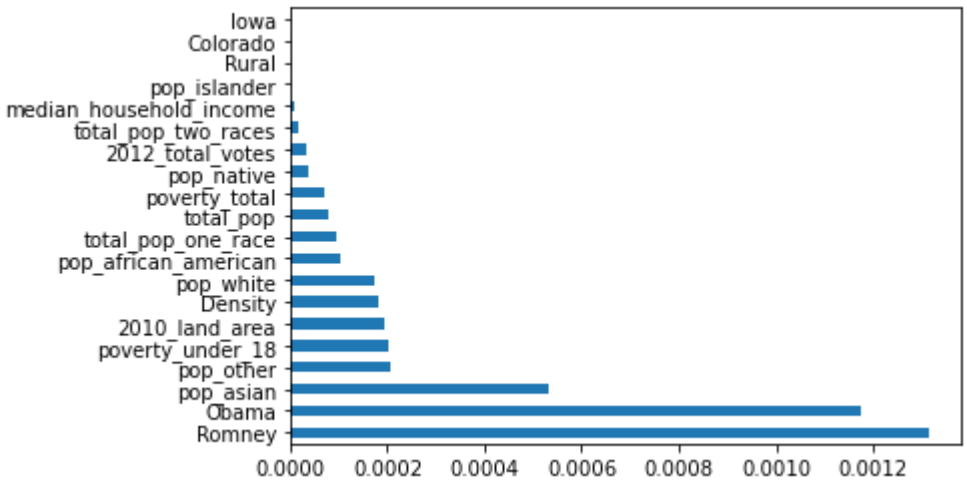
Exploratory Data Analysis for Presidential Election by County Project

Bar chart of feature importances from the final model.



Fill the tool box.

In [1]:
```
import folium
import json
import pandas as pd
import vincent
import numpy as np
from pickle import load
from pickle import dump
pd.set_option("max_rows", None)
pd.set_option("max_columns", None)
import matplotlib.pyplot as plt
```

----------Data Prep----------

Import location data (https://public.opendatasoft.com/explore/dataset/us-county-boundaries/table/?disjunctive.statefp&disjunctive.countyfp&disjunctive.name&disjunctive.namelsad&disjunctive.stusab&) for counties.

FIPS are unique numeric identifiers for each US county. FIPS is a feature in the main dataset and is included in this geojson file.

In [2]:
```
import json
with open('data/USA_Counties.geojson') as f:
    zips_map = json.load(f)
```

Load preprocessed dataset.

In [5]:
```
df1 = load(open('PICKLES/all_with_fips.pkl', 'rb'))
```

Remove the word 'county' from values in one county column.

In [6]:
```
df1['County_y'] = df1['County_y'].str.rstrip('County')
```

Change datatype of fips column.

In [7]:
```
df1.fips = df1.fips.astype(str)
```

Fill fips numbers to 5 digits. It was dropping leading zeros and causing the two data sets to not match.

