136792  2010  February  Mississippi  Newton County  10.5        1
136793  2010  February  Mississippi  Panola County  15.0        1
136794  2010  February  Mississippi  Monroe County  14.3        1
136795  2010  February  Mississippi   Hinds County  10.4        1
```

```
136796  2010  February  Mississippi  Kemper County  14.5        1

        year_z_score  rate_z_score
136792      0.894579      1.389540
136793      0.894579      2.835308
136794      0.894579      2.610411
136795      0.894579      1.357412
136796      0.894579      2.674667
```

```
year_2010_rate = df_2010.groupby(['State'])['Rate'].mean()
year_2010_rate = year_2010_rate.sort_values(ascending=False)[:15]

plt.figure(figsize=(20,8))
plt.bar(year_2010_rate.index, year_2010_rate.values,color="crimson")

# set the axis labels and title
plt.xlabel('State')
plt.ylabel('Rate')
plt.title('Top 15 State with Average Highest Rate in 2010')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,25))
for i, v in enumerate(year_2010_rate.values):
    plt.text(year_2010_rate.index[i], v+0.15, str(round(v,2)),
fontsize=15, color='green', ha='center')

# show the plot
plt.show()
```



****California has highest Rate in 2010****

****Analyzing California in 2010****

```
df_2010_california = df_2010[df_2010.State=="California"]
df_2010_california.head()
```

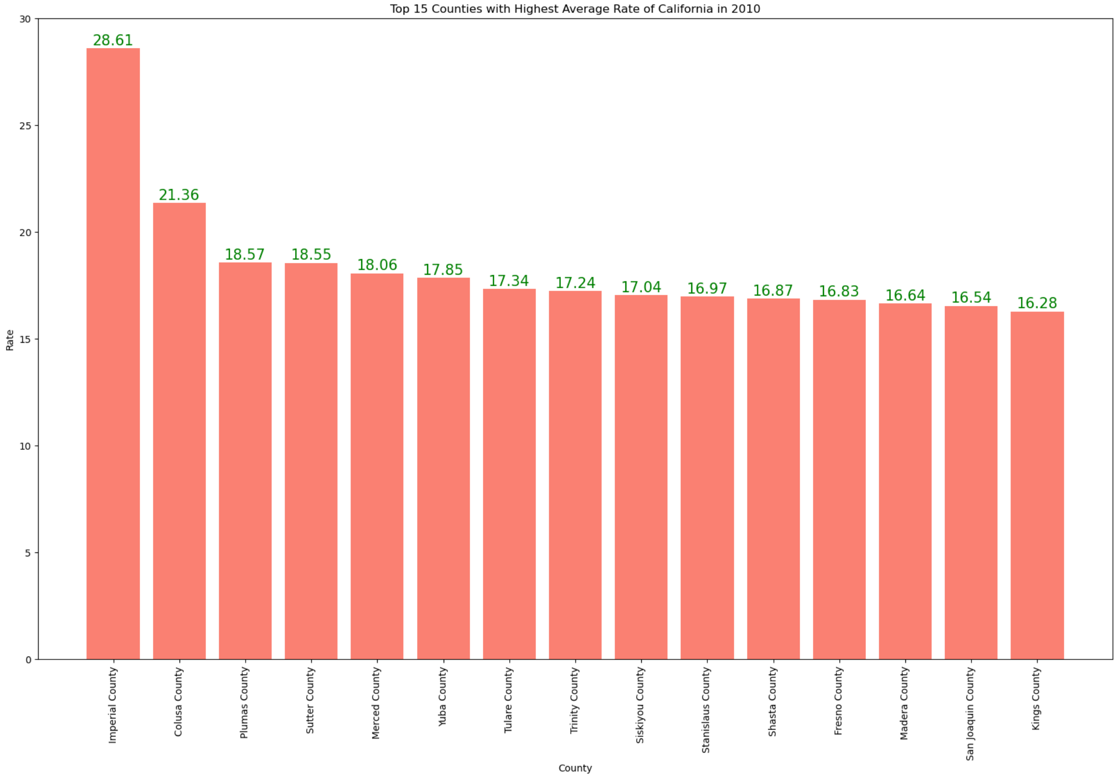
```
        Year     Month       State                  County  Rate
Quarter  \
138157  2010  February  California         Humboldt County  11.3
1
138158  2010  February  California           Sonoma County  11.5
1
138159  2010  February  California  San Luis Obispo County  10.2
1
138160  2010  February  California            Glenn County  17.6
1
138161  2010  February  California           Nevada County  12.1
1

        year_z_score  rate_z_score
138157      0.894579      1.646566
138158      0.894579      1.710822
138159      0.894579      1.293156
138160      0.894579      3.670641
138161      0.894579      1.903591
```

