In [1]:
```
# Dependencies
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
# import locale
# import requests
# import os
import csv
import scipy.stats as stats
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
# Collecting base data...
temp_df = pd.read_csv("Resources/election_all.csv")
pop_df = pd.read_csv("Resources/population2000-2016ALL.csv")
#v2000 = pd.read_csv("Resources/FOR_JINHO_2000.csv.csv")
#v2004 = pd.read_csv("Resources/FOR_JINHO_2004.csv.csv")
v2008 = pd.read_csv("Resources/FOR_JINHO_2008.csv")
v2012 = pd.read_csv("Resources/FOR_JINHO_2012.csv")
#v2016 = pd.read_csv("Resources/FOR_JINHO_2016.csv.csv")
v2012.head()
```

Out[2]:

	Location	total_votes	2012_democrat_votes	2012_republican_votes
0	Alabama, Autauga	23932	6363.0	17379.0
1	Alabama, Baldwin	85338	18424.0	66016.0
2	Alabama, Barbour	11509	5912.0	5550.0
3	Alabama, Bibb	8420	2202.0	6132.0
4	Alabama, Blount	24006	2970.0	20757.0

In [3]:
```
# Creating master State, County details...
master_location_df = temp_df[['state','county','state_po']]
master_location_df = master_location_df.drop_duplicates()
master_location_df['Location'] = master_location_df.state+", "+master_location_df.cc
master_location_df.columns = ['State', 'County', 'State_po', 'Location']
master_location_df = master_location_df.dropna()
master_location_df.to_csv(r'Resources/master_state_info.csv', index=False, header=Tr
# print(len(master_location_df))
# master_location_df.head()
```

In [4]:
```
# Collecting required fields...
# pop_df = pop_df[['Location','2000','2004','2008','2012','2016']]
pop_df = pop_df[['Location','2012']]
# print(len(pop_df))
# pop_df.head()
pop_final = pd.merge(pop_df, master_location_df, on='Location')
pop_final
# Creating summary data by state...
pop_state_summary = pop_final.groupby('State')
pop_state_summary = pop_state_summary.sum()

pop_county_summary = pop_final.groupby('Location')
pop_county_summary = pop_county_summary.sum()
pop_county_summary = pop_county_summary[pop_county_summary['2012'] != 0]
pop_county_summary.reset_index
pop_county_summary.head()
```

Out[4]:

Location	2012
Alabama, Autauga	54954
Alabama, Baldwin	190145
Alabama, Barbour	27169
Alabama, Bibb	22667
Alabama, Blount	57580

In [5]:
```
# Creating summary for State...
v2012_final = pd.merge(v2012, master_location_df, on='Location')
v2012_final['2012_other_votes'] = v2012_final["total_votes"]-v2012_final["2012_democ
v2012_state_summary = v2012_final.groupby('State')
v2012_state_summary = v2012_state_summary.sum()
# v2012_state_summary.head()
v2012_state_summary['year'] = '2012'
year = v2012_state_summary['year'].iloc[0]
# print(v2012_state_summary['total_votes'].min()/1000, v2012_state_summary['total_vo
#
# merge population data to calcuate avg.
#
v2012_state_summary = v2012_state_summary.merge(pop_state_summary, on='State')
v2012_state_summary['avg_votes'] = round(v2012_state_summary['total_votes']*100/v201
v2012_state_summary['2012_democrat_votes'] = round(v2012_state_summary['2012_democra
v2012_state_summary['2012_republican_votes'] = round(v2012_state_summary['2012_repub
v2012_state_summary['2012_other_votes'] = round(v2012_state_summary['2012_other_vote
hv_st = v2012_state_summary['avg_votes'].max()
highst = v2012_state_summary.loc[v2012_state_summary['avg_votes'] == hv_st]
hv_st = highst.index.tolist()
lv_st = v2012_state_summary['avg_votes'].min()
lowst = v2012_state_summary.loc[v2012_state_summary['avg_votes'] == lv_st]
lv_st = lowst.index.tolist()
v2012_state_summary.head()
```

Out[5]:

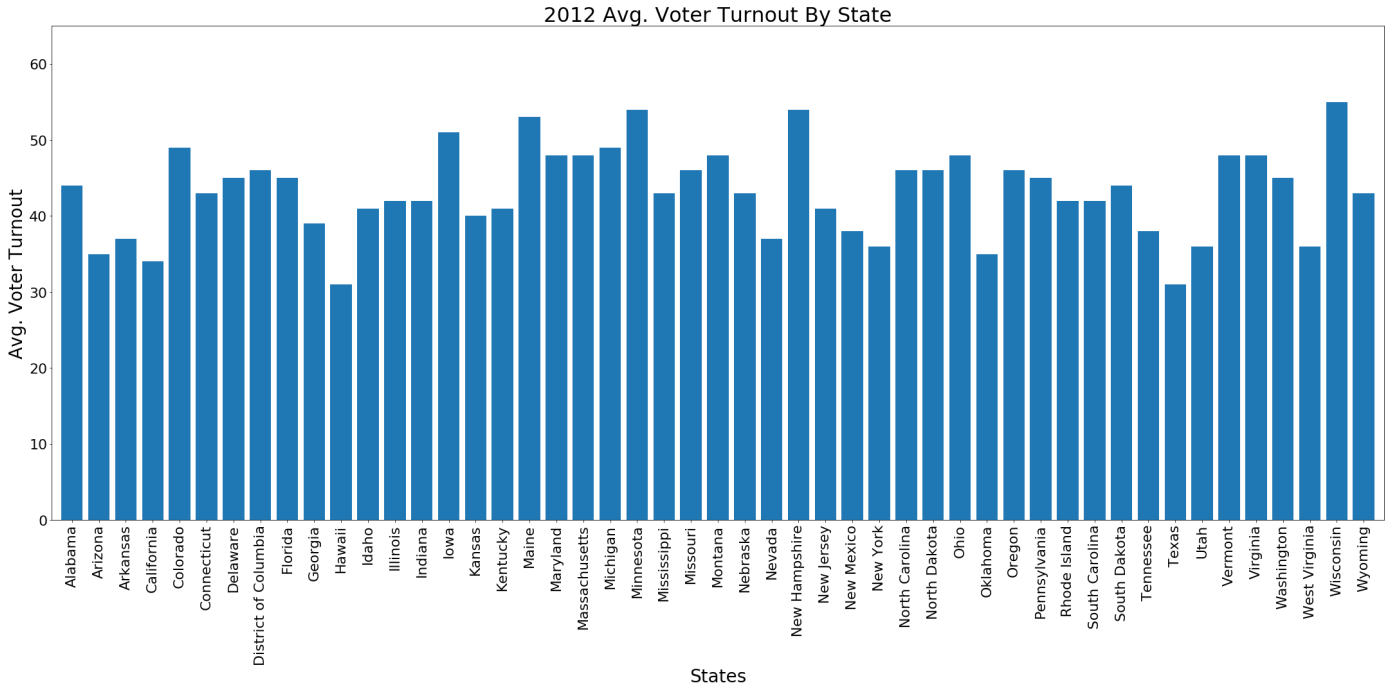
State	total_votes	2012_democrat_votes	2012_republican_votes	2012_other_votes	year	2012	avg_vote
Alabama	2070353	17.0	27.0	0.0	2012	4730827	44.
Arizona	2299254	16.0	19.0	1.0	2012	6554978	35.
Arkansas	1069468	13.0	22.0	1.0	2012	2924172	37.
California	13038547	21.0	13.0	1.0	2012	37948800	34.
Colorado	2569217	25.0	23.0	1.0	2012	5192647	49.