In [8]:
```
df1.fips = df1.fips.str.zfill(5)
```

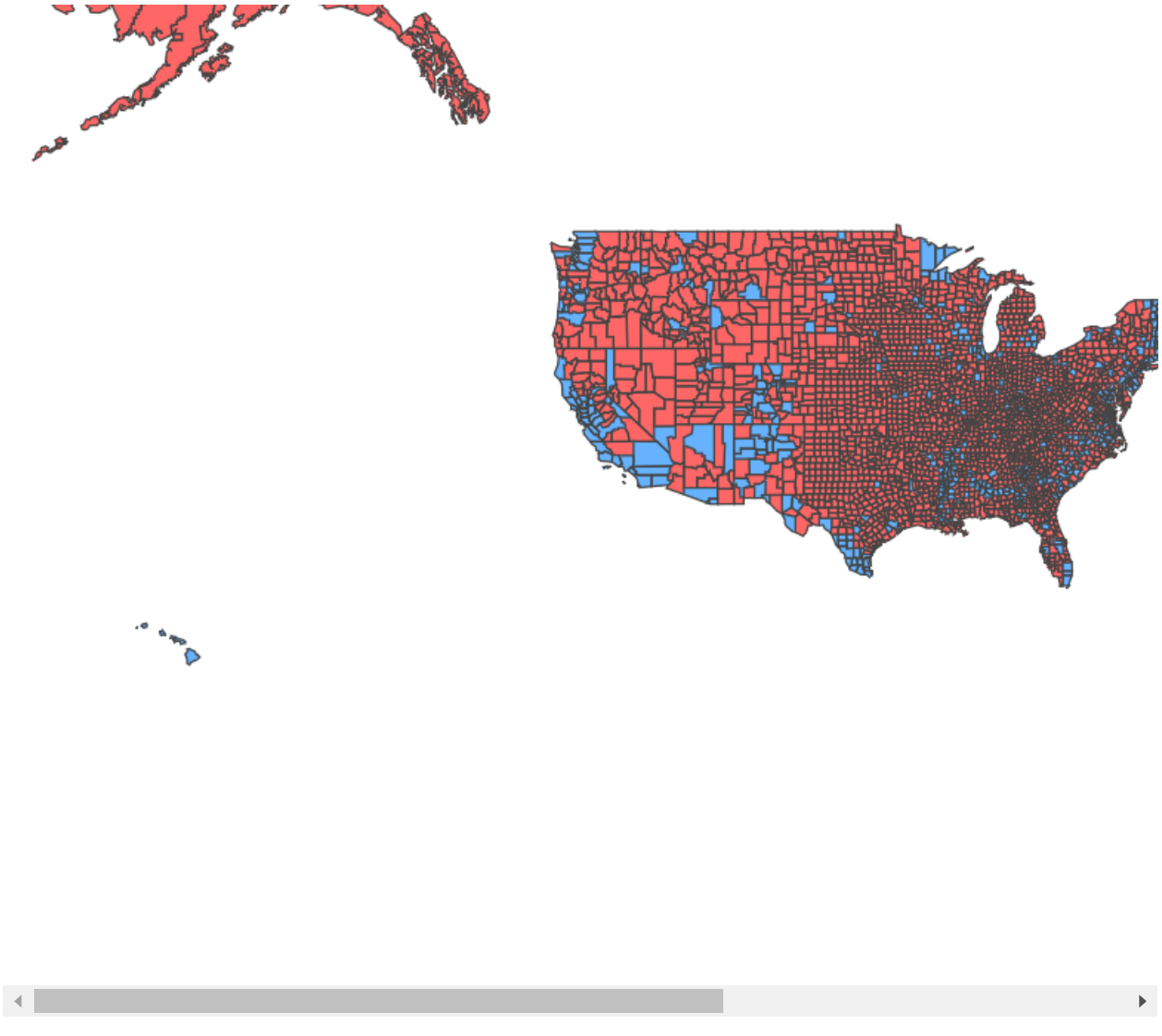
----------Target Analysis----------

Map of 2016 winner

In [9]:
```
df1['Winner'] = df1['Target']
```

In [10]:
```
import plotly.express as px

fig = px.choropleth_mapbox(df1, geojson= zips_map, color="Winner",
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                           color_discrete_map = {'Clinton': '#66B2FF', 'Trump': '
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```

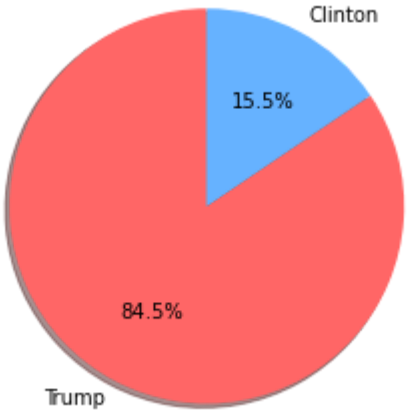


Pie Chart of Target Distribution

Donald Trump won 84.5 % of US counties in 2016.

In [11]:
```
labels = ['Trump', 'Clinton']
fig1, ax1 = plt.subplots()
ax1.pie(df1.Target.value_counts(), autopct='%1.1f%%',
        shadow=True, startangle=90, colors = ['#FF6666', '#66B2FF'], labels = lab
ax1.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.

plt.show()
```



Pie Chart of Popular Vote

This is included as illustration to show the difference between the popular vote and how counties as a whole voted.

In [15]:
```
target = load(open('PICKLES/target_df.pkl', 'rb'))
```

In [16]:
```
target['Clinton'] = pd.to_numeric(target['Clinton'])
target['Trump'] = pd.to_numeric(target['Trump'])
```

In [17]:
```
target.Clinton.sum()
```

Out[17]: 62298328

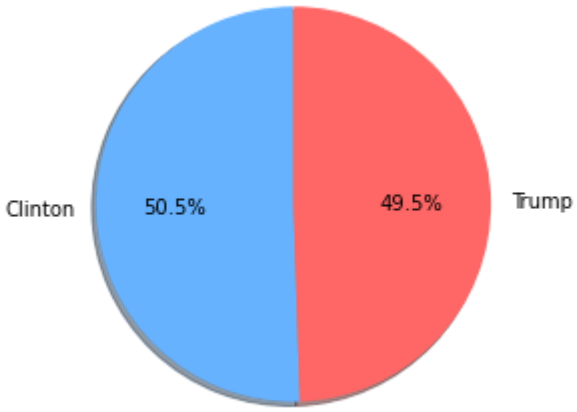
In [18]:
```
target.Trump.sum()
```

Out[18]: 60995541

In [19]:
```
labels = 'Clinton', 'Trump'
sizes = [62298328, 60995541]

fig1, ax1 = plt.subplots()
ax1.pie(sizes, labels=labels, autopct='%1.1f%%',
        shadow=True, startangle=90, colors = ['#66B2FF', '#FF6666'])
ax1.axis('equal')  # Equal aspect ratio ensures that pie is drawn as a circle.