```
california_2010_county_rate = df_2010_california.groupby(['County'])
['Rate'].mean()
california_2010_county_rate =
california_2010_county_rate.sort_values(ascending=False)[:15]
california_2010_county_rate
```

```
County
Imperial County       28.61
Colusa County         21.36
Plumas County         18.57
Sutter County         18.55
Merced County         18.06
Yuba County           17.85
Tulare County         17.34
Trinity County        17.24
Siskiyou County       17.04
Stanislaus County     16.97
Shasta County         16.87
Fresno County         16.83
Madera County         16.64
San Joaquin County    16.54
Kings County          16.28
Name: Rate, dtype: float64
```

```
plt.figure(figsize=(20,12))
plt.bar(california_2010_county_rate.index,
california_2010_county_rate.values,color="salmon")
```

```
# set the axis labels and title
plt.xlabel('County')
plt.ylabel('Rate')
plt.title('Top 15 Counties with Highest Average Rate of California in
2010')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,30))
for i, v in enumerate(california_2010_county_rate.values):
    plt.text(california_2010_county_rate.index[i], v+0.15,
str(round(v,2)), fontsize=15, color='green', ha='center')

# show the plot
plt.show()
```



****Imperial County has highest rate for California Sate in 2010****

****Analyzing Imperial County in 2010****

```
df_imperial_county =
df_2010_california[df_2010_california.County=="Imperial County"]
df_imperial_county.head()
```

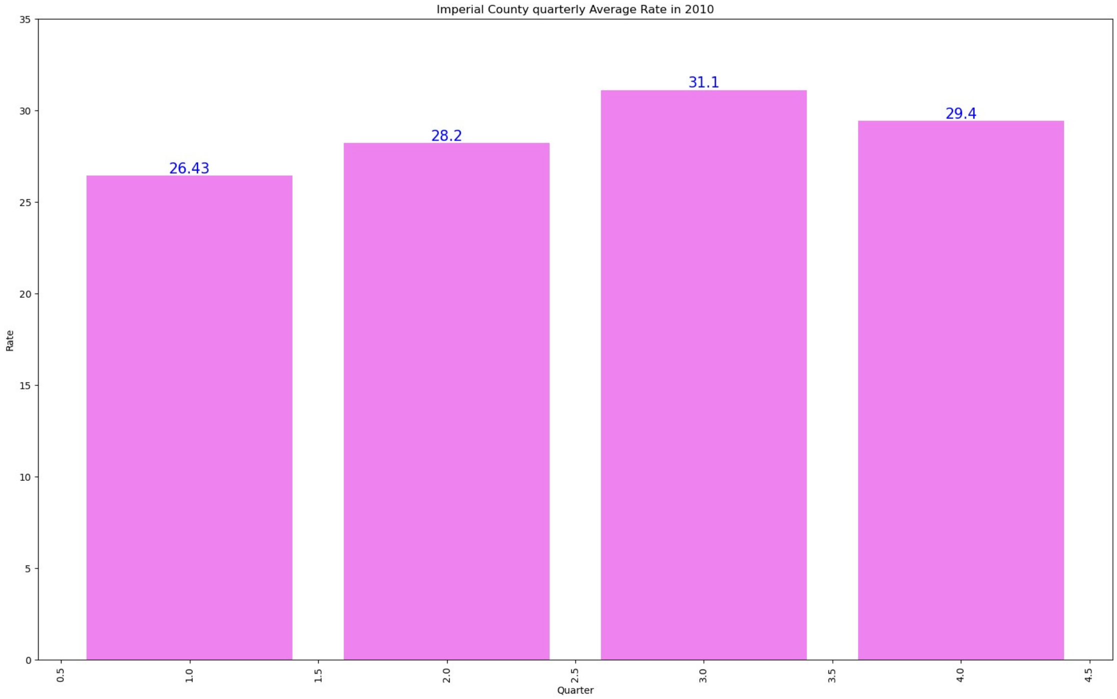
```
        Year     Month       State           County  Rate  Quarter  \
138183  2010  February  California  Imperial County  26.7        1
141068  2010   October  California  Imperial County  30.5        4
```

```
143953  2010     March  California  Imperial County  26.1        1
149665  2010       May  California  Imperial County  28.2        2
152550  2010   January  California  Imperial County  26.5        1

        year_z_score  rate_z_score
138183      0.894579      6.594304
141068      0.894579      7.815175
143953      0.894579      6.401535
149665      0.894579      7.076227
152550      0.894579      6.530048
```

```
imperial_county_2010_rate_quarterly =
df_imperial_county.groupby(['Quarter'])['Rate'].mean()
imperial_county_2010_rate_quarterly =
imperial_county_2010_rate_quarterly.sort_values(ascending=False)
imperial_county_2010_rate_quarterly
```

```
Quarter
3    31.100000
4    29.400000
2    28.200000
1    26.433333
Name: Rate, dtype: float64
```

```
plt.figure(figsize=(20,12))
plt.bar(imperial_county_2010_rate_quarterly.index,
imperial_county_2010_rate_quarterly.values,color="violet")

# set the axis labels and title
plt.xlabel('Quarter')
plt.ylabel('Rate')
plt.title('Imperial County quarterly Average Rate in 2010')

# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,35))
for i, v in enumerate(imperial_county_2010_rate_quarterly.values):
    plt.text(imperial_county_2010_rate_quarterly.index[i], v+0.15,
str(round(v,2)), fontsize=15, color='blue', ha='center')

# show the plot
plt.show()
```



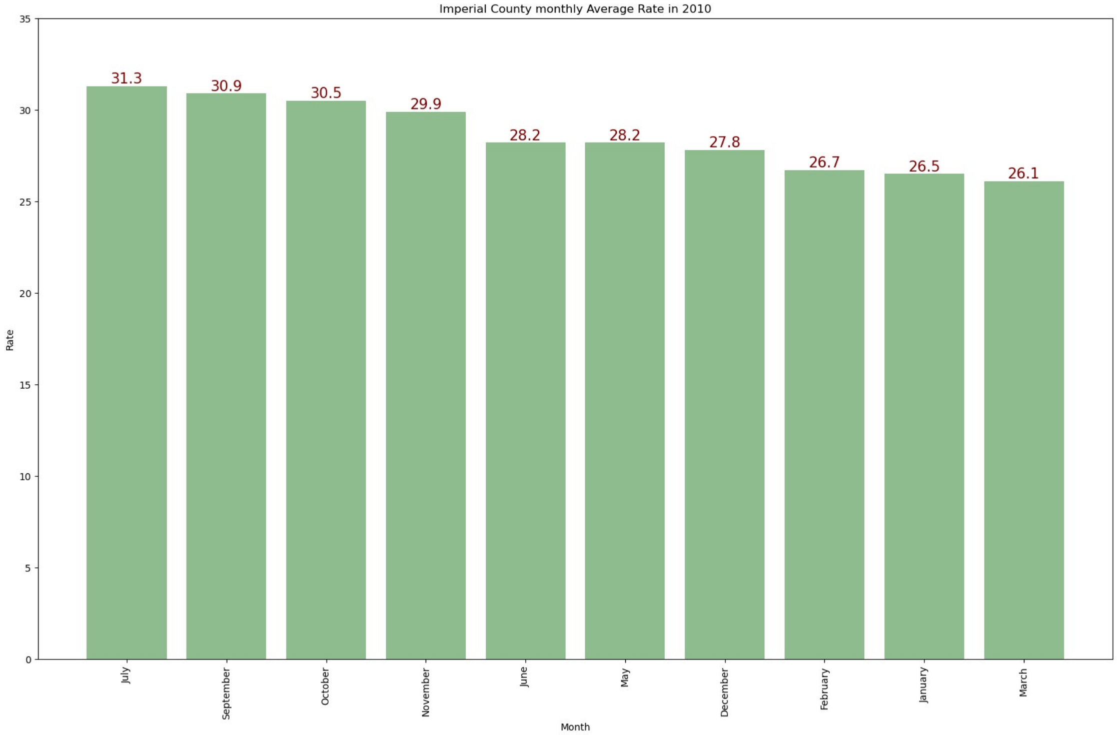
****Unemployment rate is around to 30 in third and fourth quarter, which is very high.****

```
imperial_county_2010_rate = df_imperial_county.groupby(['Month'])
['Rate'].mean()
imperial_county_2010_rate =
imperial_county_2010_rate.sort_values(ascending=False)
imperial_county_2010_rate
```

```
Month
July         31.3
September    30.9
October      30.5
November     29.9
June         28.2
May          28.2
December     27.8
February     26.7
January      26.5
March        26.1
Name: Rate, dtype: float64
```

```
plt.figure(figsize=(20,12))
plt.bar(imperial_county_2010_rate.index,
imperial_county_2010_rate.values,color="darkseagreen")

# set the axis labels and title
plt.xlabel('Month')
plt.ylabel('Rate')
plt.title('Imperial County monthly Average Rate in 2010')
```

```
# rotate the x-axis labels for better visibility
plt.xticks(rotation=90)
plt.ylim((0,35))
for i, v in enumerate(imperial_county_2010_rate.values):
    plt.text(imperial_county_2010_rate.index[i], v+0.15,
str(round(v,2)), fontsize=15, color='maroon', ha='center')

# show the plot
plt.show()
```



****Imperial County has Unmployment Rate to approx more than 30 from July to November. Hence Imperial County is plays major role in California higher unemployment rate and rate is most in 2010****