In [1]:

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

In [2]:

```
!pip install plotly
```

```
Requirement already satisfied: plotly in c:\users\deepu\appdata\local\progra
ms\python\python39\lib\site-packages (5.2.2)
Requirement already satisfied: six in c:\users\deepu\appdata\local\programs
\python\python39\lib\site-packages (from plotly) (1.16.0)
Requirement already satisfied: tenacity>=6.2.0 in c:\users\deepu\appdata\loc
al\programs\python\python39\lib\site-packages (from plotly) (8.0.1)

WARNING: You are using pip version 21.1.3; however, version 21.2.4 is availa
ble.
You should consider upgrading via the 'c:\users\deepu\appdata\local\programs
\python\python39\python.exe -m pip install --upgrade pip' command.
```

In [3]:

```
import plotly.express as px
from plotly.offline import init_notebook_mode
init_notebook_mode(connected= True)
```

In [4]:

```
global_temp_country = pd.read_csv('GlobalLandTemperaturesByCountry.csv')
```

In [5]:

```
global_temp_country.head()
```

Out[5]:

	dt	AverageTemperature	AverageTemperatureUncertainty	Country
0	1743-11-01	4.384	2.294	Åland
1	1743-12-01	NaN	NaN	Åland
2	1744-01-01	NaN	NaN	Åland
3	1744-02-01	NaN	NaN	Åland
4	1744-03-01	NaN	NaN	Åland

In [6]:

```
global_temp_country.shape
```

Out[6]:

```
(577462, 4)
```

In [7]:

```
global_temp_country.isna().sum()
```

Out[7]:

```
dt                                    0
AverageTemperature                32651
AverageTemperatureUncertainty     31912
Country                               0
dtype: int64
```

In [8]:

```
global_temp_country.dropna()
```

Out[8]:

	dt	AverageTemperature	AverageTemperatureUncertainty	Country
0	1743-11-01	4.384	2.294	Åland
5	1744-04-01	1.530	4.680	Åland
6	1744-05-01	6.702	1.789	Åland
7	1744-06-01	11.609	1.577	Åland
8	1744-07-01	15.342	1.410	Åland
...	...	...	...	...
577456	2013-04-01	21.142	0.495	Zimbabwe
577457	2013-05-01	19.059	1.022	Zimbabwe
577458	2013-06-01	17.613	0.473	Zimbabwe
577459	2013-07-01	17.000	0.453	Zimbabwe
577460	2013-08-01	19.759	0.717	Zimbabwe

544811 rows × 4 columns

In [9]:

```
global_temp_country.isna().sum()
```

Out[9]:

```
dt                                    0
AverageTemperature                32651
AverageTemperatureUncertainty     31912
Country                               0
dtype: int64
```

In [10]:

```
global_temp_country.dropna(axis='index',how='any',inplace = True)
```

In [11]:

```
global_temp_country.dropna().isna().sum()
```

Out[11]:

```
dt                             0
AverageTemperature             0
AverageTemperatureUncertainty  0
Country                        0
dtype: int64
```

In [12]:

```
global_temp_country['Country'].unique()
```

Out[12]:

```
array(['Åland', 'Afghanistan', 'Africa', 'Albania', 'Algeria',
       'American Samoa', 'Andorra', 'Angola', 'Anguilla',
       'Antigua And Barbuda', 'Argentina', 'Armenia', 'Aruba', 'Asia',
       'Australia', 'Austria', 'Azerbaijan', 'Bahamas', 'Bahrain',
       'Baker Island', 'Bangladesh', 'Barbados', 'Belarus', 'Belgium',
       'Belize', 'Benin', 'Bhutan', 'Bolivia',
       'Bonaire, Saint Eustatius And Saba', 'Bosnia And Herzegovina',
       'Botswana', 'Brazil', 'British Virgin Islands', 'Bulgaria',
       'Burkina Faso', 'Burma', 'Burundi', "Côte D'Ivoire", 'Cambodia',
       'Cameroon', 'Canada', 'Cape Verde', 'Cayman Islands',
       'Central African Republic', 'Chad', 'Chile', 'China',
       'Christmas Island', 'Colombia', 'Comoros',
       'Congo (Democratic Republic Of The)', 'Congo', 'Costa Rica',
       'Croatia', 'Cuba', 'Curaçao', 'Cyprus', 'Czech Republic',
       'Denmark (Europe)', 'Denmark', 'Djibouti', 'Dominica',
       'Dominican Republic', 'Ecuador', 'Egypt', 'El Salvador',
       'Equatorial Guinea', 'Eritrea', 'Estonia', 'Ethiopia', 'Europe',
       'Falkland Islands (Islas Malvinas)', 'Faroe Islands',
       'Federated States Of Micronesia', 'Fiji', 'Finland',
       'France (Europe)', 'France', 'French Guiana', 'French Polynesia',
       'French Southern And Antarctic Lands', 'Gabon', 'Gambia',
       'Gaza Strip', 'Georgia', 'Germany', 'Ghana', 'Greece', 'Greenland',
       'Grenada', 'Guadeloupe', 'Guam', 'Guatemala', 'Guernsey',
       'Guinea Bissau', 'Guinea', 'Guyana', 'Haiti',
       'Heard Island And Mcdonald Islands', 'Honduras', 'Hong Kong',
       'Hungary', 'Iceland', 'India', 'Indonesia', 'Iran', 'Iraq',
       'Ireland', 'Isle Of Man', 'Israel', 'Italy', 'Jamaica', 'Japan',
       'Jersey', 'Jordan', 'Kazakhstan', 'Kenya', 'Kingman Reef',
       'Kiribati', 'Kuwait', 'Kyrgyzstan', 'Laos', 'Latvia', 'Lebanon',
       'Lesotho', 'Liberia', 'Libya', 'Liechtenstein', 'Lithuania',
       'Luxembourg', 'Macau', 'Macedonia', 'Madagascar', 'Malawi',
       'Malaysia', 'Mali', 'Malta', 'Martinique', 'Mauritania',
       'Mauritius', 'Mayotte', 'Mexico', 'Moldova', 'Monaco', 'Mongolia',
       'Montenegro', 'Montserrat', 'Morocco', 'Mozambique', 'Namibia',
       'Nepal', 'Netherlands (Europe)', 'Netherlands', 'New Caledonia',
       'New Zealand', 'Nicaragua', 'Niger', 'Nigeria', 'Niue',
       'North America', 'North Korea', 'Northern Mariana Islands',
       'Norway', 'Oceania', 'Oman', 'Pakistan', 'Palau', 'Palestina',
       'Palmyra Atoll', 'Panama', 'Papua New Guinea', 'Paraguay', 'Peru',
       'Philippines', 'Poland', 'Portugal', 'Puerto Rico', 'Qatar',
       'Reunion', 'Romania', 'Russia', 'Rwanda', 'Saint Barthélemy',
       'Saint Kitts And Nevis', 'Saint Lucia', 'Saint Martin',
       'Saint Pierre And Miquelon', 'Saint Vincent And The Grenadines',
       'Samoa', 'San Marino', 'Sao Tome And Principe', 'Saudi Arabia',
       'Senegal', 'Serbia', 'Seychelles', 'Sierra Leone', 'Singapore',
       'Sint Maarten', 'Slovakia', 'Slovenia', 'Solomon Islands',
       'Somalia', 'South Africa', 'South America',
       'South Georgia And The South Sandwich Isla', 'South Korea',
       'Spain', 'Sri Lanka', 'Sudan', 'Suriname',
       'Svalbard And Jan Mayen', 'Swaziland', 'Sweden', 'Switzerland',
       'Syria', 'Taiwan', 'Tajikistan', 'Tanzania', 'Thailand',
       'Timor Leste', 'Togo', 'Tonga', 'Trinidad And Tobago', 'Tunisia',
       'Turkey', 'Turkmenistan', 'Turks And Caicas Islands', 'Uganda',
       'Ukraine', 'United Arab Emirates', 'United Kingdom (Europe)',
       'United Kingdom', 'United States', 'Uruguay', 'Uzbekistan',
```

```
        'Venezuela', 'Vietnam', 'Virgin Islands', 'Western Sahara',
        'Yemen', 'Zambia', 'Zimbabwe'], dtype=object)
```

In [13]:

```
dict1={
    'United Kingdom (Europe)':'United Kingdom',
    'France (Europe)':'France',
    'Netherlands (Europe)':'Netherlands',
    'Denmark (Europe)':'Denmark',
     'Congo (Democratic Republic Of The)': 'Congo'

}
```

In [14]:

```
global_temp_country['Country'].replace(dict1,inplace=True)
```

In [15]:

```
global_temp_country['Country'].unique()
```

Out[15]:

```
array(['Åland', 'Afghanistan', 'Africa', 'Albania', 'Algeria',
       'American Samoa', 'Andorra', 'Angola', 'Anguilla',
       'Antigua And Barbuda', 'Argentina', 'Armenia', 'Aruba', 'Asia',
       'Australia', 'Austria', 'Azerbaijan', 'Bahamas', 'Bahrain',
       'Baker Island', 'Bangladesh', 'Barbados', 'Belarus', 'Belgium',
       'Belize', 'Benin', 'Bhutan', 'Bolivia',
       'Bonaire, Saint Eustatius And Saba', 'Bosnia And Herzegovina',
       'Botswana', 'Brazil', 'British Virgin Islands', 'Bulgaria',
       'Burkina Faso', 'Burma', 'Burundi', "Côte D'Ivoire", 'Cambodia',
       'Cameroon', 'Canada', 'Cape Verde', 'Cayman Islands',
       'Central African Republic', 'Chad', 'Chile', 'China',
       'Christmas Island', 'Colombia', 'Comoros', 'Congo', 'Costa Rica',
       'Croatia', 'Cuba', 'Curaçao', 'Cyprus', 'Czech Republic',
       'Denmark', 'Djibouti', 'Dominica', 'Dominican Republic', 'Ecuador',
       'Egypt', 'El Salvador', 'Equatorial Guinea', 'Eritrea', 'Estonia',
       'Ethiopia', 'Europe', 'Falkland Islands (Islas Malvinas)',
       'Faroe Islands', 'Federated States Of Micronesia', 'Fiji',
       'Finland', 'France', 'French Guiana', 'French Polynesia',
       'French Southern And Antarctic Lands', 'Gabon', 'Gambia',
       'Gaza Strip', 'Georgia', 'Germany', 'Ghana', 'Greece', 'Greenland',
       'Grenada', 'Guadeloupe', 'Guam', 'Guatemala', 'Guernsey',
       'Guinea Bissau', 'Guinea', 'Guyana', 'Haiti',
       'Heard Island And Mcdonald Islands', 'Honduras', 'Hong Kong',
       'Hungary', 'Iceland', 'India', 'Indonesia', 'Iran', 'Iraq',
       'Ireland', 'Isle Of Man', 'Israel', 'Italy', 'Jamaica', 'Japan',
       'Jersey', 'Jordan', 'Kazakhstan', 'Kenya', 'Kingman Reef',
       'Kiribati', 'Kuwait', 'Kyrgyzstan', 'Laos', 'Latvia', 'Lebanon',
       'Lesotho', 'Liberia', 'Libya', 'Liechtenstein', 'Lithuania',
       'Luxembourg', 'Macau', 'Macedonia', 'Madagascar', 'Malawi',
       'Malaysia', 'Mali', 'Malta', 'Martinique', 'Mauritania',
       'Mauritius', 'Mayotte', 'Mexico', 'Moldova', 'Monaco', 'Mongolia',
       'Montenegro', 'Montserrat', 'Morocco', 'Mozambique', 'Namibia',
       'Nepal', 'Netherlands', 'New Caledonia', 'New Zealand',
       'Nicaragua', 'Niger', 'Nigeria', 'Niue', 'North America',
       'North Korea', 'Northern Mariana Islands', 'Norway', 'Oceania',
       'Oman', 'Pakistan', 'Palau', 'Palestina', 'Palmyra Atoll',
       'Panama', 'Papua New Guinea', 'Paraguay', 'Peru', 'Philippines',
       'Poland', 'Portugal', 'Puerto Rico', 'Qatar', 'Reunion', 'Romania',
       'Russia', 'Rwanda', 'Saint Barthélemy', 'Saint Kitts And Nevis',
       'Saint Lucia', 'Saint Martin', 'Saint Pierre And Miquelon',
       'Saint Vincent And The Grenadines', 'Samoa', 'San Marino',
       'Sao Tome And Principe', 'Saudi Arabia', 'Senegal', 'Serbia',
       'Seychelles', 'Sierra Leone', 'Singapore', 'Sint Maarten',
       'Slovakia', 'Slovenia', 'Solomon Islands', 'Somalia',
       'South Africa', 'South America',
       'South Georgia And The South Sandwich Isla', 'South Korea',
       'Spain', 'Sri Lanka', 'Sudan', 'Suriname',
       'Svalbard And Jan Mayen', 'Swaziland', 'Sweden', 'Switzerland',
       'Syria', 'Taiwan', 'Tajikistan', 'Tanzania', 'Thailand',
       'Timor Leste', 'Togo', 'Tonga', 'Trinidad And Tobago', 'Tunisia',
       'Turkey', 'Turkmenistan', 'Turks And Caicas Islands', 'Uganda',
       'Ukraine', 'United Arab Emirates', 'United Kingdom',
       'United States', 'Uruguay', 'Uzbekistan', 'Venezuela', 'Vietnam',
       'Virgin Islands', 'Western Sahara', 'Yemen', 'Zambia', 'Zimbabwe'],
      dtype=object)
```

In [16]:

```
avg_temp=global_temp_country.groupby(['Country'])['AverageTemperature'].mean().to_frame().r
```

In [17]:

```
avg_temp
```

Out[17]:

	Country	AverageTemperature
0	Afghanistan	14.045007
1	Africa	24.074203
2	Albania	12.610646
3	Algeria	22.985112
4	American Samoa	26.611965
...	...	...
232	Western Sahara	22.319818
233	Yemen	26.253597
234	Zambia	21.282956
235	Zimbabwe	21.117547
236	Åland	5.291383

237 rows × 2 columns

In [18]:

```
fig = px.choropleth(avg_temp,locations='Country',locationmode='country names',color='Averag
fig.update_layout(title='choropleth graph')
```

In [19]:

```
g_temp=pd.read_csv('GlobalTemperatures.csv')
g_temp.head()
```

Out[19]:

	dt	LandAverageTemperature	LandAverageTemperatureUncertainty	LandMaxTemperature	L
0	1750-01-01	3.034	3.574	NaN	
1	1750-02-01	3.083	3.702	NaN	
2	1750-03-01	5.626	3.076	NaN	
3	1750-04-01	8.490	2.451	NaN	
4	1750-05-01	11.573	2.072	NaN	

In [20]:

```
# g_temp.isna().sum()
```

In [21]:

```
# g_temp.dropna(axis='index',inplace=True)
```

In [22]:

```
# g_temp.isna().sum()
```

In [23]:

```
g_temp.head()
```

Out[23]:

	dt	LandAverageTemperature	LandAverageTemperatureUncertainty	LandMaxTemperature	L
0	1750-01-01	3.034	3.574	NaN	
1	1750-02-01	3.083	3.702	NaN	
2	1750-03-01	5.626	3.076	NaN	
3	1750-04-01	8.490	2.451	NaN	
4	1750-05-01	11.573	2.072	NaN	

In [24]:

```
g_temp['dt'][0]
```

Out[24]:

```
'1750-01-01'
```

In [25]:

```
g_temp['dt'][0].split('-')[0]
```

Out[25]:

```
'1750'
```

In [26]:

```
def fetch_year(date):
    return date.split('-')[0]
```

g

In [27]:

```
g_temp['year']= g_temp['dt'].apply(fetch_year)
```

In [28]:

```
g_temp.head()
```

Out[28]:

	dt	LandAverageTemperature	LandAverageTemperatureUncertainty	LandMaxTemperature	L
0	1750-01-01	3.034	3.574	NaN	
1	1750-02-01	3.083	3.702	NaN	
2	1750-03-01	5.626	3.076	NaN	
3	1750-04-01	8.490	2.451	NaN	
4	1750-05-01	11.573	2.072	NaN	

In [29]:

```
avg_g_temp=g_temp.groupby('year').agg({'LandAverageTemperature':'mean','LandAverageTemperat
```

In [30]:

```
avg_g_temp.isna().sum()
```

Out[30]:

```
year                                 0
LandAverageTemperature               0
LandAverageTemperatureUncertainty    0
dtype: int64
```

In [31]:

```
avg_g_temp.head()
```

Out[31]:

	year	LandAverageTemperature	LandAverageTemperatureUncertainty
0	1750	8.719364	2.637818
1	1751	7.976143	2.781143
2	1752	5.779833	2.977000
3	1753	8.388083	3.176000
4	1754	8.469333	3.494250

In [32]:

```
avg_g_temp['dat_uncertainity_top']=avg_g_temp['LandAverageTemperature'] + avg_g_temp['LandA
```

In [33]:

```
avg_g_temp['dat_uncertainity_bottom']=avg_g_temp['LandAverageTemperature'] - avg_g_temp['La
```

In [34]:

```
avg_g_temp.head()
```

Out[34]:

	year	LandAverageTemperature	LandAverageTemperatureUncertainty	dat_uncertainity_top	dat
0	1750	8.719364	2.637818	11.357182	
1	1751	7.976143	2.781143	10.757286	
2	1752	5.779833	2.977000	8.756833	
3	1753	8.388083	3.176000	11.564083	
4	1754	8.469333	3.494250	11.963583	

In [35]:

```
avg_g_temp.columns
```

Out[35]:

```
Index(['year', 'LandAverageTemperature', 'LandAverageTemperatureUncertaint
y',
       'dat_uncertainity_top', 'dat_uncertainity_bottom'],
      dtype='object')
```

In [36]:

```
fig2=px.line(avg_g_temp,x='year',y=['LandAverageTemperature',
       'dat_uncertainity_top', 'dat_uncertainity_bottom'],title='line graph')
fig2.show()
```

In [37]:

```
g_temp.head()
```

Out[37]:

	dt	LandAverageTemperature	LandAverageTemperatureUncertainty	LandMaxTemperature	L
0	1750-01-01	3.034	3.574	NaN	
1	1750-02-01	3.083	3.702	NaN	
2	1750-03-01	5.626	3.076	NaN	
3	1750-04-01	8.490	2.451	NaN	
4	1750-05-01	11.573	2.072	NaN	

Type *Markdown* and LaTeX: α^2

In [38]:

```
g_temp['dt']=pd.to_datetime(g_temp['dt'])
```

Type *Markdown* and LaTeX: α^2

In [39]:

```
g_temp.head()
```

Out[39]:

	dt	LandAverageTemperature	LandAverageTemperatureUncertainty	LandMaxTemperature	L
0	1750-01-01	3.034	3.574	NaN	
1	1750-02-01	3.083	3.702	NaN	
2	1750-03-01	5.626	3.076	NaN	
3	1750-04-01	8.490	2.451	NaN	
4	1750-05-01	11.573	2.072	NaN	

In [40]:

```
g_temp['month']=g_temp['dt'].dt.month
```

In [41]:

```
g_temp.head()
```

Out[41]:

	dt	LandAverageTemperature	LandAverageTemperatureUncertainty	LandMaxTemperature	L
0	1750-01-01	3.034	3.574	NaN	
1	1750-02-01	3.083	3.702	NaN	
2	1750-03-01	5.626	3.076	NaN	
3	1750-04-01	8.490	2.451	NaN	
4	1750-05-01	11.573	2.072	NaN	

In [42]:

```
def season_check(month):
    if month>=3 and month<5:
        return 'spring'
    elif month>=5 and month<8:
        return 'summer'
    elif month>=8 and month<11:
        return 'autumn'
    else:
        return 'winter'
```

In [43]:

```
g_temp['season']=g_temp['month'].apply(season_check)
```

In [44]:

```
g_temp.head()
```

Out[44]:

	dt	LandAverageTemperature	LandAverageTemperatureUncertainty	LandMaxTemperature	L
0	1750-01-01	3.034	3.574	NaN	
1	1750-02-01	3.083	3.702	NaN	
2	1750-03-01	5.626	3.076	NaN	
3	1750-04-01	8.490	2.451	NaN	
4	1750-05-01	11.573	2.072	NaN	

In [46]:

```
years = g_temp['year'].unique()
```

In [47]:

```
years
```

Out[47]:

```
array(['1750', '1751', '1752', '1753', '1754', '1755', '1756', '1757',
       '1758', '1759', '1760', '1761', '1762', '1763', '1764', '1765',
       '1766', '1767', '1768', '1769', '1770', '1771', '1772', '1773',
       '1774', '1775', '1776', '1777', '1778', '1779', '1780', '1781',
       '1782', '1783', '1784', '1785', '1786', '1787', '1788', '1789',
       '1790', '1791', '1792', '1793', '1794', '1795', '1796', '1797',
       '1798', '1799', '1800', '1801', '1802', '1803', '1804', '1805',
       '1806', '1807', '1808', '1809', '1810', '1811', '1812', '1813',
       '1814', '1815', '1816', '1817', '1818', '1819', '1820', '1821',
       '1822', '1823', '1824', '1825', '1826', '1827', '1828', '1829',
       '1830', '1831', '1832', '1833', '1834', '1835', '1836', '1837',
       '1838', '1839', '1840', '1841', '1842', '1843', '1844', '1845',
       '1846', '1847', '1848', '1849', '1850', '1851', '1852', '1853',
       '1854', '1855', '1856', '1857', '1858', '1859', '1860', '1861',
       '1862', '1863', '1864', '1865', '1866', '1867', '1868', '1869',
       '1870', '1871', '1872', '1873', '1874', '1875', '1876', '1877',
       '1878', '1879', '1880', '1881', '1882', '1883', '1884', '1885',
       '1886', '1887', '1888', '1889', '1890', '1891', '1892', '1893',
       '1894', '1895', '1896', '1897', '1898', '1899', '1900', '1901',
       '1902', '1903', '1904', '1905', '1906', '1907', '1908', '1909',
       '1910', '1911', '1912', '1913', '1914', '1915', '1916', '1917',
       '1918', '1919', '1920', '1921', '1922', '1923', '1924', '1925',
       '1926', '1927', '1928', '1929', '1930', '1931', '1932', '1933',
       '1934', '1935', '1936', '1937', '1938', '1939', '1940', '1941',
       '1942', '1943', '1944', '1945', '1946', '1947', '1948', '1949',
       '1950', '1951', '1952', '1953', '1954', '1955', '1956', '1957',
       '1958', '1959', '1960', '1961', '1962', '1963', '1964', '1965',
       '1966', '1967', '1968', '1969', '1970', '1971', '1972', '1973',
       '1974', '1975', '1976', '1977', '1978', '1979', '1980', '1981',
       '1982', '1983', '1984', '1985', '1986', '1987', '1988', '1989',
       '1990', '1991', '1992', '1993', '1994', '1995', '1996', '1997',
       '1998', '1999', '2000', '2001', '2002', '2003', '2004', '2005',
       '2006', '2007', '2008', '2009', '2010', '2011', '2012', '2013',
       '2014', '2015'], dtype=object)
```

In [48]:

```
usa_states = pd.read_csv("GlobalLandTemperaturesByState.csv")
```

In [51]:

```
usa_states.head()
```

Out[51]:

	dt	AverageTemperature	AverageTemperatureUncertainty	State	Country
0	1855-05-01	25.544	1.171	Acre	Brazil
1	1855-06-01	24.228	1.103	Acre	Brazil
2	1855-07-01	24.371	1.044	Acre	Brazil
3	1855-08-01	25.427	1.073	Acre	Brazil
4	1855-09-01	25.675	1.014	Acre	Brazil

In [60]:

```
filter = (usa_states['Country']=='United States')
usa = usa_states[filter]
```

In [67]:

```
usa.head()
```

Out[67]:

	dt	AverageTemperature	AverageTemperatureUncertainty	State	Country
7458	1743-11-01	10.722	2.898	Alabama	United States
7459	1743-12-01	NaN	NaN	Alabama	United States
7460	1744-01-01	NaN	NaN	Alabama	United States
7461	1744-02-01	NaN	NaN	Alabama	United States
7462	1744-03-01	NaN	NaN	Alabama	United States

In [71]:

```
# usa['States']=usa['State'].unique()
```

In [75]:

```
states_usa=usa.groupby('State').agg({'AverageTemperature':'mean'}).reset_index()
```

In [82]:

```
states_usa.head()
```

Out[82]:

	State	AverageTemperature
0	Alabama	17.066138
1	Alaska	-4.890738
2	Arizona	15.381526
3	Arkansas	15.573963
4	California	14.327677

In [81]:

```
# !pip install opencage
```

In [78]:

```
import geopy
```

In [87]:

```
from geopy.geocoders import Nominatim
geolocator = Nominatim(user_agent='app')
```

In [88]:

```
lat=[]
lon=[]

for state in states_usa['State']:
    state=geolocator.geocode(state)
    lat.append(state.latitude)
    lon.append(state.longitude)
```

In [89]:

```
states_usa['latitude']=lat
states_usa['longitude']=lon
```

In [90]:

```
states_usa.head()
```

Out[90]:

	State	AverageTemperature	latitude	longitude
0	Alabama	17.066138	33.258882	-86.829534
1	Alaska	-4.890738	64.445961	-149.680909
2	Arizona	15.381526	34.395342	-111.763275
3	Arkansas	15.573963	35.204888	-92.447911
4	California	14.327677	36.701463	-118.755997

In [ ]:

```
import folium
from folium.plugins import HeatMap
basemap = folium
```