plt.show()
```



----------Previous Election Analysis----------

Map of 2012 winner

Romney won 2440 counties and Obama won 701.

In [20]:
```
(df1['Obama'] < df1['Romney']).value_counts()
```

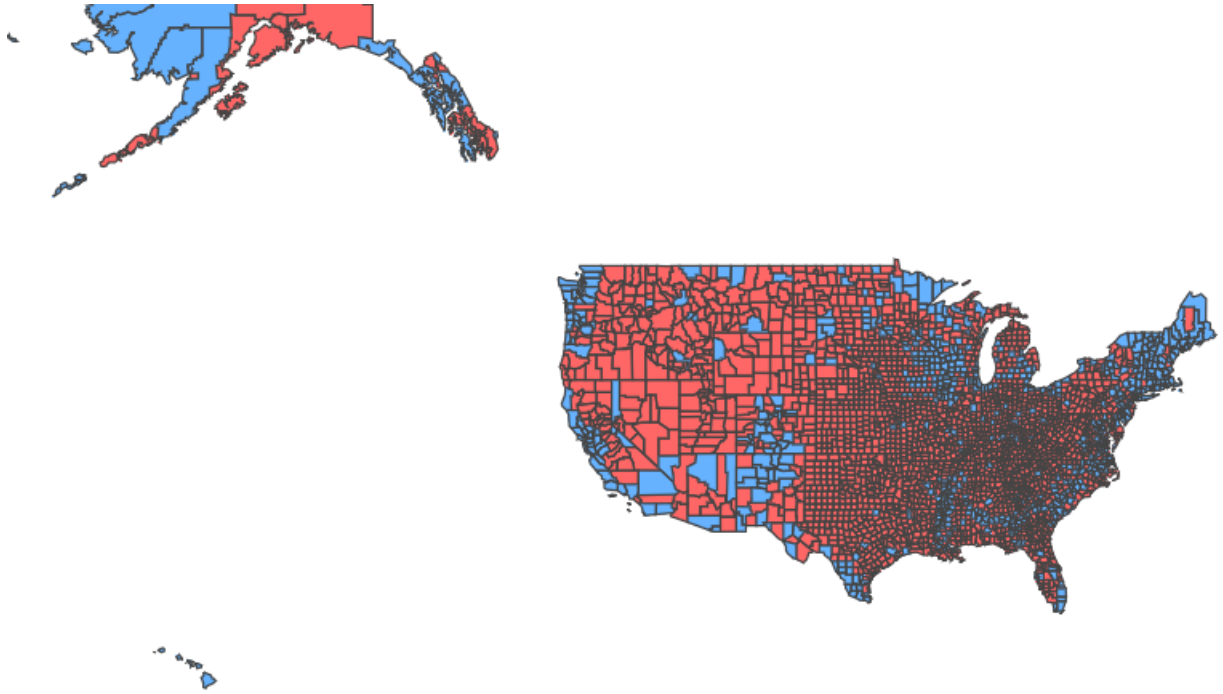
Out[20]:
```
True     2440
False     701
dtype: int64
```

Creat a column for the winner of the 2012 election.

In [21]:
```
conditions = [(df1['Obama'] < df1['Romney']), (df1['Obama'] > df1['Romney'])]
choices = ['Romney', 'Obama']
df1['2012 Election Winner'] = np.select(conditions, choices, default = np.nan)
```

In [22]:
```
import plotly.express as px

fig = px.choropleth_mapbox(df1, geojson= zips_map, color="2012 Election Winner",
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                           color_discrete_map = {'Obama': '#66B2FF', 'Romney': '#
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



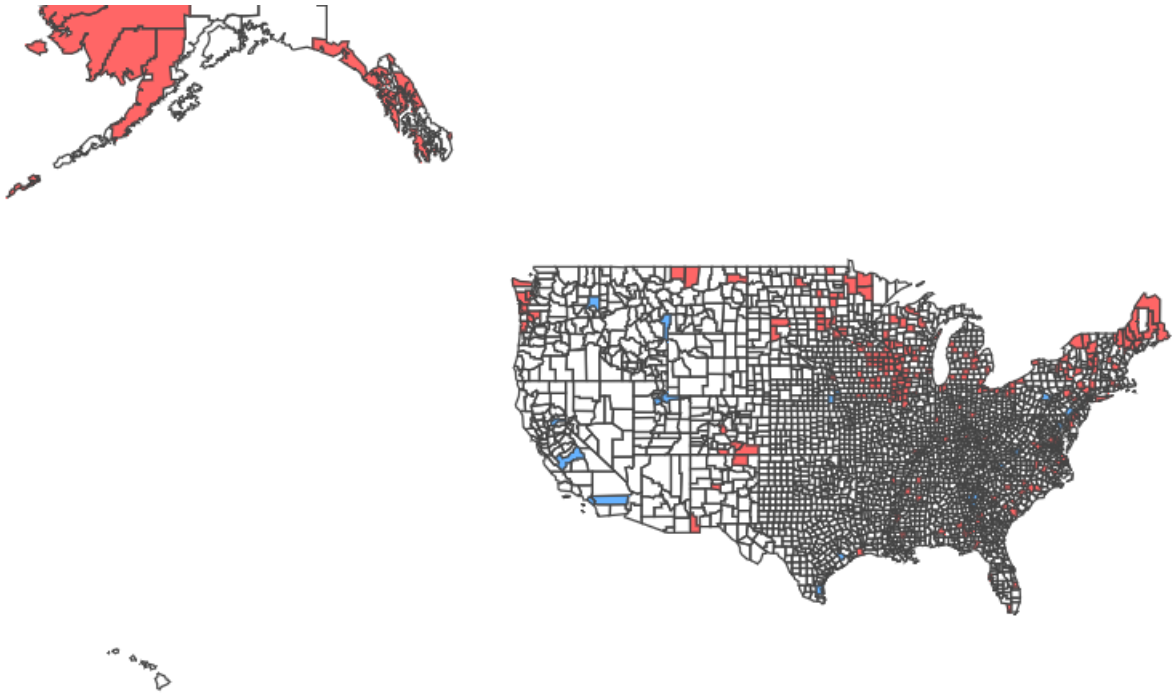
Map of Swing Counties

```
Of the 3141 counties(or equivalents) in the US, 253 of them swung in 2016. 92%
of those 253 swung Republican.
```

In [23]:
```
conditions = [((df1['Target'] == 'Trump') & (df1['2012 Election Winner'] == 'Romr
              ((df1['Target'] == 'Clinton') & (df1['2012 Election Winner'] == 'C
             ((df1['Target'] == 'Clinton') & (df1['2012 Election Winner'] == 'Rom
              ((df1['Target'] == 'Trump') & (df1['2012 Election Winner'] == 'Ob
choices = ['Stayed the same', 'Stayed the same', 'Swung to Democrats', 'Swung to
df1['Swing Counties'] = np.select(conditions, choices, default = np.nan)
```

In [26]:
```
import plotly.express as px

fig = px.choropleth_mapbox(df1, geojson= zips_map, color="Swing Counties",
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                           color_discrete_map = {'Stayed the same': 'white', 'Swu
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



Further analysis of these clusters would be interesting.

- Maine
- Washington and Oregon

- Iowa, Wisconsin, Illinois
- Minnesota
- Southern Colorado, Northern New Mexico
- Alaska!

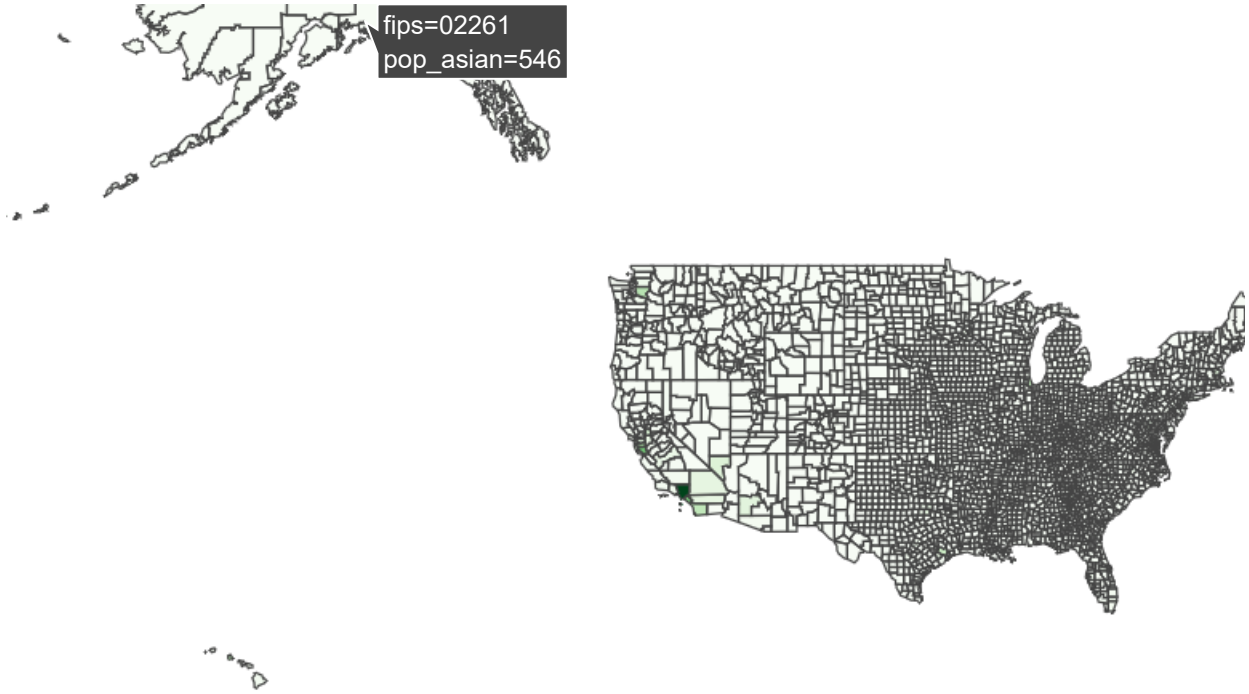
----------Population of Asian Descent Analysis----------

This is the total population of people who reported being a single race and chose Asian. This is not a rate.

Map of Populations of Asian Descent

In [27]:
```
import plotly.express as px

fig = px.choropleth_mapbox(df1, geojson= zips_map, color="pop_asian",
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                          color_continuous_scale="Greens")
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



Interesting Areas:

- Houston Area
- LA and surrounding counties
- San Jose, CA area
- King County, WA (Seattle area)
- Phoenix
- Chicago

Map of 50 Counties with Highest Asian American Population

46 of these counties voted for Hillary Clinton.

Sort the dataframe.

In [28]:
```
highest_asian_pop = df1.sort_values(by = 'pop_asian', ascending = False)
```

In [29]:
```
highest_asian_pop.head()
```

Out[29]:

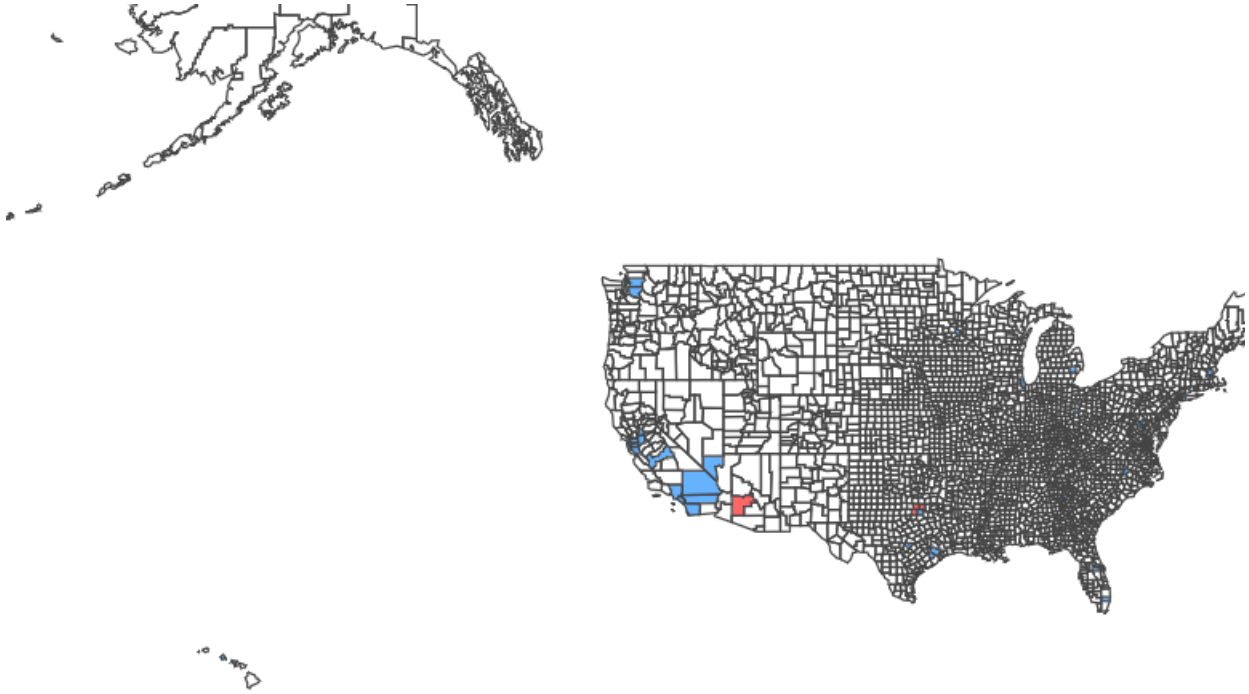
	id	total_pop	total_pop_one_race	pop_white	pop_african_american	pop_nati
204	0500000US06037	10014009.0	8525941.0	3259427.0	794364.0	163464
228	0500000US06085	1936259.0	1726791.0	622617.0	44966.0	22142
215	0500000US06059	3186989.0	2739808.0	1383257.0	53842.0	38322
1867	0500000US36081	2405464.0	2162100.0	621475.0	403077.0	30513
186	0500000US06001	1682353.0	1491537.0	523836.0	164879.0	19659

Replace target value with zero for all but the top 50 for mapping purposes.

In [30]:
```
highest_asian_pop.iloc[50:, 21] = 0
```

In [31]:
```
import plotly.express as px

fig = px.choropleth_mapbox(highest_asian_pop, geojson= zips_map, color="Target",
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                           color_discrete_map = {'Trump': '#FF6666', 'Clinton': '
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



Map of 50 Counties with Lowest Population of Asian Descent

37 of these counties have 0 people of Asian descent. The other 13 have 1.

48 of these counties voted for Donald Trump.

Resort dataframe.

In [32]:
```
lowest_asian_pop = df1.sort_values(by = 'pop_asian', ascending = True)
```

Replace the target with 0 in all but the top 50 rows.

In [33]:
```
lowest_asian_pop.iloc[50:, 21] = 0
```

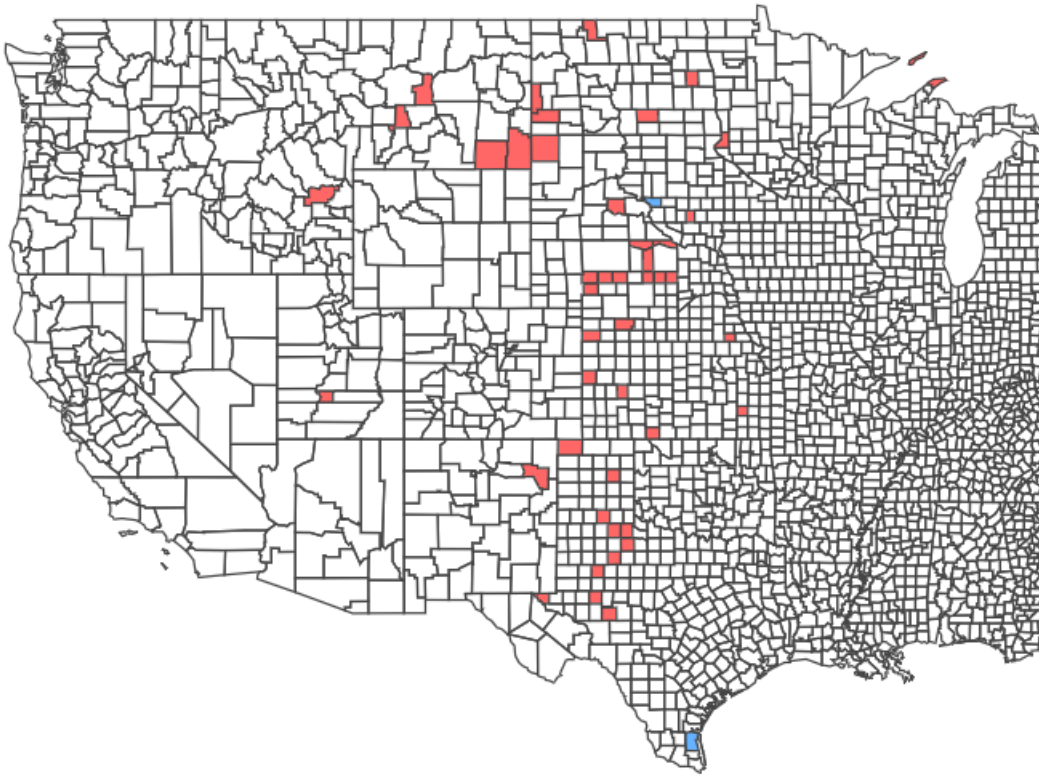
In [34]:
```
lowest_asian_pop.head(50)
```

Out[34]:

	id	total_pop	total_pop_one_race	pop_white	pop_african_american	pop_nat
903	0500000US20033	1689.0	1599.0	1560.0	12.0	
2694	0500000US48345	1063.0	986.0	931.0	10.0	
990	0500000US20207	3115.0	2945.0	2890.0	8.0	3
1805	0500000US35021	657.0	485.0	428.0	4.0	
1744	0500000US31183	774.0	745.0	741.0	0.0	
986	0500000US20199	1512.0	1426.0	1370.0	3.0	

In [35]:
```
import plotly.express as px

fig = px.choropleth_mapbox(lowest_asian_pop, geojson= zips_map, color="Target",
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                           color_discrete_map = {'Trump': '#FF6666', 'Clinton': '
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



----------Children in Poverty Analysis----------

Total number of children in poverty is the feature in the model. Keep in mind that this is not a rate. This is the number of people under 18 who are in poverty.

Map of 50 Counties with Highest Number of Children in Poverty

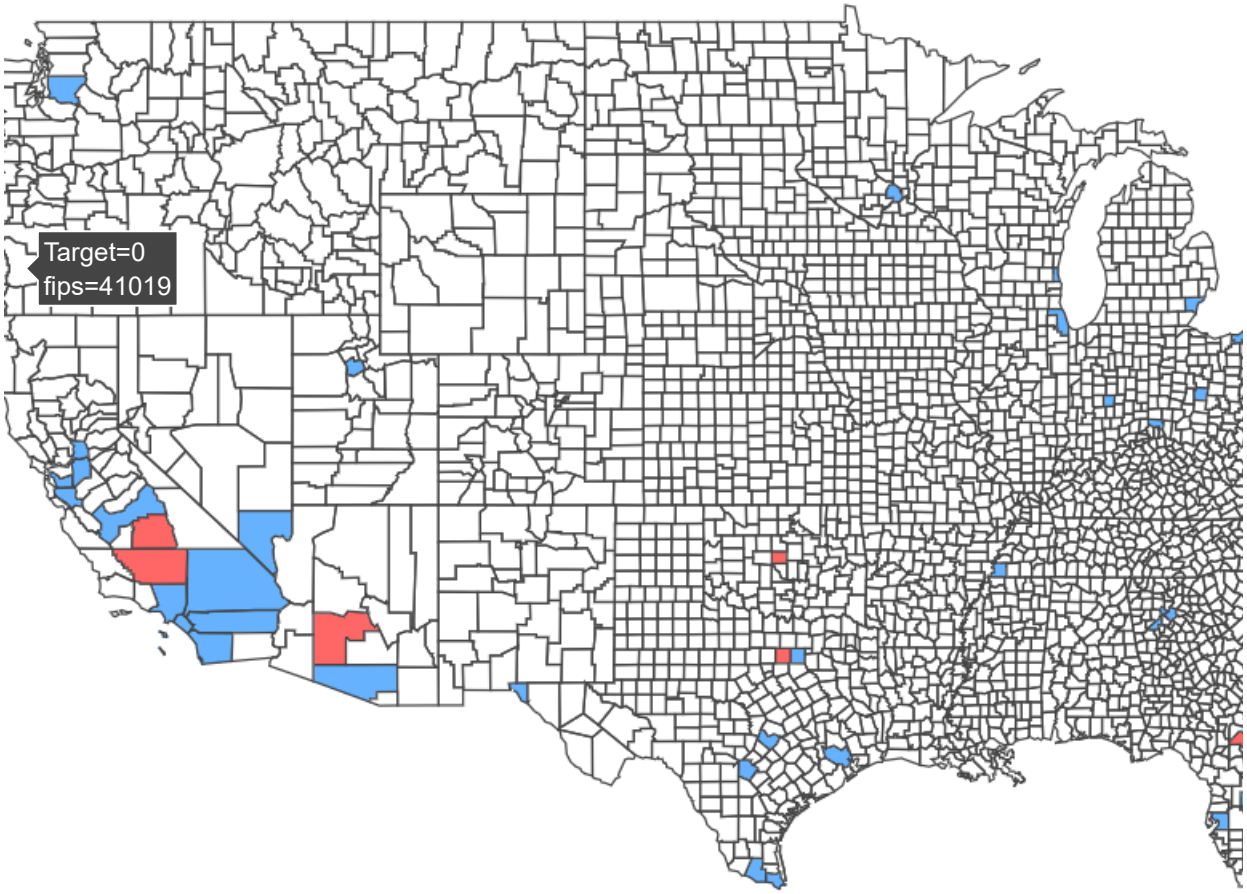
44 of these counties voted for Hillary Clinton.

In [36]:
```
highest_child_poverty = df1.sort_values(by = 'poverty_under_18', ascending = Fals
```

In [37]:
```
highest_child_poverty.iloc[50:, 21] = 0
```

In [38]:
```
import plotly.express as px

fig = px.choropleth_mapbox(highest_child_poverty, geojson= zips_map, color="Targe
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                           color_discrete_map = {'Trump': '#FF6666', 'Clinton': '
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



Map of 50 Counties with Lowest Number of Children in Poverty

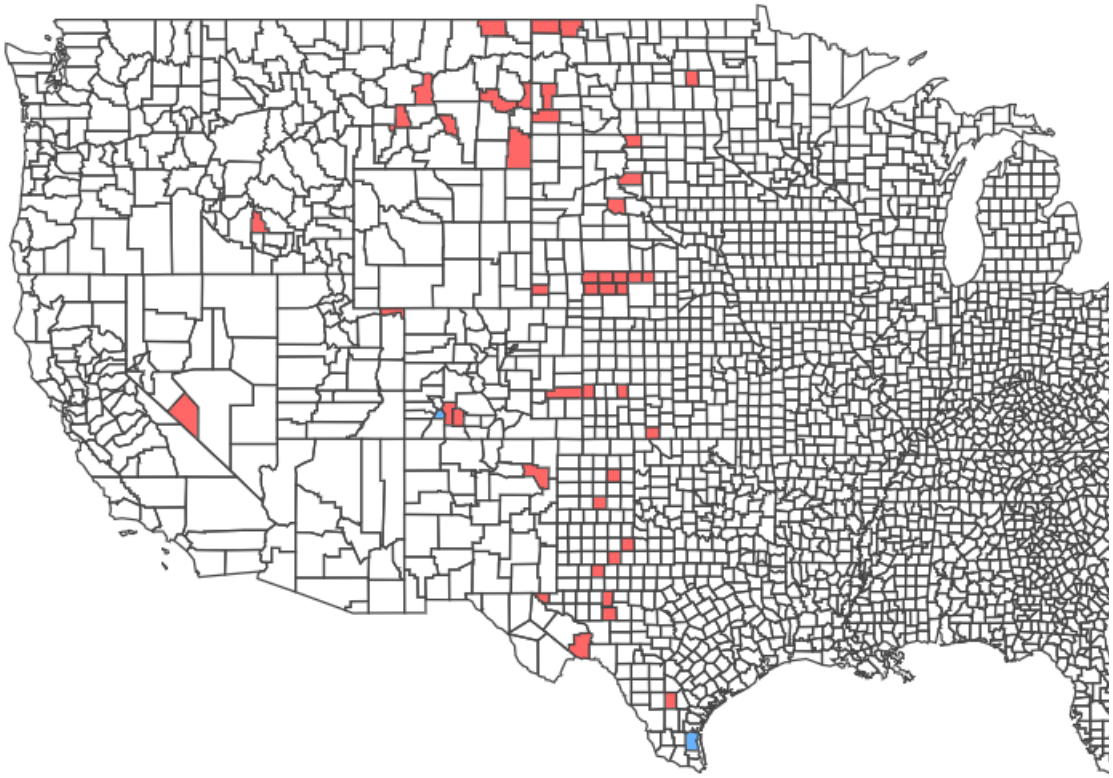
48 of these counties voted for Donald Trump.

In [39]:
```
lowest_child_poverty = df1.sort_values(by = 'poverty_under_18')
```

In [40]:
```
lowest_child_poverty.iloc[50:, 21] = 0
```

In [41]:
```
import plotly.express as px

fig = px.choropleth_mapbox(lowest_child_poverty, geojson= zips_map, color="Target
                           locations="fips", featureidkey="properties.FIPS",
                           center={"lat": 31.5, "lon": -99.9},
                           mapbox_style="white-bg", zoom=2,
                           color_discrete_map = {'Trump': '#FF6666', 'Clinton': '
fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
fig.show()
```



Map of Childhood Poverty Rate

This model does not include childhood poverty as a rate but I wanted to look into it.
The average childhood poverty rate in the US is 4.75%.

In [42]:
```
avg_child_poverty_rate = (df1.poverty_under_18.sum() / df1.total_pop.sum()) *100
avg_child_poverty_rate
```

Out[42]: 4.751593622044022

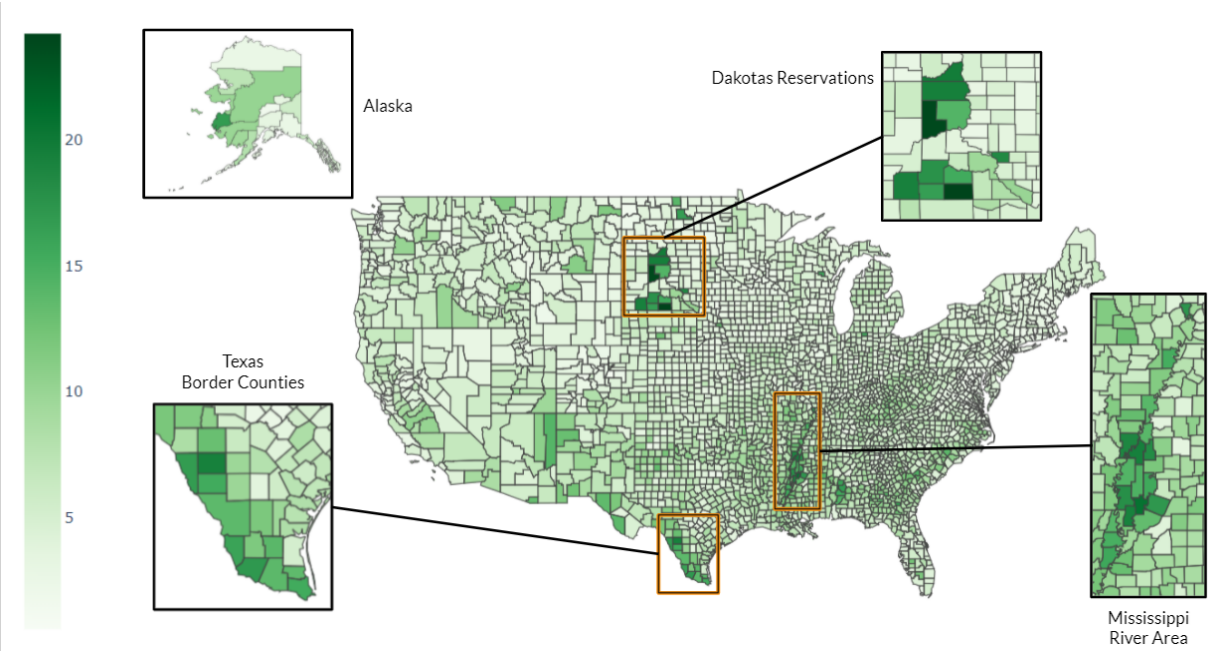
In [43]:
```
df1['poverty_under_18_rate'] = (df1.poverty_under_18 / df1.total_pop)*100
```

Below is the code for the childhood poverty rate. I have pasted in an image with popouts from a slide show to look at instead.

In [44]:
```
# import plotly.express as px

# fig = px.choropleth_mapbox(df1, geojson= zips_map, color="poverty_under_18_rate
#                            locations="fips", featureidkey="properties.FIPS",
#                            center={"lat": 31.5, "lon": -99.9},
#                            mapbox_style="white-bg", zoom=2,
#                           color_continuous_scale="Greens")
# fig.update_layout(margin={"r":0,"t":0,"l":0,"b":0})
# fig.show()
```

These dark pockets are very interesting! Let's take a look.



Additional Information about Pockets of High Childhood Poverty Rates

Texas/Mexico Border

Zapata County, TX: Named for Colonel José Antonio de Zapata, a rancher in the area who rebelled against Mexico. 84% Hispanic
Dimmit County, TX: It's named for Philip Dimmitt, a major figure in the Texas Revolution. 85%

Hispanic
Cameron County, TX: Named for Captain Ewen Cameron, a soldier during the Texas Revolution and in the ill-fated Mier Expedition. 88% Hispanic
Zavala County, TX: Zavala is named for Lorenzo de Zavala, Mexican politician, signer of the Texas Declaration of Independence, and first vice president of the Republic of Texas. Housed an internment camp during WW2. 91% Hispanic (I recommend reading about this county. So interesting!)
Starr County, TX: border. 97.7% hispanic
Maverick County, TX: border 95% hispanic

Dakota Reservations

Mellette County, SD: Rosebud Indian Reservation 54.1 % Native American
Corson County, SD: Standing Rock Indian Reservation 67% Native American
Bennett County, SD: The North American continental pole of inaccessibility. Pine Ridge Indian Reservation 61% Native American
Benson County, ND: Spirit Lake Indian Reservation 55% Native American
Todd County, SD: Rosebud Indian Reservation 88% Native American
Ziebach County, SD: Cheyenne River Indian Reservation 72% Native American
Sioux County, ND: Standing Rock Indian Reservation 84% Native American
Corson County, SD: Standing Rock Indian Reservation, 60% Native American
Oglala Lakota, SD: Pine Ridge Indian Reservation 94% Native American
Buffalo County, SD: Crow Creek Indian Reservation 81% Native American
Jackson County, SD: Pine Ridge Indian Reservation, 52% Native American

Mississippi Delta and Surrounding Counties

Alexander County, IL: along Miss River but probably not considered Delta. Between 2010 and 2020, the population of Alexander County decreased to 5,240. The percentage decline in the population of 36.4 percent was the largest of any of the 3,138 U.S. counties. Although the population of the county had been decreasing for decades, the closure of the Tamms Correctional Center in 2013 probably caused an acceleration of the decline in the 2010s. 60.9% White
Holmes County, Miss: Delta. 83% African American
Pemiscot County, Missouri: Delta. 72% White
Leflore County, Miss: Delta. In the period from 1877 to 1950, Leflore County had 48 documented lynchings of African Americans, by far the highest number in the state. 72% African American
Humphreys County, Miss: Catfish capital of the world 75% African American
Coahoma County, Miss: Delta, 75.5% African American
Sharkey County, Miss: Delta. 71% African American
Phillips County, Ark: Delta. Ranks as the county with the highest number of lynchings in U.S. history. 63.1% African American
Quitman County, Miss: Martin Luther King Jr. originally wanted the Poor People's Campaign to start in Quitman County because of the intense and visible economic disparity there. 69.6% African American
Washington County, Miss:Delta 71% African American

Other

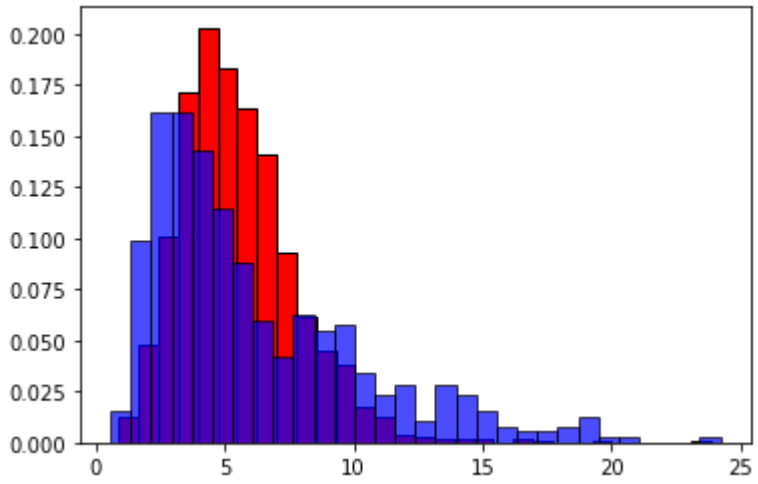
Menominee County, WI: Menominee Indian Reservation. 87% Native. Bluest county in Wisconsin in the 2020 election.
Perry County, Alabama: 68.7% African American
Wilcox County, Alabama: 72.5% African American
Atkinson County, Georgia: 67% white
Dallas County, Alabama: County seat is Selma. 69% African American
Kusilvak County, AK: 92% Native. Not a reservation and seems to have many people groups.

Histogram of Childhood Poverty Rate and Target

In [45]:
```
Trump = df1.loc[df1.Target == 'Trump']
Clinton = df1.loc[df1.Target == 'Clinton']
```

In [46]:
```
x = Clinton.poverty_under_18_rate
z = Trump.poverty_under_18_rate
```

In [48]:
```
plt.hist(z, bins = 30, ec = 'k', stacked = True, color = 'red', density = True)
plt.hist(x, bins = 30, ec = 'k', stacked = True, color = 'blue', density = True,
```



----------Features to Explore in the Future----------

- Density
- Model Predictions
  - Map of predictions
  - Analysis of missed counties
- Land Area
- Population Other (people who identified as one race but none of the available options in the census) I suspect we might have some interesting information in there.

In [ ]: