Donation Analysis

- We are going to run an analysis of the data collected from donations made from donors in 2008
- From the analysis we would be able to view the following
- A high-level snapshot of the donors key metrics, presented in a table format
- A graphical analysis of the data

Import necessary libraries dependencies

In [1]:
```
# Dependencies - Files to load
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
pd.options.mode.chained_assignment = None
donors_df = pd.read_csv("Resources/donors2008.csv")
```

Statistical Overview of DataFrame

In [2]:
```
# Display a statistical overview of the dataframe
donors_df.describe().round(2)
```

Out[2]:

	Amount
count	1776.00
mean	659.31
std	1274.42
min	5.00
25%	200.00
50%	250.00
75%	500.00
max	5000.00

In [3]:
```
# Display the number of rows and columns, the data type of each column, the nu
mber of non-NaN elements, and the total memory usage.
donors_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1776 entries, 0 to 1775
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype  
---  ------     --------------  -----  
 0   LastName   1776 non-null   object 
 1   FirstName  1776 non-null   object 
 2   Employer   1743 non-null   object 
 3   City       1776 non-null   object 
 4   State      1776 non-null   object 
 5   Zip        1776 non-null   object 
 6   Amount     1776 non-null   float64
dtypes: float64(1), object(6)
memory usage: 97.2+ KB
```

Cleaning Data

- Determine if there is any missing values
- Drop rows of NAN

In [4]:
```
# Determine if there are any missing values
donors_df.count()
```

Out[4]:
```
LastName     1776
FirstName    1776
Employer     1743
City         1776
State        1776
Zip          1776
Amount       1776
dtype: int64
```

In [5]:
```
# Drop missing values
donors_df = donors_df.dropna(how='any')
```

Cleaning Names and Replacing Substrings in a Python String

- Prefixes: "Dr. ", "Mr. ","Ms. ", "Mrs. ", "Miss"
- Suffixes: " MD", " DDS", " DVM", " PhD"

In [6]:
```
# Add prefix to remove it from list
prefixes = ["Dr. ", "Mr. ","Ms. ", "Mrs. ", "Miss "]

# Iterate through the words in the prefix list and replace them with an empty
 space,""
for word in prefixes:
    donors_df['FirstName']= donors_df['FirstName'].str.replace(word,"")
```

In [7]:
```
# Add suffix to remove it from list
suffixes =[" MD", " DDS", " DVM", " PhD"]

# Iterate through the words in the prefix list and replace them with an empty
 space,""
for word in suffixes:
    donors_df['LastName'] = donors_df["LastName"].str.replace(word,"")
```

In [8]:
```
# Cleanup and rename columns names to more explanatory names using a ditionary
donors_df = donors_df.rename(columns={"LastName": 'Last Name,',"FirstName": 'F
irst Name'})
donors_df.head()
```

Out[8]:

	Last Name,	First Name	Employer	City	State	Zip	Amount
0	Aaron	Eugene	State Department	Dulles	VA	20189	500.0
1	Abadi	Barbara	Abadi & Co.	New York	NY	10021	200.0
2	Adamany	Anthony	Retired	Rockford	IL	61103	500.0
3	Adams	Lorraine	Self	New York	NY	10026	200.0
4	Adams	Marion	None	Exeter	NH	3833	100.0

Determinie data in Rows and Columns

In [9]:
```
# Display the 1st, 9th, 49, and 99th row information
# Display rows 0 to 3
test1=donors_df.loc[[0,8,48,98]]
test2=donors_df.loc[0:3]
print(test1)
print(test2)
```

```
   Last Name, First Name           Employer          City State    Zip  \
0       Aaron     Eugene    State Department       Dulles    VA  20189
8       Adida        Ben  Harvard University  Mountain View    CA  94043
48     Arnold       Marc               Self      Longmont    CO  80503
98     Baruch        Ann               None     Haverford    PA  19041

    Amount
0    500.0
8    200.0
48   200.0
98   500.0
  Last Name, First Name          Employer      City State    Zip  Amount
0      Aaron     Eugene  State Department    Dulles    VA  20189   500.0
1      Abadi    Barbara       Abadi & Co.  New York    NY  10021   200.0
2    Adamany    Anthony           Retired  Rockford    IL  61103   500.0
3      Adams   Lorraine              Self  New York    NY  10026   200.0
```

In [10]:
```
# test1- sort dataframe based on a column value['amount'] lowest to highest (ASC)
test1 = donors_df.sort_values(by='Amount', ascending=True).head(10)
print(test1)
```

```
     Last Name, First Name                          Employer           City  \
823     Kaufman    Harriet                              Self       New York
321      Corroo   Mary Coe                         Bob Evans     Cape Coral
1211     Parker       Lisa  Lawrence Welk Family Foundation   Santa Monica
448       Emery    Deborah          Califronia Men's Colony  Arroyo Grande
1336      Rolls     Harold                              None     Fort Plain
562       Gibbs      Vicki                              Self      Roseville
1775    Zyskind        Jon                      JDS Uniphase        Concord
1126    Naegele     Cushla                   VOS Selections       New York
1197      Paley   Patricia      NYC Department of Education       Brooklyn
1218   Pawlenko    Natalie                             NJDHSS      Princeton

     State         Zip  Amount
823     NY       10003     5.0
321     FL       33990     5.0
1211    CA       90404    10.0
448     CA       93420    15.0
1336    NY       13339    20.0
562     CA  95661-5402    20.0
1775    MA       10742    25.0
1126    NY       10025    25.0
1197    NY  11238-4001    25.0
1218    NJ        8540    25.0
```

In [11]:
```
# Display the data from the 2nd, 4th, and 6th columns showing rows 1,3 and 4
donors_df.loc[[1,3,4],["First Name","City","Zip"]]
```

Out[11]:

	First Name	City	Zip
1	Barbara	New York	10021
3	Lorraine	New York	10026
4	Marion	Exeter	3833

In [12]:
```
# Print the data from the the first column
donors_df.iloc[:,0].head()
```

Out[12]:
```
0      Aaron
1      Abadi
2    Adamany
3      Adams
4      Adams
Name: Last Name,, dtype: object
```

In [13]:
```
# Print data from the first three coluns showing last five rows
donors_df.iloc[:, 0:3].tail()
```

Out[13]:

	Last Name,	First Name	Employer
1769	Zeluf	Craig	TD Ameritrade
1770	Zimmer	Charles	RZO LLC / QED Productions
1771	Zinczenko	David	Rodale
1774	Zwerdling	David	Montg Cnty, Md
1775	Zyskind	Jon	JDS Uniphase

In [14]:
```
# Display first five rows in the second column
donors_df.iloc[:, 1].head()
```

Out[14]:
```
0      Eugene
1     Barbara
2     Anthony
3    Lorraine
4      Marion
Name: First Name, dtype: object
```

In [15]:
```
# Print row 1 and row 3 with all columns
donors_df.iloc[[1,3], :]
```

Out[15]:

	Last Name,	First Name	Employer	City	State	Zip	Amount
1	Abadi	Barbara	Abadi & Co.	New York	NY	10021	200.0
3	Adams	Lorraine	Self	New York	NY	10026	200.0

In [16]:
```
# Display the name 'Lorraine (4th row second column)
donors_df.iloc[3,1]
```

Out[16]: 'Lorraine'

Donors Donation Summary

- Donations by city [New York]
- Donations by state [Maryland, MD]
- Donation over $1,000.00
- Maximum & Minimum values donated by state
- Mean(average) donation by state

In [17]:
```
# Display the First Name of the donors from New York(five rows only)
donors_df.loc[donors_df["City"]=='New York',["First Name"]].head()
```

Out[17]:

	First Name
1	Barbara
3	Lorraine
16	Carolyn
30	Razi
42	Alexandros

In [18]:
```
# Display donors from the state of Maryland (MD)
donors_df.loc[donors_df["State"]== "MD",["First Name"]].head()
```

Out[18]:

	First Name
7	Clifford
20	Bruce
40	Mahlon
62	Margaret
69	Sandra

In [19]:
```
# display donors who donated $1000 or more (first 5)
donors_df.loc[donors_df['Amount']>= 1000,['First Name']].head()
```

Out[19]:

	First Name
9	Michael M.
11	Alexander
15	Ben
25	Ralph
27	Jeremy

In [20]:
```
# What is the minimum and maximum amount donated by each state(show five and d
ollar value)
min_df=donors_df.groupby('State')['Amount'].min().map("${:,.2f}".format).head
()
max_df=donors_df.groupby('State')['Amount'].max().map("${:,.2f}".format).head
()
print(min_df)
print(max_df)
```

```
State
AE    $100.00
AK     $50.00
AL     $50.00
AP    $200.00
AR    $100.00
Name: Amount, dtype: object
State
AE      $100.00
AK      $500.00
AL      $500.00
AP      $200.00
AR    $1,000.00
Name: Amount, dtype: object
```

In [21]:
```
# What is the average donation amount per state (show ten and dollar value)
donors_df.groupby("State")["Amount"].mean().map("${:,.2f}".format).head(10)
```

Out[21]:
```
State
AE    $100.00
AK    $175.00
AL    $212.50
AP    $200.00
AR    $350.00
AZ    $206.00
CA    $692.23
CO    $851.25
CT    $825.71
DC    $647.12
Name: Amount, dtype: object
```

Donors Percentage Summary

- States Donation Percentage
- Cities Donation Percentage
- Average Donation by State

In [22]:
```
# Get the percentage donation value for state
# Get the percentage donation value for city

# First calculate the total amount for each state and then each city
# then  divide it by the total amount of donation collected and * 100
pcnt_state = donors_df.groupby("State")['Amount'].sum()
pcnt_city = donors_df.groupby("City")["Amount"].sum()
donors_total = donors_df['Amount'].sum()
```

In [23]:
```
percentage_state = pcnt_state/ float(donors_total) * 100
percentage_city = pcnt_city/ float(donors_total) * 100
```

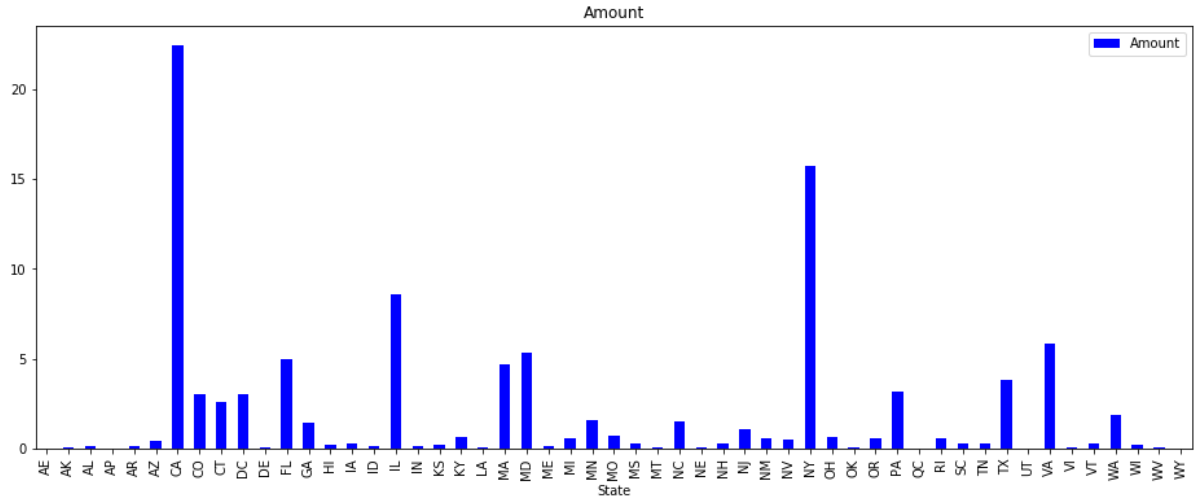
In [24]:
```
# Average Donations by State
# Average Donations by City
avg_state = donors_df.groupby("State")["Amount"].mean()
avg_city = donors_df.groupby("City")["Amount"].mean()
```

Graphical Summary

- Percentage of Donation by State
- Average Donaton by State
- Maxiumum Donations by State
- Minimum Donations by State

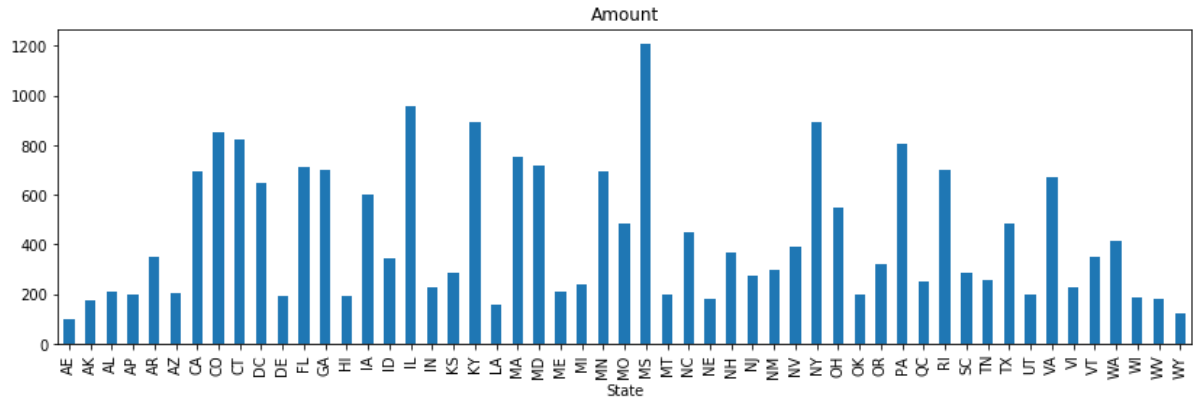
In [63]:
```
# Percentage of donations by state
percentage_state.plot(kind='bar',subplots=True, color='blue',figsize=(16, 6));
plt.legend()
percentage_state.head(10)
```

Out[63]:
```
State
AE     0.008963
AK     0.094108
AL     0.152366
AP     0.017925
AR     0.156847
AZ     0.461578
CA    22.397384
CO     3.051793
CT     2.590215
DC     3.015943
Name: Amount, dtype: float64
```



In [47]:
```
# Average donations by state
avg_state.plot(kind='bar',subplots=True,figsize=(14,4))
avg_state.head(10)
```

Out[47]:
```
State
AE    100.000000
AK    175.000000
AL    212.500000
AP    200.000000
AR    350.000000
AZ    206.000000
CA    692.232687
CO    851.250000
CT    825.714286
DC    647.115385
Name: Amount, dtype: float64
```

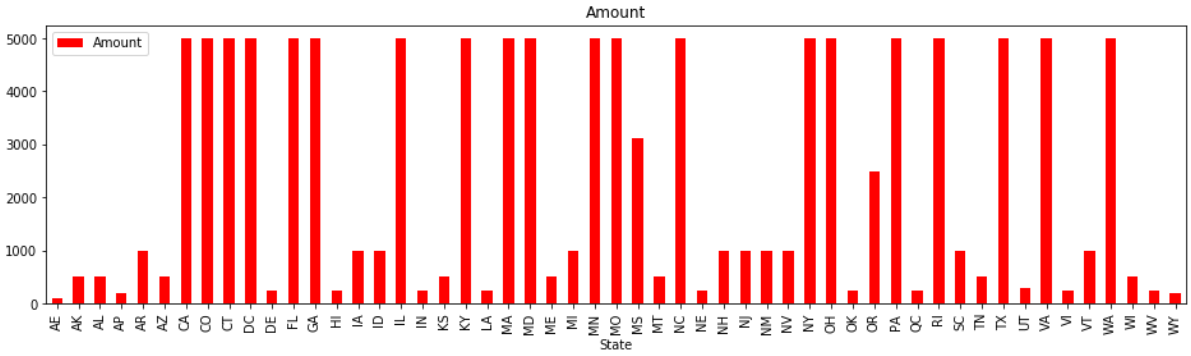


In [54]:
```
# Maximun donations by state
max_df=donors_df.groupby('State')['Amount'].max()
max_df.head(10)
```

Out[54]:
```
State
AE     100.0
AK     500.0
AL     500.0
AP     200.0
AR    1000.0
AZ     500.0
CA    5000.0
CO    5000.0
CT    5000.0
DC    5000.0
Name: Amount, dtype: float64
```

In [59]:
```
max_df.plot(kind='bar',subplots=True, color='red',figsize=(16, 4)); plt.legend()
```

Out[59]:
```
<matplotlib.legend.Legend at 0x215001a7d08>
```



In [60]:
```
# Minimum donations by state
min_df=donors_df.groupby('State')['Amount'].min()
min_df.head(10)
```

Out[60]:
```
State
AE    100.0
AK     50.0
AL     50.0
AP    200.0
AR    100.0
AZ     25.0
CA     10.0
CO     50.0
CT     25.0
DC     25.0
Name: Amount, dtype: float64
```

In [62]:
```
min_df.plot(kind='bar',subplots=True, color='red',figsize=(16, 4)); plt.legend()
```

Out[62]:
```
<matplotlib.legend.Legend at 0x215009e6b08>
```