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DAP Lab Exp.No.10

2012 Federal Election Commission Database:

The US Federal Election Commission publishes data on contributions to political campaigns. This includes contributor names, occupation and employer, address, and contribution amount. An interesting dataset is from the 2012 US presidential election

1. Load CSV file and convert into data frame
2. Compute an array of political parties from the candidate names
3. Analyze donation statistics by occupation and employer
4. Use pivot_table to aggregate the data by party and occupation
5. Plot total donations by party for top occupations
6. Bucketing donation amounts
7. Plot Percentage of total donations received by candidates for each donation size
8. Analyze donation statistics by state

In [1]:

```
from google.colab import drive
drive.mount('/content/drive/')
```

```
Mounted at /content/drive/
```


In [2]:

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

sns.set_style("darkgrid")
```

In [3]:

```
path = "/content/drive/MyDrive/P00000001-ALL.csv"
fec = pd.read_csv(path, low_memory=False)
fec.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1001731 entries, 0 to 1001730
Data columns (total 16 columns):
 #   Column             Non-Null Count    Dtype
---  ------             --------------    -----
 0   cmte_id            1001731 non-null  object
 1   cand_id            1001731 non-null  object
 2   cand_nm            1001731 non-null  object
 3   contbr_nm          1001731 non-null  object
 4   contbr_city        1001712 non-null  object
 5   contbr_st          1001727 non-null  object
 6   contbr_zip         1001620 non-null  object
 7   contbr_employer    988002 non-null   object
 8   contbr_occupation  993301 non-null   object
 9   contb_receipt_amt  1001731 non-null  float64
 10  contb_receipt_dt   1001731 non-null  object
 11  receipt_desc       14166 non-null    object
 12  memo_cd            92482 non-null    object
 13  memo_text          97770 non-null    object
 14  form_tp            1001731 non-null  object
 15  file_num           1001731 non-null  int64
dtypes: float64(1), int64(1), object(14)
memory usage: 122.3+ MB
```

In [4]:

```
fec.iloc[123456]
```

Out[4]:

```
cmte_id                            C00431445
cand_id                            P80003338
cand_nm                         Obama, Barack
contbr_nm                         ELLMAN, IRA
contbr_city                             TEMPE
contbr_st                                  AZ
contbr_zip                          852816719
contbr_employer      ARIZONA STATE UNIVERSITY
contbr_occupation                   PROFESSOR
contb_receipt_amt                        50.0
contb_receipt_dt                   01-DEC-11
receipt_desc                             NaN
memo_cd                                  NaN
memo_text                                NaN
form_tp                                SA17A
file_num                              772372
Name: 123456, dtype: object
```

In [5]:

```
unique_cands = fec.cand_nm.unique()
unique_cands
```

Out[5]:

```
array(['Bachmann, Michelle', 'Romney, Mitt', 'Obama, Barack',
       "Roemer, Charles E. 'Buddy' III", 'Pawlenty, Timothy',
       'Johnson, Gary Earl', 'Paul, Ron', 'Santorum, Rick',
       'Cain, Herman', 'Gingrich, Newt', 'McCotter, Thaddeus G',
       'Huntsman, Jon', 'Perry, Rick'], dtype=object)
```

In [6]:

```
parties = {'Bachmann, Michelle': 'Republican',
    'Cain, Herman': 'Republican',
    'Gingrich, Newt': 'Republican',
    'Huntsman, Jon': 'Republican',
    'Johnson, Gary Earl': 'Republican',
    'McCotter, Thaddeus G': 'Republican',
    'Obama, Barack': 'Democrat',
    'Paul, Ron': 'Republican',
    'Pawlenty, Timothy': 'Republican',
    'Perry, Rick': 'Republican',
    "Roemer, Charles E. 'Buddy' III": 'Republican',
    'Romney, Mitt': 'Republican',
    'Santorum, Rick': 'Republican'
}
```

In [7]:

```
fec.cand_nm[123456:123461]
```


Out[7]:

```
123456    Obama, Barack
123457    Obama, Barack
123458    Obama, Barack
123459    Obama, Barack
123460    Obama, Barack
Name: cand_nm, dtype: object
```

In [8]:

```
fec.cand_nm[123456:123461].map(parties)
```

Out[8]:

```
123456    Democrat
123457    Democrat
123458    Democrat
123459    Democrat
123460    Democrat
Name: cand_nm, dtype: object
```

In [9]:

```
# adding it as a column

fec['party'] = fec.cand_nm.map(parties)
```

In [10]:

```
fec['party'].value_counts()
```

Out[10]:

```
Democrat      593746
Republican    407985
Name: party, dtype: int64
```

In [11]:

```
# number of contributions and refunds

(fec.contb_receipt_amt > 0).value_counts()
```

Out[11]:

```
True     991475
False     10256
Name: contb_receipt_amt, dtype: int64
```

In [12]:

```
# taking only contributions rows

fec = fec[fec.contb_receipt_amt > 0]
```


In [13]:

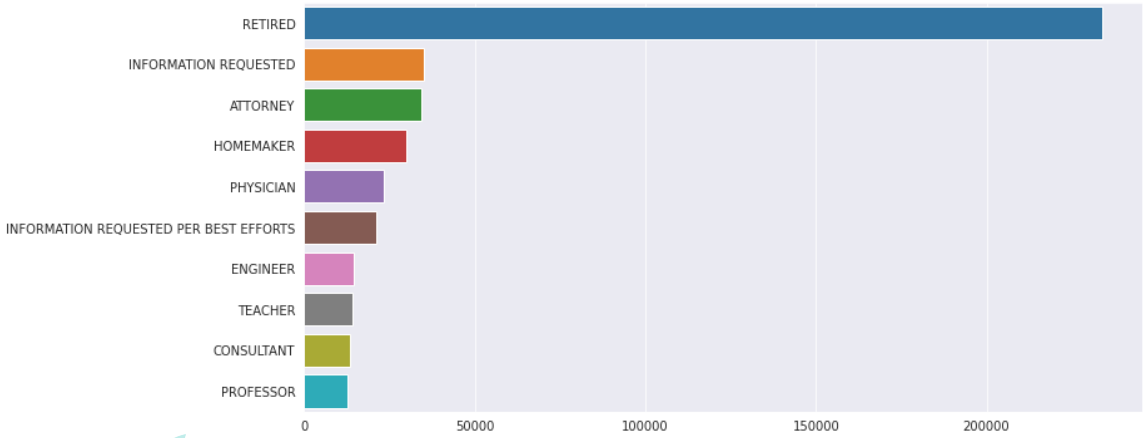
```
# making a seperate subset of only Barack Obama and Mitt Romney

fec_mrbo = fec[fec.cand_nm.isin(['Obama, Barack', 'Romney, Mitt'])]
```

Donation Statistics by Occupation and Employer

In [14]:

```
plt.figure(figsize=(12, 6))
 top_10_donor_occ = fec.contbr_occupation.value_counts().head(10)
 _ = sns.barplot(top_10_donor_occ.values, top_10_donor_occ.index)
```

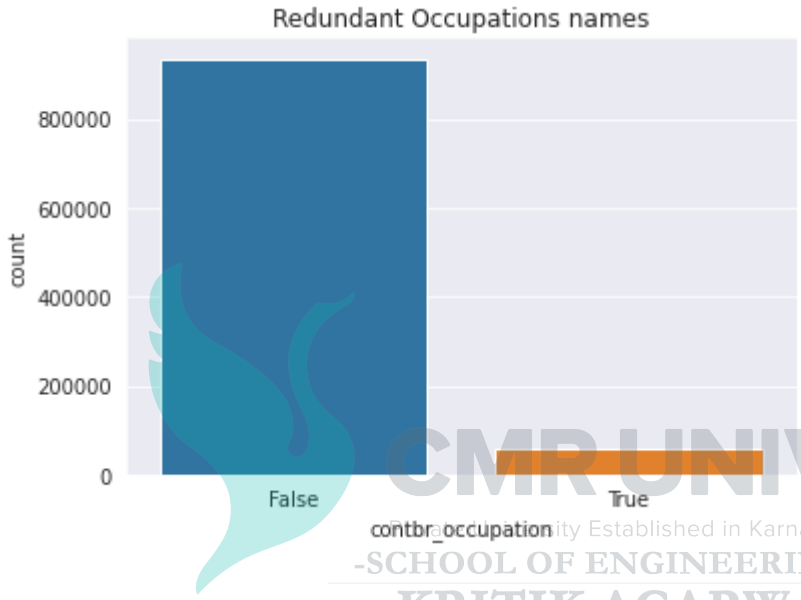
```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWa
rning: Pass the following variables as keyword args: x, y. From version 0.
12, the only valid positional argument will be `data`, and passing other a
rguments without an explicit keyword will result in an error or misinterpr
etation.
  FutureWarning
```



In [15]:

```
redundant_data = fec.contbr_occupation.isin([
    'INFORMATION REQUESTED PER BEST EFFORTS',
    'INFORMATION REQUESTED',
    'INFORMATION REQUESTED (BEST EFFORTS)'
])

_ = sns.countplot(redundant_data)
_ = plt.title("Redundant Occupations names")
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWa
rning: Pass the following variable as a keyword arg: x. From version 0.12,
the only valid positional argument will be `data`, and passing other argum
ents without an explicit keyword will result in an error or misinterpretat
ion.
  FutureWarning
```



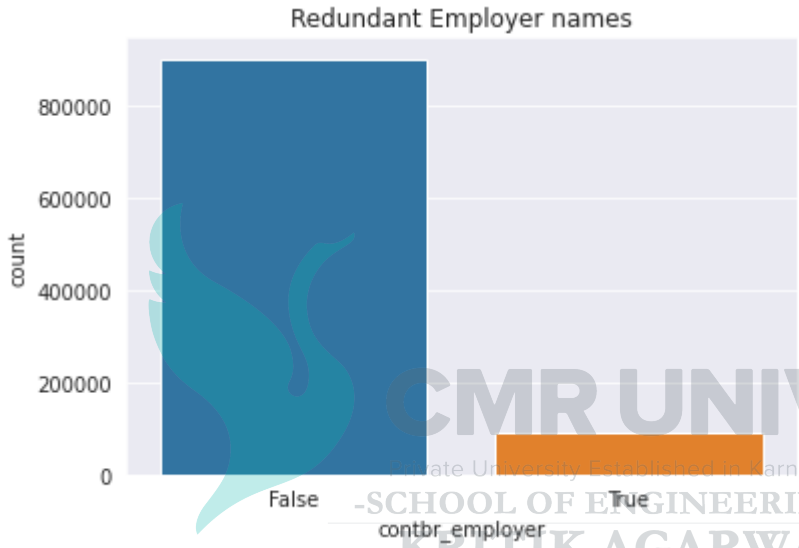
In [16]:

```
occ_mapping = {
 'INFORMATION REQUESTED PER BEST EFFORTS' : 'NOT PROVIDED',
 'INFORMATION REQUESTED' : 'NOT PROVIDED',
 'INFORMATION REQUESTED (BEST EFFORTS)' : 'NOT PROVIDED',
 'C.E.O.': 'CEO'
}
# If no mapping provided, return x
f = lambda x: occ_mapping.get(x, x)
fec.contbr_occupation = fec.contbr_occupation.map(f)
```

In [17]:

```
redundant_data = fec.contbr_employer.isin([
    'INFORMATION REQUESTED PER BEST EFFORTS',
    'INFORMATION REQUESTED',
    'SELF',
    'SELF EMPLOYED'
])

_ = sns.countplot(redundant_data)
_ = plt.title("Redundant Employer names")
```

```
/usr/local/lib/python3.7/dist-packages/seaborn/_decorators.py:43: FutureWa
rning: Pass the following variable as a keyword arg: x. From version 0.12,
the only valid positional argument will be `data`, and passing other argum
ents without an explicit keyword will result in an error or misinterpretat
ion.
  FutureWarning
```



In [18]:

```
# same thing for employers


emp_mapping = {
 'INFORMATION REQUESTED PER BEST EFFORTS' : 'NOT PROVIDED',
 'INFORMATION REQUESTED' : 'NOT PROVIDED',
 'SELF' : 'SELF-EMPLOYED',
 'SELF EMPLOYED' : 'SELF-EMPLOYED',
}
# If no mapping provided, return x
f = lambda x: emp_mapping.get(x, x)
fec.contbr_employer = fec.contbr_employer.map(f)
```

In [19]:

```
# aggregate data by party and occupation and donation over $2 million overall

by_occupation = fec.pivot_table(values='contb_receipt_amt',
                                index='contbr_occupation',
                                columns='party',
                                aggfunc='sum')
```

In [20]:

```
by_occupation
```

Out[20]:

party	Democrat	Republican
contbr_occupation		
MIXED-MEDIA ARTIST / STORYTELLER	100.0	NaN
AREA VICE PRESIDENT	250.0	NaN
RESEARCH ASSOCIATE	100.0	NaN
TEACHER	500.0	NaN
THERAPIST	3900.0	NaN
...	...	...
ZOOKEEPER	35.0	NaN
ZOOLOGIST	400.0	NaN
ZOOLOGY EDUCATION	25.0	NaN
\NONE	NaN	250.0
~	NaN	75.0

45064 rows × 2 columns

In [21]:

```
over_2mm = by_occupation[by_occupation.sum(1) > 2000000]
```

In [22]:

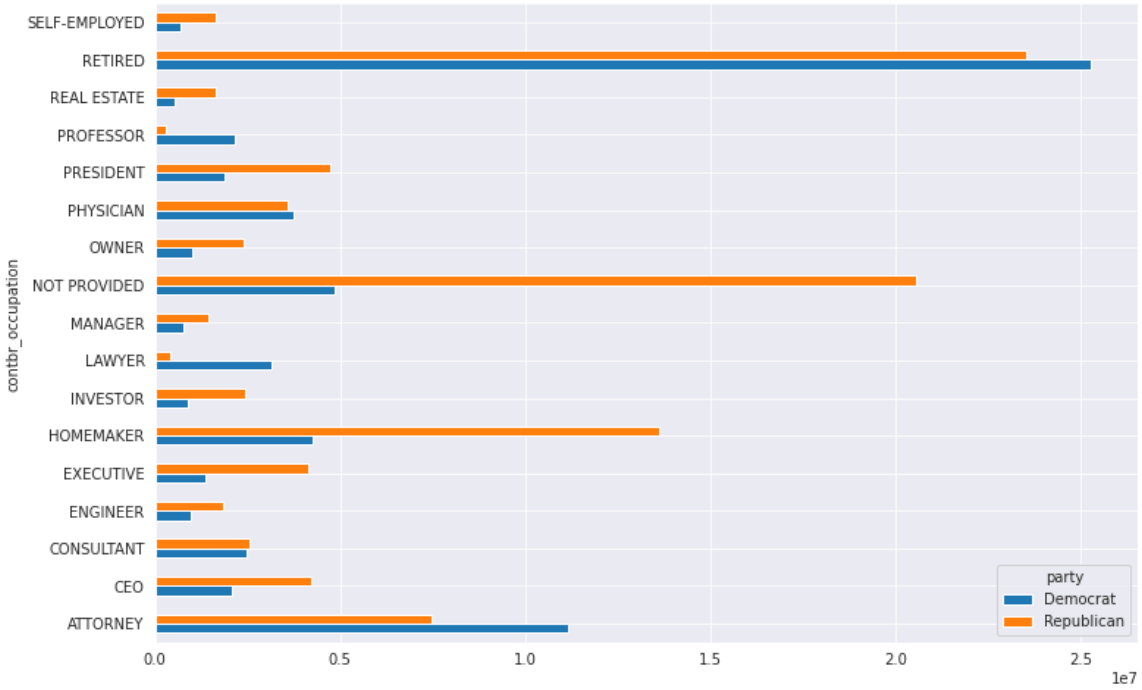
```
over_2mm
```

Out[22]:

party	Democrat	Republican
contbr_occupation		
ATTORNEY	11141982.97	7477194.43
CEO	2074974.79	4211040.52
CONSULTANT	2459912.71	2544725.45
ENGINEER	951525.55	1818373.70
EXECUTIVE	1355161.05	4138850.09
HOMEMAKER	4248875.80	13634275.78
INVESTOR	884133.00	2431768.92
LAWYER	3160478.87	391224.32
MANAGER	762883.22	1444532.37
NOT PROVIDED	4866973.96	20565473.01
OWNER	1001567.36	2408286.92
PHYSICIAN	3735124.94	3594320.24
PRESIDENT	1878509.95	4720923.76
PROFESSOR	2165071.08	296702.73
REAL ESTATE	528902.09	1625902.25
RETIRED	25305116.38	23561244.49
SELF-EMPLOYED	672393.40	1640252.54

In [23]:

```
_ = over_2mm.plot(kind='barh', figsize=(12, 8))
```



In [24]:

```
def get_top_amounts(group, key, n=5):
    totals = group.groupby(key)['contb_receipt_amt'].sum()
    return totals.nlargest(n)
```

In [25]:

```
# Then aggregate by occupation and employer:

grouped = fec_mrbo.groupby('cand_nm')

grouped.apply(get_top_amounts, 'contbr_occupation', n=7)
```

Out[25]:

```
cand_nm        contbr_occupation
Obama, Barack  RETIRED                                   25305116.38
               ATTORNEY                                  11141982.97
               INFORMATION REQUESTED                      4866973.96
               HOMEMAKER                                  4248875.80
               PHYSICIAN                                  3735124.94
               LAWYER                                     3160478.87
               CONSULTANT                                 2459912.71
Romney, Mitt   RETIRED                                   11508473.59
               INFORMATION REQUESTED PER BEST EFFORTS    11396894.84
               HOMEMAKER                                  8147446.22
               ATTORNEY                                   5364718.82
               PRESIDENT                                  2491244.89
               EXECUTIVE                                  2300947.03
               C.E.O.                                     1968386.11
Name: contb_receipt_amt, dtype: float64
```

In [26]:

```
grouped.apply(get_top_amounts, 'contbr_employer', n=10)
```

Out[26]:

```
cand_nm        contbr_employer
Obama, Barack  RETIRED                                   22694358.85
               SELF-EMPLOYED                             17080985.96
               NOT EMPLOYED                               8586308.70
               INFORMATION REQUESTED                      5053480.37
               HOMEMAKER                                  2605408.54
               SELF                                       1076531.20
               SELF EMPLOYED                               469290.00
               STUDENT                                     318831.45
               VOLUNTEER                                   257104.00
               MICROSOFT                                   215585.36
Romney, Mitt   INFORMATION REQUESTED PER BEST EFFORTS    12059527.24
               RETIRED                                   11506225.71
               HOMEMAKER                                  8147196.22
               SELF-EMPLOYED                              7409860.98
               STUDENT                                     496490.94
               CREDIT SUISSE                               281150.00
               MORGAN STANLEY                              267266.00
               GOLDMAN SACH & CO.                          238250.00
               BARCLAYS CAPITAL                            162750.00
               H.I.G. CAPITAL                              139500.00
Name: contb_receipt_amt, dtype: float64
```

Bucketing Donation Amounts

In [27]:

```
bins = np.array([0, 1, 10, 100, 1000, 10000, 100000, 1000000, 10000000])
```

In [28]:

```
labels = pd.cut(fec_mrbo.contb_receipt_amt, bins)
labels
```

Out[28]:

```
411         (10, 100]
412       (100, 1000]
413       (100, 1000]
414         (10, 100]
415         (10, 100]
             ...
701381      (10, 100]
701382    (100, 1000]
701383       (1, 10]
701384      (10, 100]
701385    (100, 1000]
Name: contb_receipt_amt, Length: 694282, dtype: category
Categories (8, interval[int64, right]): [(0, 1] < (1, 10] < (10, 100] < (1
00, 1000] <
                                         (1000, 10000] < (10000, 100000] <
(100000, 1000000] <
                                         (1000000, 10000000]]
```

In [29]:

```
# We can then group the data for Obama and Romney by name and bin label to get a histog
ram by donation size
grouped = fec_mrbo.groupby(['cand_nm', labels])
```


In [30]:

```
grouped.size().unstack(0)
```

Out[30]:

cand_nm	Obama, Barack	Romney, Mitt
contb_receipt_amt		
(0, 1]	493	77
(1, 10]	40070	3681
(10, 100]	372280	31853
(100, 1000]	153991	43357
(1000, 10000]	22284	26186
(10000, 100000]	2	1
(100000, 1000000]	3	0
(1000000, 10000000]	4	0

In [31]:

```
# sum the contribution amounts and normalize within buckets to visualize percentage of
 total donations of each size by candidate
bucket_sums = grouped.contb_receipt_amt.sum().unstack(0)
bucket_sums
```

Out[31]:

cand_nm	Obama, Barack	Romney, Mitt
contb_receipt_amt		
(0, 1]	318.24	77.00
(1, 10]	337267.62	29819.66
(10, 100]	20288981.41	1987783.76
(100, 1000]	54798531.46	22363381.69
(1000, 10000]	51753705.67	63942145.42
(10000, 100000]	59100.00	12700.00
(100000, 1000000]	1490683.08	0.00
(1000000, 10000000]	7148839.76	0.00

In [32]:

```
normed_sums = bucket_sums.div(bucket_sums.sum(axis=1), axis=0)
normed_sums
```

Out[32]:

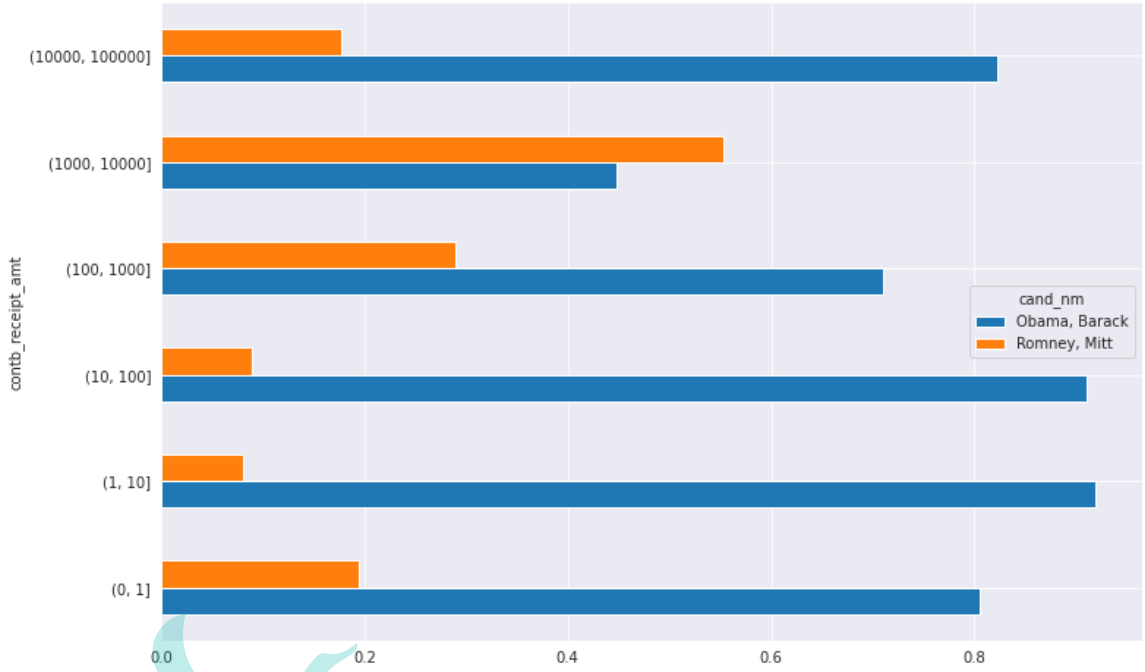
cand_nm	Obama, Barack	Romney, Mitt
contb_receipt_amt		
(0, 1]	0.805182	0.194818
(1, 10]	0.918767	0.081233
(10, 100]	0.910769	0.089231
(100, 1000]	0.710176	0.289824
(1000, 10000]	0.447326	0.552674
(10000, 100000]	0.823120	0.176880
(100000, 1000000]	1.000000	0.000000
(1000000, 10000000]	1.000000	0.000000

In [33]:

```
normed_sums[:-2].plot(kind='barh', figsize=(12, 8))
```

Out[33]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f1e3c983b10>
```



Donation Statistics by State

In [34]:

```
grouped = fec_mrbo.groupby(['cand_nm', 'contbr_st'])
totals = grouped.contb_receipt_amt.sum().unstack(0).fillna(0)
totals = totals[totals.sum(1) > 100000]
```

In [35]:

```
totals.head(10)
```

Out[35]:

cand_nm contbr_st	Obama, Barack	Romney, Mitt
AK	281840.15	86204.24
AL	543123.48	527303.51
AR	359247.28	105556.00
AZ	1506476.98	1888436.23
CA	23824984.24	11237636.60
CO	2132429.49	1506714.12
CT	2068291.26	3499475.45
DC	4373538.80	1025137.50
DE	336669.14	82712.00
FL	7318178.58	8338458.81

In [36]:

```
percent = totals.div(totals.sum(1), axis=0)
```

In [37]:

```
data = percent.reset_index().melt(id_vars='contbr_st')
data.columns
```

Out[37]:

```
Index(['contbr_st', 'cand_nm', 'value'], dtype='object')
```

In [38]:

```
plt.figure(figsize=(22, 9))

_ = sns.barplot(x='contbr_st', y='value', hue='cand_nm', data=data)
_ = plt.title("$Donation$ $Statistics$ $by$ $State$", fontsize=13)
_ = plt.xlabel("$States$", fontsize=13)
_ = plt.ylabel("$Donation$ $percentage$", fontsize=13)
```