In [6]:
```
# Creating summary for Counties..
v2012_county_summary = v2012_final.groupby('Location', as_index=False)
v2012_county_summary = v2012_county_summary.sum()
# print(v2012_county_summary['total_votes'].min(), v2012_county_summary['total_votes
v2012_county_summary = v2012_county_summary.merge(pop_county_summary, on='Location')
v2012_county_summary['avg_votes'] = round(v2012_county_summary['total_votes']*100/v2
v2012_county_summary['2012_democrat_votes'] = round(v2012_county_summary['2012_democ
v2012_county_summary['2012_republican_votes'] = round(v2012_county_summary['2012_rep
v2012_county_summary['2012_other_votes'] = round(v2012_county_summary['2012_other_vo
hv_cy = v2012_county_summary['avg_votes'].max()
highcy = v2012_county_summary.loc[v2012_county_summary['avg_votes'] == hv_cy]
hv_cy = highcy.Location.tolist()
lv_cy = v2012_county_summary['avg_votes'].min()
lowcy = v2012_county_summary.loc[v2012_county_summary['avg_votes'] == lv_cy]
lv_cy = lowcy.Location.tolist()
v2012_county_summary.head()
```

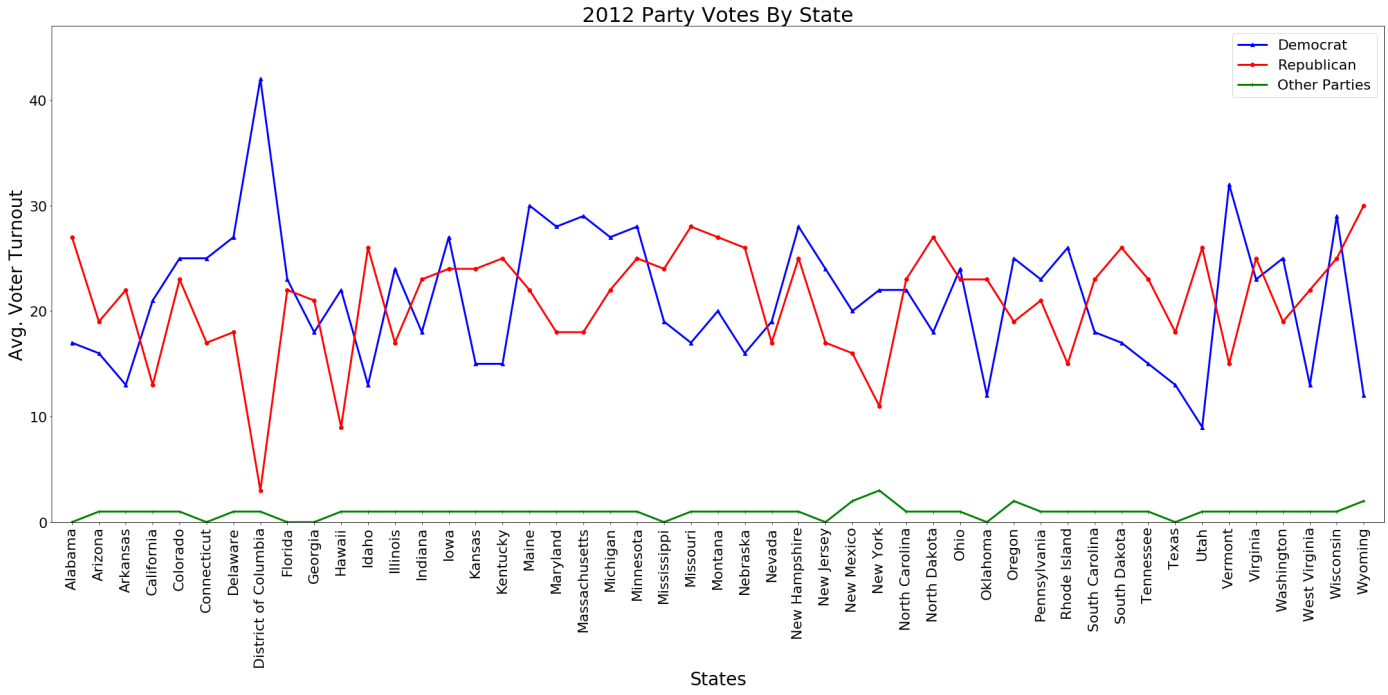
Out[6]:

	Location	total_votes	2012_democrat_votes	2012_republican_votes	2012_other_votes	2012	avg_votes
0	Alabama, Autauga	23932	12.0	32.0	0.0	54954	44.0
1	Alabama, Baldwin	85338	10.0	35.0	0.0	190145	45.0
2	Alabama, Barbour	11509	22.0	20.0	0.0	27169	42.0
3	Alabama, Bibb	8420	10.0	27.0	0.0	22667	37.0
4	Alabama, Blount	24006	5.0	36.0	0.0	57580	42.0

In [7]:
```
# Voter turnout by state...
#
title = year+' Avg. Voter Turnout By State'
pfile = title.replace(" ",'_')+'.png'
pfile = f"Resources/Images/{pfile}"
plt.figure(figsize=(30,15))
plt.rc('axes', titlesize=32)
plt.rc('axes', labelsize=28)
plt.rc('xtick', labelsize=22)
plt.rc('ytick', labelsize=22)
plt.bar(v2012_state_summary.index, v2012_state_summary.avg_votes)
plt.xticks(rotation=90)
plt.yticks(rotation=360)
plt.xlabel('States')
plt.ylabel("Avg. Voter Turnout")
plt.title(title)
plt.xlim(-0.75, len(v2012_state_summary.index)-.25)
plt.ylim(0, v2012_state_summary.avg_votes.max()+10)
plt.tight_layout()
plt.savefig(pfile)
plt.show()
```

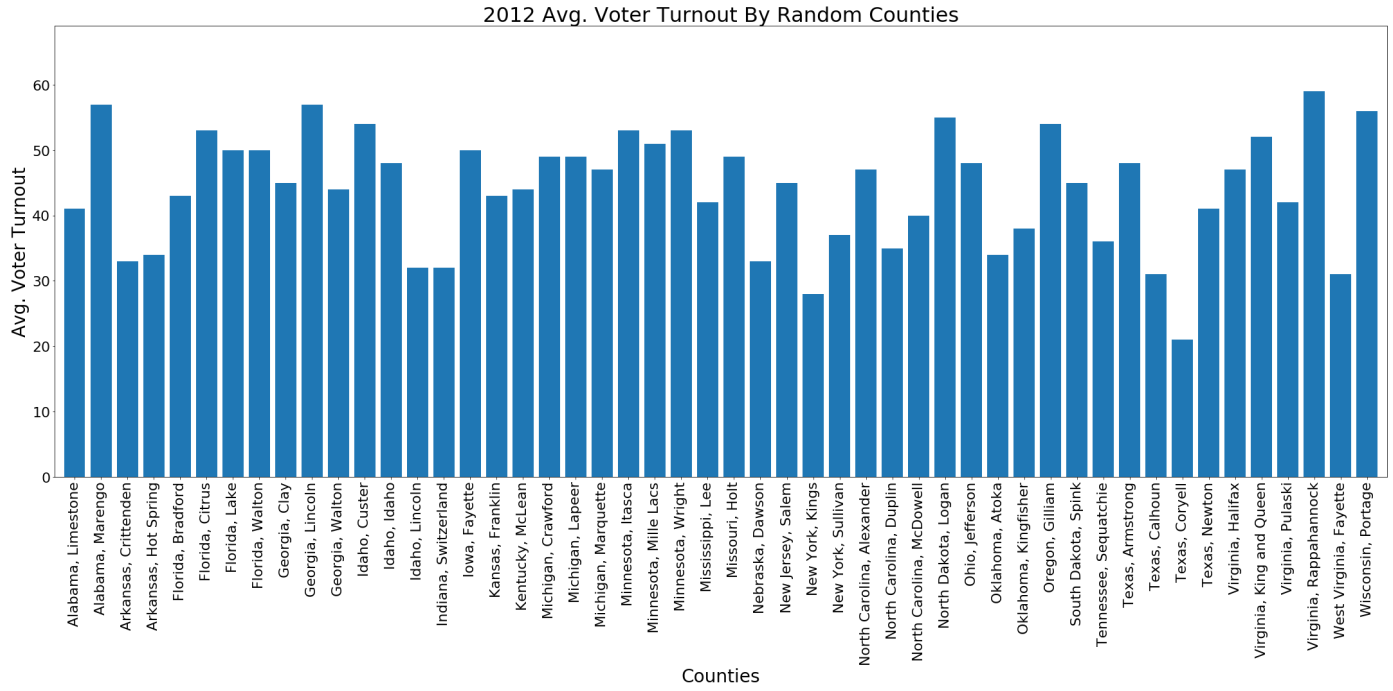


In [8]:
```
# Avg. Party votes by state...
#
plt.figure(figsize=(30,15))
plt.rc('axes', titlesize=32)
plt.rc('axes', labelsize=28)
plt.rc('xtick', labelsize=22)
plt.rc('ytick', labelsize=22)
plt.rc('legend', fontsize=22)
title = year+' Party Votes By State'
pfile = title.replace(" ",'_')+'.png'
pfile = f"Resources/Images/{pfile}"
maxy = v2012_state_summary['2012_democrat_votes'].max()
if maxy < v2012_state_summary['2012_republican_votes'].max():
    maxy = v2012_state_summary['2012_republican_votes'].max()
Democrat = plt.plot(v2012_state_summary.index, v2012_state_summary["2012_democrat_vo
Republican = plt.plot(v2012_state_summary.index, v2012_state_summary["2012_republica
Others = plt.plot(v2012_state_summary.index, v2012_state_summary["2012_other_votes"]
plt.xticks(rotation=90)
plt.yticks(rotation=360)
plt.xlabel('States')
plt.ylabel("Avg. Voter Turnout")
plt.title(title)
plt.xlim(-0.75, len(v2012_state_summary.index)-.25)
plt.ylim(0, maxy+5)
plt.legend(loc="best")
plt.tight_layout()
plt.savefig(pfile)
plt.show()
```

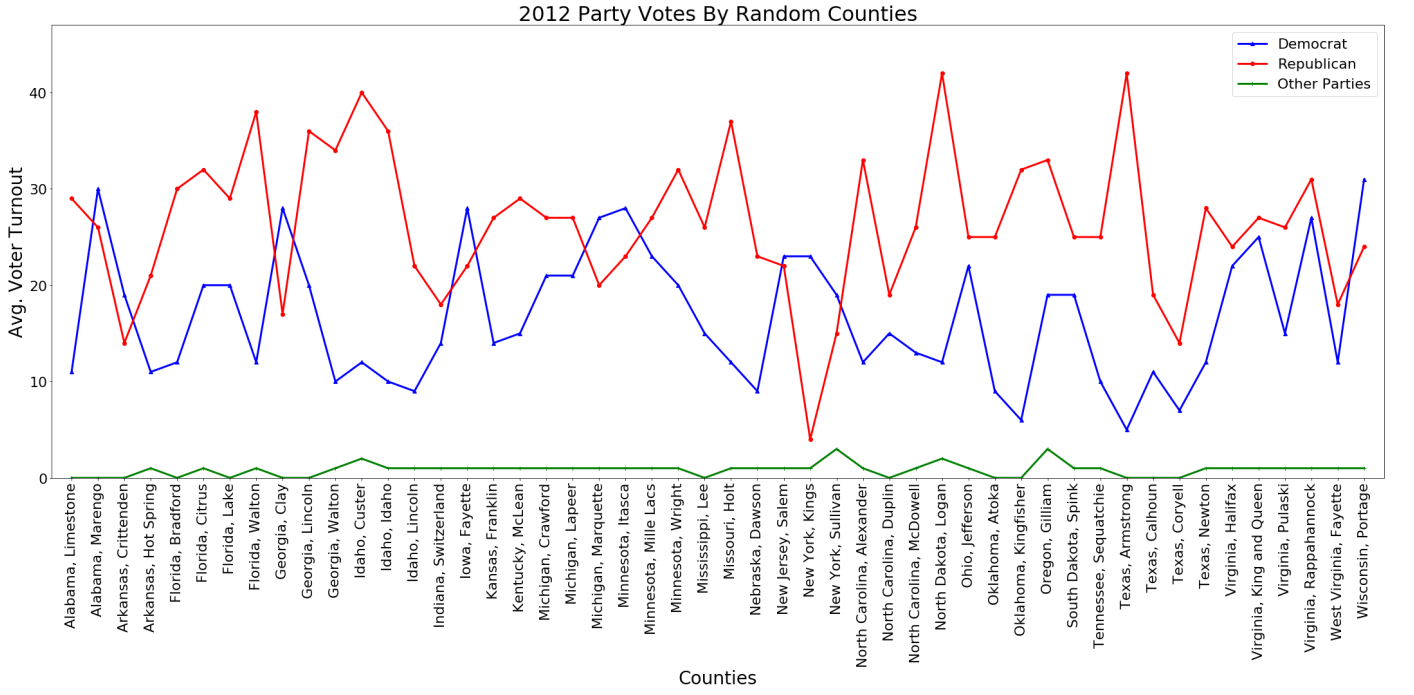


In [9]:
```
# Generating Random 50 counties...
random_sample_county = pd.DataFrame(v2012_county_summary.Location.sample(n=50, randc
random_sample_county.head()
v2012_filtered_county_summary = pd.merge(v2012_county_summary,random_sample_county,
# v2012_filtered_county_summary.head()
```

In [10]:
```
# Avg. Voter turnout by random counties...
#
title = year+' Avg. Voter Turnout By Random Counties'
pfile = title.replace(" ",'_')+'.png'
pfile = f"Resources/Images/{pfile}"
plt.figure(figsize=(30,15))
plt.rc('axes', titlesize=32)
plt.rc('axes', labelsize=28)
plt.rc('xtick', labelsize=22)
plt.rc('ytick', labelsize=22)
plt.bar(v2012_filtered_county_summary.Location, v2012_filtered_county_summary.avg_vc
plt.xticks(rotation=90)
plt.yticks(rotation=360)
plt.xlabel('Counties')
plt.ylabel("Avg. Voter Turnout")
plt.title(title)
plt.xlim(-0.75, len(v2012_filtered_county_summary.Location)-.25)
plt.ylim(0, v2012_filtered_county_summary.avg_votes.max()+10)
plt.tight_layout()
plt.savefig(pfile)
plt.show()
```



In [11]:
```
# Party votes by random counties...
#
plt.figure(figsize=(30,15))
title = year+' Party Votes By Random Counties'
pfile = title.replace(" ",'_')+'.png'
pfile = f"Resources/Images/{pfile}"
plt.rc('axes', titlesize=32)
plt.rc('axes', labelsize=28)
plt.rc('xtick', labelsize=22)
plt.rc('ytick', labelsize=22)
plt.rc('legend', fontsize=22)
maxy = v2012_state_summary['2012_democrat_votes'].max()
if maxy < v2012_state_summary['2012_republican_votes'].max():
    maxy = v2012_state_summary['2012_republican_votes'].max()
Democrat = plt.plot(v2012_filtered_county_summary.Location, v2012_filtered_county_su
Republican = plt.plot(v2012_filtered_county_summary.Location, v2012_filtered_county_
Others = plt.plot(v2012_filtered_county_summary.Location, v2012_filtered_county_summ
plt.xticks(rotation=90)
plt.yticks(rotation=360)
plt.xlabel('Counties')
plt.ylabel("Avg. Voter Turnout")
plt.title(title)
plt.xlim(-0.75, len(v2012_filtered_county_summary.Location)-.25)
plt.ylim(0, maxy+5)
plt.legend(loc="best")
plt.tight_layout()
plt.savefig(pfile)
plt.show()
```



In [12]:
```
# Highest/Lowest voter turnout...
#

print(year + " Highest Voter Turnout for the State  : " + ','.join(hv_st))
print(year + " Lowest Voter Turnout for the State   : " + ','.join(lv_st))
print("")
print(year + " Highest Voter Turnout for the County : " + ','.join(hv_cy))
print(year + " Lowest Voter Turnout for the County  : " + ','.join(lv_cy))
```

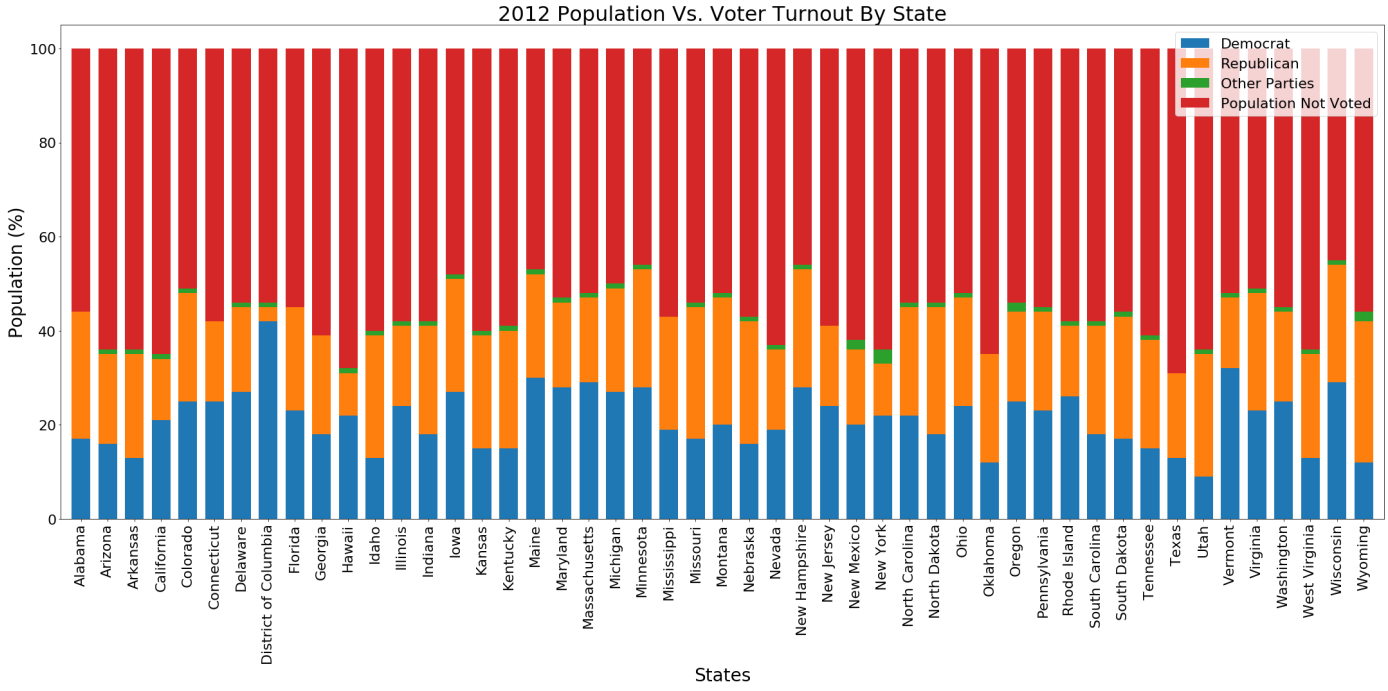
```
2012 Highest Voter Turnout for the State  : Wisconsin
2012 Lowest Voter Turnout for the State   : Hawaii,Texas

2012 Highest Voter Turnout for the County : Colorado, Mineral
2012 Lowest Voter Turnout for the County  : Georgia, Chattahoochee
```

In [13]:
```
population_votes = v2012_state_summary[['2012_democrat_votes','2012_republican_votes
population_votes.columns = ['2012_democrat_votes', '2012_republican_votes','2012_oth
population_votes['pop_notvoted'] = (100-(population_votes['2012_democrat_votes']+pop
population_votes.head()
```

Out[13]:

State	2012_democrat_votes	2012_republican_votes	2012_other_votes	pop_notvoted
Alabama	17.0	27.0	0.0	56.0
Arizona	16.0	19.0	1.0	64.0
Arkansas	13.0	22.0	1.0	64.0
California	21.0	13.0	1.0	65.0
Colorado	25.0	23.0	1.0	51.0

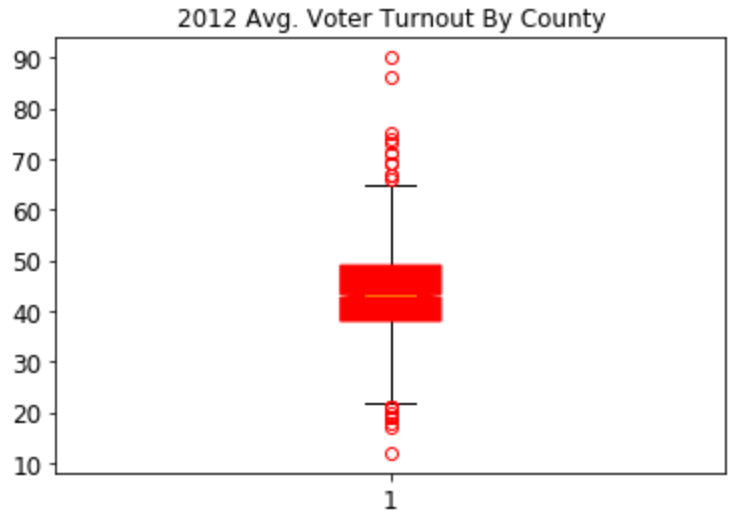
In [14]:
```
# Poplulation vs.Voter turnout by state for the year 2012...
#
title = year+' Population Vs. Voter Turnout By State'
pfile = title.replace(" ",'_')+'.png'
pfile = f"Resources/Images/{pfile}"
plt.figure(figsize=(30,15))
bottom = 0
label = ['Democrat','Republican','Other Parties','Population Not Voted']
plt.rc('axes', titlesize=32)
plt.rc('axes', labelsize=28)
plt.rc('xtick', labelsize=22)
plt.rc('ytick', labelsize=22)
#
for i in population_votes.columns:
    plt.bar(population_votes.index, population_votes[i],  width=0.7, bottom=bottom)
    bottom += population_votes[i]
#
plt.xticks(rotation=90)
plt.yticks(rotation=360)
plt.legend(label)
plt.xlabel('States')
plt.ylabel("Population (%)")
plt.title(title)
plt.xlim(-0.75, len(population_votes.index)-.25)
plt.tight_layout()
plt.savefig(pfile)
plt.show()
```



In [15]:
```
# Outliers
#
quartiles = v2012_county_summary['avg_votes'].quantile([.25,.5,.75])
lowerq = quartiles[0.25]
upperq = quartiles[0.75]
iqr = upperq-lowerq
lower_bound = lowerq - (1.5*iqr)
upper_bound = upperq + (1.5*iqr)

print(f"The lower quartile of county outliers  is :{lowerq}")
print(f"The upper quartile of county outliers  is :{upperq}")
print(f"The interquartile range of county outliers  is :{iqr}")
print(f"The median of county volume  is :{quartiles[0.5]}")
print(f"Values below {round(lower_bound,6)} could be outliers. ")
print(f"Values above {round(upper_bound,6)} could be outliers. ")
print(" ")
```

```
The lower quartile of county outliers  is :38.0
The upper quartile of county outliers  is :49.0
The interquartile range of county outliers  is :11.0
The median of county volume  is :43.0
Values below 21.5 could be outliers.
Values above 65.5 could be outliers.
```

In [16]:
```
title = year+' Avg. Voter Turnout By County'
pfile = title.replace(" ",'_')+'.png'
pfile = f"Resources/Images/{pfile}"
boxplot_data = v2012_county_summary['avg_votes']
fig = plt.figure()
plt.rc('axes', titlesize=12)
plt.rc('axes', labelsize=12)
plt.rc('xtick', labelsize=12)
plt.rc('ytick', labelsize=12)
plt.rc('legend', fontsize=12)
c = "red"
plt.boxplot(boxplot_data,  notch=True, patch_artist=True,
            boxprops=dict(facecolor=c, color=c), flierprops=dict(color=c, markeredge

plt.title(title)
plt.savefig(pfile)
plt.show()
```



In [17]:
```
pop_county = v2012_county_summary['avg_votes']
sample_county = pd.DataFrame(v2012_county_summary.avg_votes.sample(n=1000, random_st

stats.ttest_1samp(sample_county, pop_county.mean())
```

Out[17]:
```
Ttest_1sampResult(statistic=array([0.52359702]), pvalue=array([0.60067498]))
```

In [ ]:

In [ ]:

In [ ]: