Assignment 5 - GTECH 73100 GeoComputation I Nikola Janjic

Firstly, I will install the plotly and other data visualization packages using pip.

In [1]:
```
!pip install plotly
```

```
Requirement already satisfied: plotly in c:\users\toshiba\anaconda3\lib\site-packages
(5.6.0)
Requirement already satisfied: six in c:\users\toshiba\anaconda3\lib\site-packages (f
rom plotly) (1.16.0)
Requirement already satisfied: tenacity>=6.2.0 in c:\users\toshiba\anaconda3\lib\site
-packages (from plotly) (8.0.1)
```

The plotly.express module (usually imported as px) contains functions that can create entire figures at once, and is referred to as Plotly Express or PX. Plotly Express is a built-in part of the plotly library, and is the recommended starting point for creating most common figures.

In [2]:
```
import plotly.express as px
import pandas as pd
import json
import plotly.io as pio
```

In my next step I will produce at least three types of charts using plotly.

First I downloaded from kaggle.com website one interesting file: parks.csv file, which I will use to present 3 different charts in this task. Considering the fact that I am an ecologist I have decided to use the dataset which includes the name and area (in acres) of all 57 USA State National Parks. I will describe visually dependence between the each National State Park and the above mentioned area in acres (1 acre = 0.00405 sq.km). Each of American states has at least one national park, however Delaware is the only state in the country without a National Park.

In [3]:
```
file = pd.read_csv(r"C:\Users\Toshiba\Downloads\parks.csv")
file.head(57)
```

Out[3]:

	Park Code	Park Name	State	Acres	Latitude	Longitude
0	ACAD	Acadia National Park	ME	47390	44.35	-68.21
1	ARCH	Arches National Park	UT	76519	38.68	-109.57
2	BADL	Badlands National Park	SD	242756	43.75	-102.50
3	BIBE	Big Bend National Park	TX	801163	29.25	-103.25
4	BISC	Biscayne National Park	FL	172924	25.65	-80.08
5	BLCA	Black Canyon of the Gunnison National Park	CO	32950	38.57	-107.72
6	BRCA	Bryce Canyon National Park	UT	35835	37.57	-112.18
7	CANY	Canyonlands National Park	UT	337598	38.20	-109.93
8	CARE	Capitol Reef National Park	UT	241904	38.20	-111.17
9	CAVE	Carlsbad Caverns National Park	NM	46766	32.17	-104.44
10	CHIS	Channel Islands National Park	CA	249561	34.01	-119.42
11	CONG	Congaree National Park	SC	26546	33.78	-80.78
12	CRLA	Crater Lake National Park	OR	183224	42.94	-122.10
13	CUVA	Cuyahoga Valley National Park	OH	32950	41.24	-81.55
14	DENA	Denali National Park and Preserve	AK	3372402	63.33	-150.50
15	DEVA	Death Valley National Park	CA, NV	4740912	36.24	-116.82
16	DRTO	Dry Tortugas National Park	FL	64701	24.63	-82.87
17	EVER	Everglades National Park	FL	1508538	25.32	-80.93
18	GAAR	Gates Of The Arctic National Park and Preserve	AK	7523898	67.78	-153.30
19	GLAC	Glacier National Park	MT	1013572	48.80	-114.00
20	GLBA	Glacier Bay National Park and Preserve	AK	3224840	58.50	-137.00
21	GRBA	Great Basin National Park	NV	77180	38.98	-114.30
22	GRCA	Grand Canyon National Park	AZ	1217403	36.06	-112.14
23	GRSA	Great Sand Dunes National Park and Preserve	CO	42984	37.73	-105.51
24	GRSM	Great Smoky Mountains National Park	TN, NC	521490	35.68	-83.53
25	GRTE	Grand Teton National Park	WY	309995	43.73	-110.80
26	GUMO	Guadalupe Mountains National Park	TX	86416	31.92	-104.87
27	HALE	Haleakala National Park	HI	29094	20.72	-156.17
28	HAVO	Hawaii Volcanoes National Park	HI	323431	19.38	-155.20
29	HOSP	Hot Springs National Park	AR	5550	34.51	-93.05
30	ISRO	Isle Royale National Park	MI	571790	48.10	-88.55
31	JOTR	Joshua Tree National Park	CA	789745	33.79	-115.90

	Park Code	Park Name	State	Acres	Latitude	Longitude
32	KATM	Katmai National Park and Preserve	AK	3674530	58.50	-155.00
33	KEFJ	Kenai Fjords National Park	AK	669983	59.92	-149.65
34	KOVA	Kobuk Valley National Park	AK	1750717	67.55	-159.28
35	LACL	Lake Clark National Park and Preserve	AK	2619733	60.97	-153.42
36	LAVO	Lassen Volcanic National Park	CA	106372	40.49	-121.51
37	MACA	Mammoth Cave National Park	KY	52830	37.18	-86.10
38	MEVE	Mesa Verde National Park	CO	52122	37.18	-108.49
39	MORA	Mount Rainier National Park	WA	235625	46.85	-121.75
40	NOCA	North Cascades National Park	WA	504781	48.70	-121.20
41	OLYM	Olympic National Park	WA	922651	47.97	-123.50
42	PEFO	Petrified Forest National Park	AZ	93533	35.07	-109.78
43	PINN	Pinnacles National Park	CA	26606	36.48	-121.16
44	REDW	Redwood National Park	CA	112512	41.30	-124.00
45	ROMO	Rocky Mountain National Park	CO	265828	40.40	-105.58
46	SAGU	Saguaro National Park	AZ	91440	32.25	-110.50
47	SEKI	Sequoia and Kings Canyon National Parks	CA	865952	36.43	-118.68
48	SHEN	Shenandoah National Park	VA	199045	38.53	-78.35
49	THRO	Theodore Roosevelt National Park	ND	70447	46.97	-103.45
50	VOYA	Voyageurs National Park	MN	218200	48.50	-92.88
51	WICA	Wind Cave National Park	SD	28295	43.57	-103.48
52	WRST	Wrangell - St Elias National Park and Preserve	AK	8323148	61.00	-142.00
53	YELL	Yellowstone National Park	WY, MT, ID	2219791	44.60	-110.50
54	YOSE	Yosemite National Park	CA	761266	37.83	-119.50
55	ZION	Zion National Park	UT	146598	37.30	-113.05

The first chart will be a donut pie chart that will visually represent the dependence between the State National Park and area in acres.

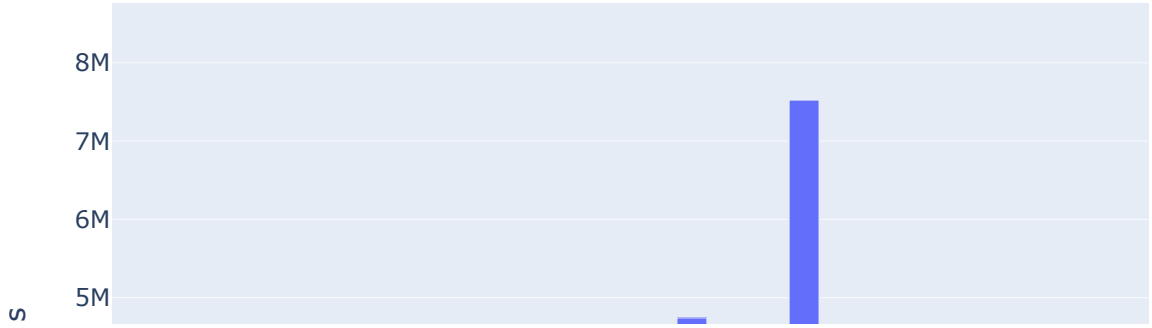
In [4]:
```
park_area = px.pie(file, values="Acres", names="Park Name", title="Area in Acres for E
park_area.show()
```

Area in Acres for Each State Park

From the pie chart above can be seen that the top3 biggest national parks in USA are Wrangell and Gates of The Arctic in Alaska and Death Valley in Nevada.

Considering the fact that I have 56 national parks in my datatset, I think that the following bar chart will work better in this case. In additon, this time I used park code instead of the full name of each park to improve visualization.

In [5]:
```
parkcode_area = px.bar(file, x="Park Code", y="Acres", title="Area in Acres vs Park Co
parkcode_area.show()
```



From the bar chart above is clear that the biggest areas in acres are represented with 3 state national parks: WRST = Wrangell, GAAR = Gates of The Arctic, and DEVA = Death Valley National Park, respetively. This result corresponds with the result in my first donut pie chart.

Finally, my third chart will include the density heatmap where I will include the state abbreviation and the State Park name.

In [8]:
```
state_park_name = px.density_heatmap(file, x="State", y="Park Name")
state_park_name.show()
```

As the last task in this assignement I have to export at least one chart to a static image and one chart to an HTML page, using Python code.

I will create the file path first.

In [32]:
```
%pip install -U kaleido
import os
if not os.path.exists(r"C:\Users\Toshiba\Downloads\Code"):
    os.mkdir(r"C:\Users\Toshiba\Downloads\Code")
```

```
Requirement already satisfied: kaleido in c:\users\toshiba\anaconda3\lib\site-package
s (0.2.1)Note: you may need to restart the kernel to use updated packages.
```

After that I will create HTML and PNG image respectively.

In [31]:
```
parkcode_area.write_html(r"C:\Users\Toshiba\Downloads\Code.html")
```

In [ ]:
```
park_area.write_image(r"C:\Users\Toshiba\Downloads\Code\park_area.png")
parkcode_area.write_image(r"C:\Users\Toshiba\Downloads\Code\parkcode_area.png")
state_park_name.write_image(r"C:\Users\Toshiba\Downloads\Code\state_park_name.png")
```