visualization_01

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- Development Env : Jupyter Lab
- Module : Visualization_01
- Summary : This module will create a data using some data modulation technique and create an interactive data to visulization to understand more about data.

NOTE : The code below is run in the data after preprocessing. Some of the states are missing data due to some data are dropped from preprocessing for easeness to run in local environment. It means entire notebook is run in incomplete/partial data sample.

This notebook is completely designed to create different charts,images and maps for usa road accident data visulalization.

[1]:
```
import os
import random
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from pylab import rcParams
from mpl_toolkits.mplot3d import Axes3D
from pandas.plotting import scatter_matrix
from IPython.display import Image
import pydotplus
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.neighbors import KNeighborsClassifier
from sklearn import preprocessing
from sklearn import svm
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import confusion_matrix
from sklearn.tree import DecisionTreeClassifier
from sklearn import metrics
from sklearn import preprocessing
from sklearn.tree import export_graphviz
from sklearn.externals.six import StringIO
from sklearn import metrics
from sklearn.datasets import make_blobs
from sklearn.preprocessing import StandardScaler
from sklearn.cluster import KMeans
```

```
from sklearn.ensemble import RandomForestRegressor
from sklearn.neural_network import MLPRegressor
from sklearn.datasets import make_regression
from fbprophet import Prophet
print("Loaded Successfully -- -- -- -- -- -- -- -- -- -- -- -- --")
```

```
Loaded Successfully -- -- -- -- -- -- -- -- -- -- -- -- --
```

```
/Users/patthar/opt/anaconda3/lib/python3.7/site-
packages/sklearn/externals/six.py:31: DeprecationWarning: The module is
deprecated in version 0.21 and will be removed in version 0.23 since we've
dropped support for Python 2.7. Please rely on the official version of six
(https://pypi.org/project/six/).
  "(https://pypi.org/project/six/).", DeprecationWarning)
```

[2]:
```
source_path = "../../data/pre_processing/"
```

One careful assumption here is leading 0 in FIPS codes are removed as data is of int type in source so they are preserved here.

[3]:
```
us_road_accident_df_0 = pd.read_csv(source_path+"preprocessed_us_accident_data.
↪csv", dtype={'State_FIPS_Code': object,"County_FIPS_Code":object })
us_road_accident_df_0.head()
```

[3]:

	Unnamed: 0	ID	Severity	Start_Time	End_Time	\
0	0	A-1	3	2016-02-08 05:46:00	2016-02-08 11:00:00	
1	1	A-2	2	2016-02-08 06:07:59	2016-02-08 06:37:59	
2	2	A-3	2	2016-02-08 06:49:27	2016-02-08 07:19:27	
3	3	A-4	3	2016-02-08 07:23:34	2016-02-08 07:53:34	
4	4	A-5	2	2016-02-08 07:39:07	2016-02-08 08:09:07	

	Start_Lat	Start_Lng	Street	Side	City	…	\
0	39.865147	-84.058723	I-70 E	R	Dayton	…	
1	39.928059	-82.831184	Brice Rd	L	Reynoldsburg	…	
2	39.063148	-84.032608	State Route 32	R	Williamsburg	…	
3	39.747753	-84.205582	I-75 S	R	Dayton	…	
4	39.627781	-84.188354	Miamisburg Centerville Rd	R	Dayton	…	

	Roundabout	Station	Stop	Traffic_Calming	Traffic_Signal	Turning_Loop	\
0	False	False	False	False	False	False	
1	False	False	False	False	False	False	
2	False	False	False	False	True	False	
3	False	False	False	False	False	False	
4	False	False	False	False	True	False	

	Sunrise_Sunset	countyState	State_FIPS_Code	County_FIPS_Code
0	Night	Montgomery County, OH	39	113
1	Night	Franklin County, OH	39	049

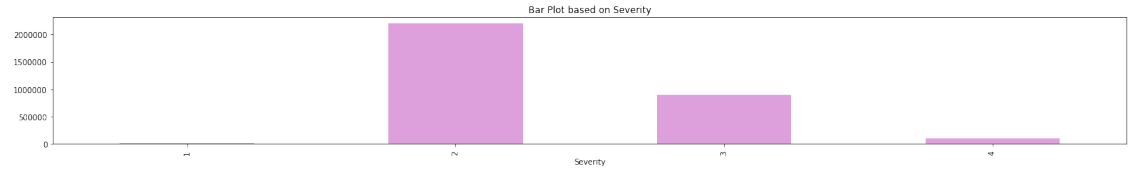
```
2          Night    Clermont County, OH                39                 025
3          Night  Montgomery County, OH                39                 113
4            Day  Montgomery County, OH                39                 113

[5 rows x 40 columns]
```

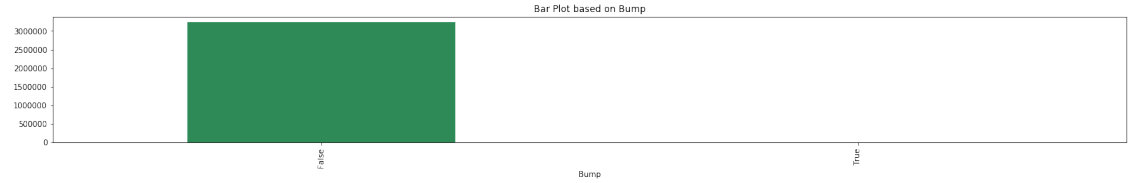
1 1. Looking in more details of different features and count using bar and pir chart.

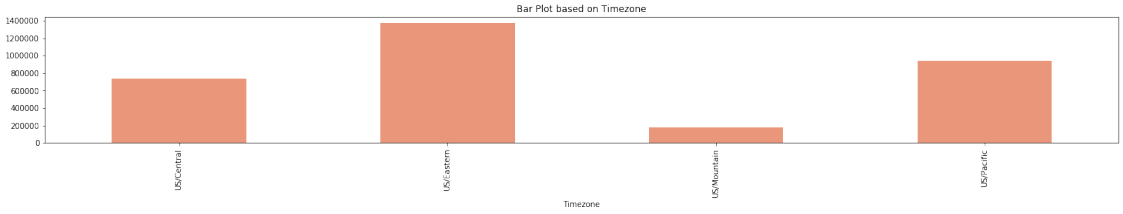
[4]:
```
def plot_pie_chart(col):
    us_road_accident_df_0.groupby(col).size().plot.pie(title ="Pie chart based␣
↪on" + col, figsize=(5,5))
    plt.show()
```

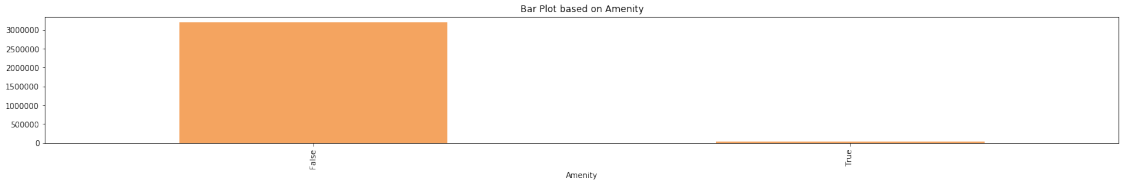
[5]:
```
def plot_bar_chart(col):
    colors =␣
↪["rosybrown","darksalmon","sandybrown","seagreen","khaki","lightblue","plum","y"]
    us_road_accident_df_0.groupby(col).size().plot.
↪bar(figsize=(25,3),title="Bar Plot based on " + col ,color =random.
↪choice(colors))
    plt.show()
```

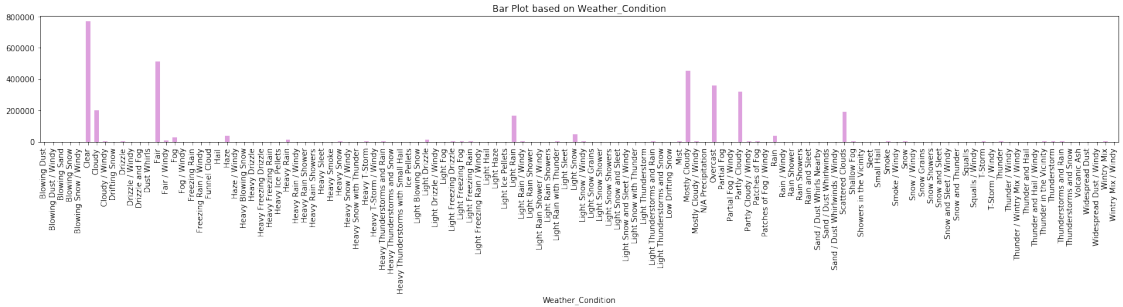
[6]:
```
for col in␣
↪["Severity","Bump","Timezone","Amenity","Weather_Condition","Wind_Direction","Railway"]:
↪
    plot_bar_chart(col)
```

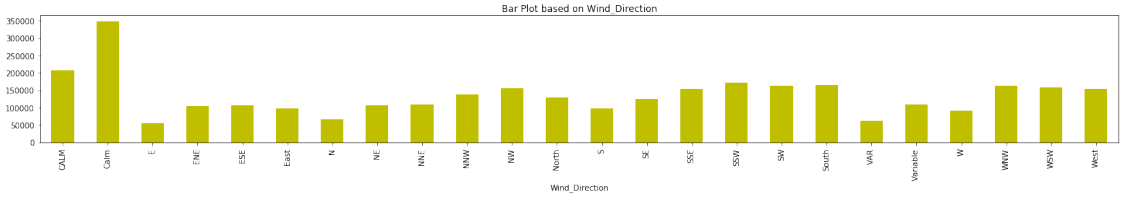


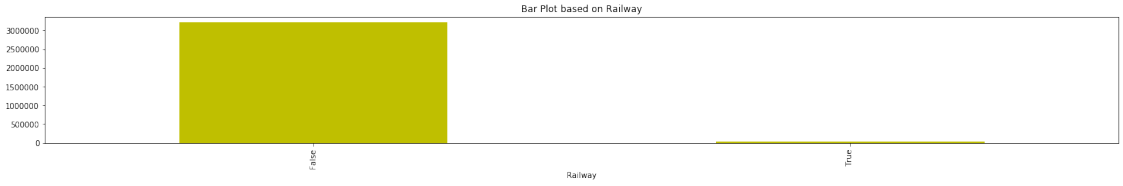



Bar Plot based on Timezone
1400000
1200000
1000000
800000
600000
400000
200000
0
US/Central
US/Eastern
US/Mountain
US/Pacific
Timezone


Bar Plot based on Amenity
3000000
2500000
2000000
1500000
1000000
500000
0
False
True
Amenity


Bar Plot based on Weather_Condition
800000
600000
400000
200000
0
Weather_Condition


Bar Plot based on Wind_Direction
350000
300000
250000
200000
150000
100000
50000
0
CALM
Calm
E
ENE
ESE
East
N
NE
NNE
NNW
NW
North
S
SE
SSE
SSW
SW
South
VAR
Variable
W
WNW
WSW
West
Wind_Direction


Bar Plot based on Railway
3000000
2500000
2000000
1500000
1000000
500000
0
False
True
Railway

From above discussion we found out that, the data is being varied with differnt attributes like Railway, Wind_Direction, Weather_Condition etc.

2 2. Total number of accidents based on States

Total data was grouped by State and Count was done. The number of accidents happened in each states are plotted in USA map and data sample is also shown. It showed many accidents are happening in California, Florida and Texas.

[7]:
```
def plot_state_wise_usa_count(df,title,color):
    import plotly.graph_objects as go
    fig = go.Figure(data=go.Choropleth(
        locations=df['State'],
        z=df['Count'].astype(float),
        locationmode='USA-states',
        colorscale=color,
        autocolorscale=False,
#         text="dummy", # hover text
        marker_line_color='white', # line markers between states
        colorbar_title="Total Accident"
    ))

    fig.update_layout(
        title_text=title,
        geo = dict(
            scope='usa',
            projection=go.layout.geo.Projection(type = 'albers usa'),
            showlakes=True, # lakes
            lakecolor='rgb(255, 255, 255)'),
    )
    fig.show()
```

2.0.1 Total number of accidents based on State

[8]:
```
road_accident_by_state = us_road_accident_df_0.groupby(['State'])['ID'].count().
↪to_frame(name="Count").reset_index()
road_accident_by_state.head()
```

[8]:

	State	Count
0	AL	43754
1	AR	1890
2	AZ	75223
3	CA	778464
4	CO	33789

[9]:
```
plot_state_wise_usa_count(road_accident_by_state,"Total Road Accident By␣
↪State","blues")
```

3 3. Total Accident for Each County

Once total accidents happening in each state is plotted, total accidents happening in each county is also plotted. For making plot easy total number of accidents happening are categorized in five different clustures. One of the assumption we made here is number of accidents are not divided by total population of the state. The plot based on accident density could be more accurate but it provided us more detail visualization based on each county.

[10]:
```
def plot_data_by_county_total_usa(df):
    import plotly.figure_factory as ff

    colorscale = [
    'rgb(193, 193, 193)',
    'rgb(239,239,239)',
    'rgb(195, 196, 222)',
    'rgb(144,148,194)',
    'rgb(101,104,168)',
    'rgb(65, 53, 132)'
    ]
    values = df['Count'].tolist()
    fips = df['FIPS'].tolist()
    fig = ff.create_choropleth(fips=fips, values=values,binning_endpoints=[500,␣
 ↪1000, 5000, 10000, 20000], colorscale=colorscale,)
    fig.layout.template = None
    fig.show()
```

[11]:
```
road_accident_by_county = us_road_accident_df_0.
 ↪groupby(['State_FIPS_Code','County_FIPS_Code'])['ID'].count().
 ↪to_frame(name="Count").reset_index()
```

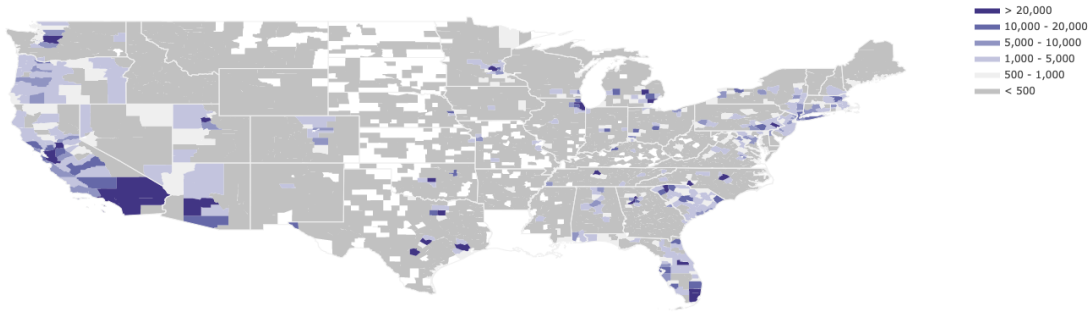
[12]:
```
## Total county wise
```

```
road_accident_by_county['FIPS'] = road_accident_by_county.
 ↪State_FIPS_Code+road_accident_by_county.County_FIPS_Code
road_accident_by_county.head()
```

[12]:

	State_FIPS_Code	County_FIPS_Code	Count	FIPS
0	01	001	428	01001
1	01	003	1149	01003
2	01	005	21	01005
3	01	007	57	01007
4	01	009	1397	01009

[13]:
```
plot_data_by_county_total_usa(road_accident_by_county)
```



4 4. Accident Happening at Night

Accidents could be greatly influenced by Day and Night situaltion. So a plot of accidents happening at night is also done.

[14]:
```
road_accident_at_night = us_road_accident_df_0.
 ↪loc[us_road_accident_df_0['Sunrise_Sunset'] =="Night"]
road_accident_at_night.head()
```

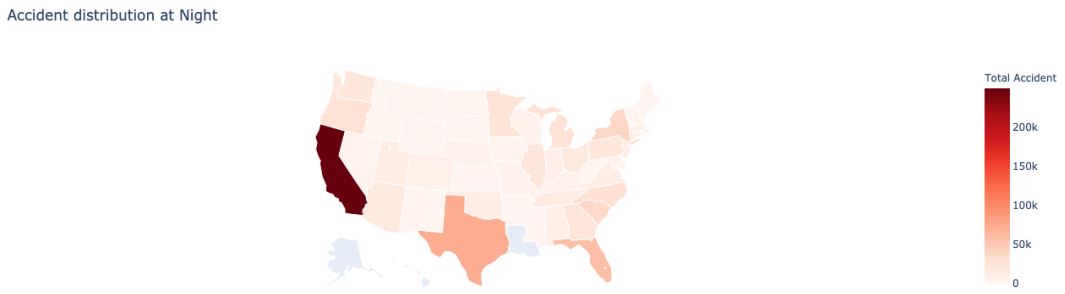
[14]:

	Unnamed: 0	ID	Severity	Start_Time	End_Time	\
0	0	A-1	3	2016-02-08 05:46:00	2016-02-08 11:00:00	
1	1	A-2	2	2016-02-08 06:07:59	2016-02-08 06:37:59	
2	2	A-3	2	2016-02-08 06:49:27	2016-02-08 07:19:27	
3	3	A-4	3	2016-02-08 07:23:34	2016-02-08 07:53:34	
32	32	A-33	3	2016-02-08 18:24:00	2016-02-08 21:00:00	

	Start_Lat	Start_Lng	Street	Side	City	…	Roundabout	\
0	39.865147	-84.058723	I-70 E	R	Dayton	…	False	
1	39.928059	-82.831184	Brice Rd	L	Reynoldsburg	…	False	
2	39.063148	-84.032608	State Route 32	R	Williamsburg	…	False	

```
3   39.747753 -84.205582          I-75 S    R        Dayton  …      False
32  40.042725 -82.997307     North Fwy S    R      Columbus  …      False

   Station   Stop Traffic_Calming Traffic_Signal Turning_Loop Sunrise_Sunset  \
0    False  False           False          False        False          Night
1    False  False           False          False        False          Night
2    False  False           False           True        False          Night
3    False  False           False          False        False          Night
32   False  False           False          False        False          Night

              countyState  State_FIPS_Code  County_FIPS_Code
0   Montgomery County, OH               39               113
1     Franklin County, OH               39               049
2     Clermont County, OH               39               025
3   Montgomery County, OH               39               113
32    Franklin County, OH               39               049

[5 rows x 40 columns]
```

[15]:
```
road_accident_at_night_state = road_accident_at_night.groupby(['State'])['ID'].
 ↪count().to_frame(name="Count").reset_index()
plot_state_wise_usa_count(road_accident_at_night_state, "Accident distribution␣
 ↪at Night", "reds")
```



5 5. Most Severe Accident Distribution in USA

How severe accidents are distributed in the USA ? Unlike severe accidents distribution severe accidents are happening more in florida than in CA

[16]:
```
most_severe_accident = us_road_accident_df_0.
 ↪loc[us_road_accident_df_0['Severity'] ==4]
most_severe_accident.head()
```

[16]:

	Unnamed: 0	ID	Severity	Start_Time	End_Time	\
617	617	A-620	4	2016-03-11 13:18:48	2016-03-11 13:48:48	
1171	1192	A-1198	4	2016-06-24 22:28:49	2016-06-24 22:58:49	
1837	1882	A-1902	4	2016-07-01 14:09:13	2016-07-01 14:39:13	
3986	4095	A-4144	4	2016-07-25 14:23:33	2016-07-25 15:11:13	
4778	4904	A-4965	4	2016-08-01 07:44:37	2016-08-01 08:29:37	

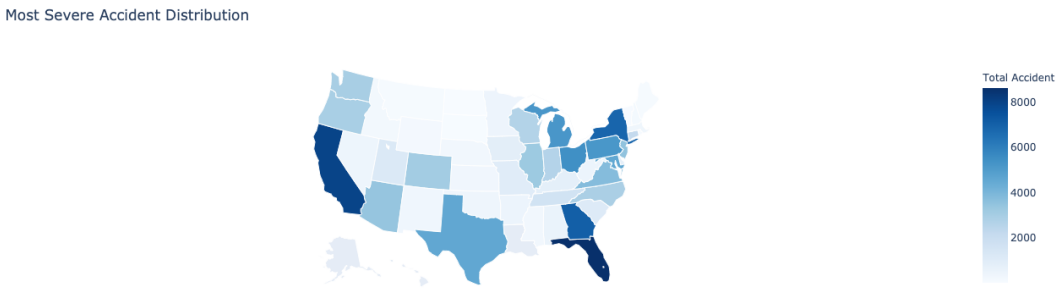
	Start_Lat	Start_Lng	Street	Side	City	…	\
617	39.917412	-83.014236	Frank Rd	R	Columbus	…	
1171	37.321117	-121.899887	I-280 S	R	San Jose	…	
1837	37.630623	-122.435043	Junipero Serra Fwy N	R	San Bruno	…	
3986	37.339115	-121.851807	Bayshore Fwy S	R	San Jose	…	
4778	37.710648	-122.166687	Marina Blvd	R	San Leandro	…	

	Roundabout	Station	Stop	Traffic_Calming	Traffic_Signal	Turning_Loop	\
617	False	False	False	False	False	False	
1171	False	False	False	False	False	False	
1837	False	False	False	False	False	False	
3986	False	False	False	False	False	False	
4778	False	False	False	False	False	False	

	Sunrise_Sunset	countyState	State_FIPS_Code	County_FIPS_Code
617	Day	Franklin County, OH	39	049
1171	Night	Santa Clara County, CA	06	085
1837	Day	San Mateo County, CA	06	081
3986	Day	Santa Clara County, CA	06	085
4778	Day	Alameda County, CA	06	001

[5 rows x 40 columns]

[17]:
```
most_severe_accident_count = most_severe_accident.groupby(['State'])['ID'].
↪count().to_frame(name="Count").reset_index()
plot_state_wise_usa_count(most_severe_accident_count, "Most Severe Accident␣
↪Distribution", "blues")
```



6 6. Accident Happening Due to Railways

After finding the distribution of accidents based on severity, we calculated the accident distribution due to railways. It looks more accidents are happening in CA, IL, NC, TX due to railways. Unlike severe accidents distribution no of accidents due to railway is less in florida.

[18]:
```
accident_due_railways = us_road_accident_df_0.
↪loc[us_road_accident_df_0['Railway']==True]
accident_due_railways.head()
```

[18]:

	Unnamed: 0	ID	Severity	Start_Time	End_Time	\
74	74	A-75	2	2016-02-10 06:53:02	2016-02-10 07:23:02	
801	806	A-810	3	2016-06-21 20:02:45	2016-06-21 20:32:45	
917	925	A-930	3	2016-06-22 18:13:45	2016-06-22 18:43:45	
1002	1016	A-1021	2	2016-06-23 12:04:13	2016-06-23 12:34:13	
1570	1607	A-1617	2	2016-06-29 06:29:19	2016-06-29 07:08:00	

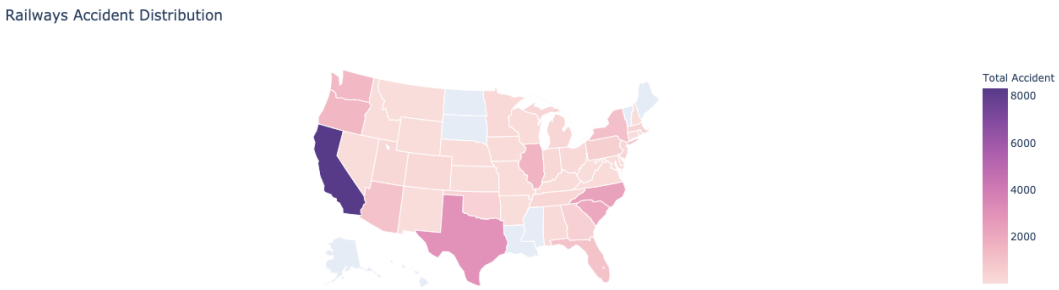
	Start_Lat	Start_Lng	Street	Side	City	…	\
74	39.814526	-84.021744	S Central Ave	R	Fairborn	…	
801	37.690559	-122.074669	I-580 E	R	Castro Valley	…	
917	37.316528	-121.911858	Parkmoor Ave	L	San Jose	…	
1002	37.552235	-122.308876	J Arthur Younger Fwy W	R	San Mateo	…	
1570	37.595875	-121.886383	Bond Ln	L	Sunol	…	

	Roundabout	Station	Stop	Traffic_Calming	Traffic_Signal	Turning_Loop	\
74	False	False	False	False	False	False	
801	False	True	False	False	False	False	
917	False	False	False	False	False	False	
1002	False	False	False	False	False	False	
1570	False	False	False	False	False	False	

	Sunrise_Sunset	countyState	State_FIPS_Code	County_FIPS_Code
74	Night	Greene County, OH	39	057
801	Day	Alameda County, CA	06	001
917	Day	Santa Clara County, CA	06	085
1002	Day	San Mateo County, CA	06	081
1570	Day	Alameda County, CA	06	001

[5 rows x 40 columns]

[19]:
```
accident_due_railways_count = accident_due_railways.groupby(['State'])['ID'].
↪count().to_frame(name="Count").reset_index()
plot_state_wise_usa_count(accident_due_railways_count, "Railways Accident␣
↪Distribution", "purpor")
```



7 7. Accident Happening at Traffic Signal

We also plotted distribution of the accidents at Traffic Signal. CA is leading on this too along with TX, NC, SC and NY

[20]:
```
accident_happen_at_traffic_signal = us_road_accident_df_0.
↪loc[us_road_accident_df_0['Traffic_Signal']==True]
accident_happen_at_traffic_signal.head()
```

[20]:

	Unnamed: 0	ID	Severity	Start_Time	End_Time	\
2	2	A-3	2	2016-02-08 06:49:27	2016-02-08 07:19:27	
4	4	A-5	2	2016-02-08 07:39:07	2016-02-08 08:09:07	
13	13	A-14	2	2016-02-08 08:37:07	2016-02-08 09:07:07	
14	14	A-15	2	2016-02-08 08:39:43	2016-02-08 09:09:43	
18	18	A-19	2	2016-02-08 09:25:17	2016-02-08 09:55:17	

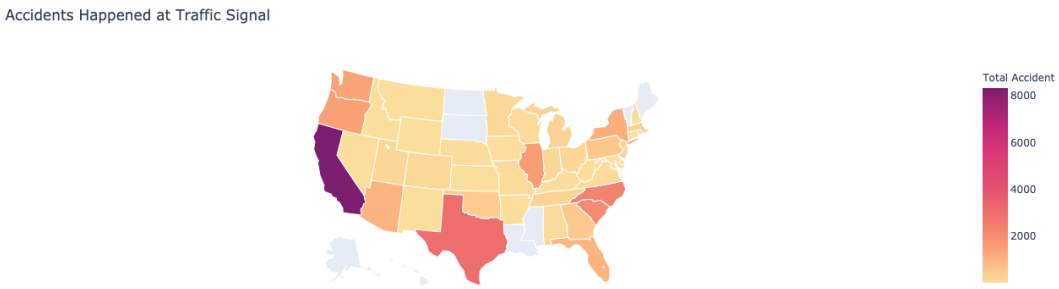
	Start_Lat	Start_Lng	Street	Side	City	…	\
2	39.063148	-84.032608	State Route 32	R	Williamsburg	…	
4	39.627781	-84.188354	Miamisburg Centerville Rd	R	Dayton	…	
13	39.790760	-84.241547	Salem Ave	L	Dayton	…	
14	39.972038	-82.913521	E Broad St	L	Columbus	…	
18	39.740669	-84.184135	Rubicon St	L	Dayton	…	

	Roundabout	Station	Stop	Traffic_Calming	Traffic_Signal	Turning_Loop	\
2	False	False	False	False	True	False	
4	False	False	False	False	True	False	
13	False	False	False	False	True	False	
14	False	False	False	False	True	False	
18	False	False	False	False	True	False	

	Sunrise_Sunset	countyState	State_FIPS_Code	County_FIPS_Code
2	Night	Clermont County, OH	39	025
4	Day	Montgomery County, OH	39	113

```
13            Day  Montgomery County, OH                39                113
14            Day    Franklin County, OH                39                049
18            Day  Montgomery County, OH                39                113

[5 rows x 40 columns]
```

[21]:
```
trafiic_signal_accident_count = accident_due_railways.groupby(['State'])['ID'].
 ↪count().to_frame(name="Count").reset_index()
plot_state_wise_usa_count(trafiic_signal_accident_count, "Accidents Happened at␣
 ↪Traffic Signal", "sunsetdark")
```



8 8. Accident Happening on Stop Sign

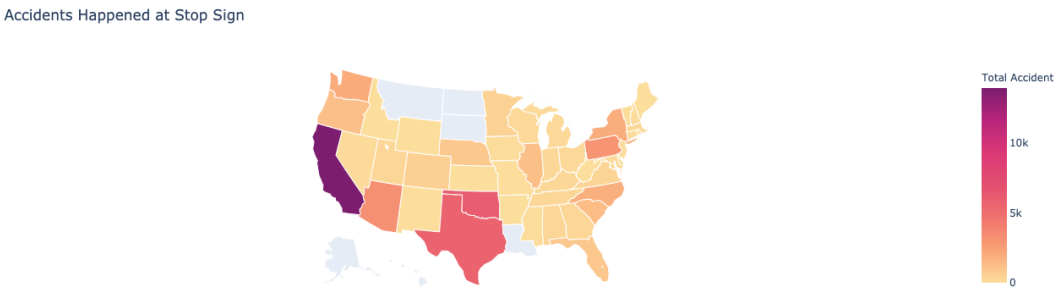
Similarly accidents happening on Stop Sign are distribuited as below

[22]:
```
accident_happen_at_stop_sign = us_road_accident_df_0.
 ↪loc[us_road_accident_df_0['Stop']==True]
accident_happen_at_stop_sign.head()
```

[22]:
```
     Unnamed: 0     ID  Severity          Start_Time            End_Time  \
90           90   A-91         2  2016-02-11 06:20:28  2016-02-11 06:50:28
284         284  A-285         2  2016-02-19 08:05:52  2016-02-19 08:35:52
311         311  A-312         2  2016-02-22 08:04:43  2016-02-22 08:34:43
644         644  A-647         2  2016-03-14 09:22:34  2016-03-14 09:52:34
786         790  A-793         2  2016-06-21 15:09:59  2016-06-21 15:54:59

     Start_Lat   Start_Lng           Street Side           City  … \
90   38.994080  -84.142021       S Bantam Rd    L         Bethel  …
284  41.375961  -83.647453        E Court St    L  Bowling Green  …
311  39.981968  -83.008698         W 2nd Ave    R       Columbus  …
644  41.383537  -83.641235        Frazee Ave    L  Bowling Green  …
786  39.328636 -121.111160  State Highway 49    R    Nevada City  …
```

```
    Roundabout Station  Stop Traffic_Calming Traffic_Signal Turning_Loop  \
90       False   False  True           False          False        False
284      False   False  True           False          False        False
311      False   False  True           False          False        False
644      False   False  True           False          False        False
786      False   False  True           False          False        False

    Sunrise_Sunset          countyState  State_FIPS_Code  County_FIPS_Code
90           Night  Clermont County, OH               39               025
284            Day      Wood County, OH               39               173
311            Day  Franklin County, OH               39               049
644            Day      Wood County, OH               39               173
786            Day    Nevada County, CA               06               057

[5 rows x 40 columns]
```

[23]:
```
stop_accident_count = accident_happen_at_stop_sign.groupby(['State'])['ID'].
↪count().to_frame(name="Count").reset_index()
plot_state_wise_usa_count(stop_accident_count, "Accidents Happened at Stop␣
↪Sign", "sunsetdark")
```



9 9. Accident Happening while Crossing

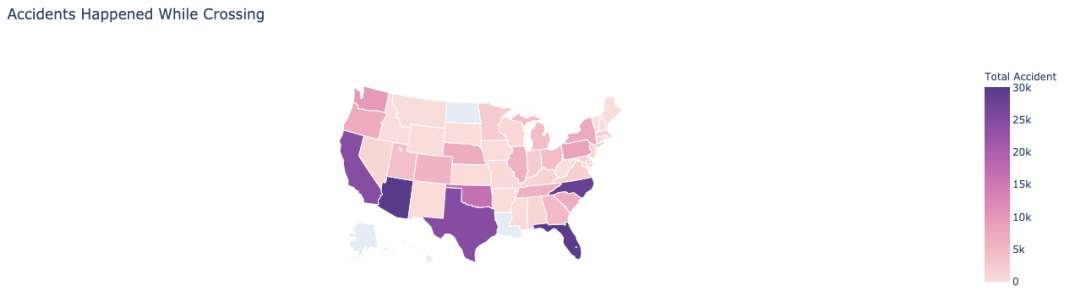
While plotting no of accidents happening at crossing AZ, FL, TX are leading on this

[24]:
```
accident_happen_while_crossing = us_road_accident_df_0.
↪loc[us_road_accident_df_0['Crossing']==True]
accident_happen_while_crossing.head()
```

[24]:
```
    Unnamed: 0    ID  Severity          Start_Time            End_Time  \
18          18  A-19         2 2016-02-08 09:25:17 2016-02-08 09:55:17
41          41  A-42         2 2016-02-09 05:47:16 2016-02-09 06:17:16
70          70  A-71         2 2016-02-09 11:09:37 2016-02-09 11:39:37
```

```
74          74  A-75          2  2016-02-10 06:53:02  2016-02-10 07:23:02
92          92  A-93          2  2016-02-11 07:17:58  2016-02-11 07:47:58

    Start_Lat  Start_Lng              Street Side      City  … Roundabout  \
18  39.740669 -84.184135          Rubicon St    L    Dayton  …      False
41  39.787731 -84.173439        Air City Ave    R    Dayton  …      False
70  41.022358 -83.650345           S Main St    L   Findlay  …      False
74  39.814526 -84.021744       S Central Ave    R  Fairborn  …      False
92  40.030342 -83.030197  Olentangy River Rd    R  Columbus  …      False

   Station   Stop Traffic_Calming Traffic_Signal Turning_Loop Sunrise_Sunset  \
18   False  False           False           True        False            Day
41   False  False           False           True        False          Night
70   False  False           False           True        False            Day
74   False  False           False          False        False          Night
92   False  False           False          False        False          Night

              countyState  State_FIPS_Code  County_FIPS_Code
18  Montgomery County, OH               39               113
41  Montgomery County, OH               39               113
70     Hancock County, OH               39               063
74      Greene County, OH               39               057
92    Franklin County, OH               39               049

[5 rows x 40 columns]
```

[25]:
```
crossing_accident_count = accident_happen_while_crossing.
 ↪groupby(['State'])['ID'].count().to_frame(name="Count").reset_index()
plot_state_wise_usa_count(crossing_accident_count, "Accidents Happened While␣
 ↪Crossing", "purpor")
```



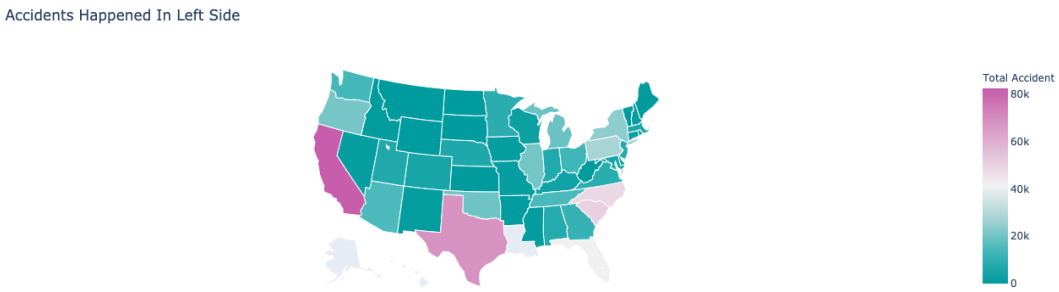
10 10. Accidents Happening at Left Side

In entire data we found more accidents are happening in left side, so we also created a no of accidents distributed on Left side.

[26]:
```
accident_happened_on_left_side = us_road_accident_df_0.
↪loc[us_road_accident_df_0['Side']=="L"]
accident_happened_on_left_side.head()
```

[26]:
```
    Unnamed: 0    ID  Severity           Start_Time             End_Time  \
1            1   A-2         2  2016-02-08 06:07:59  2016-02-08 06:37:59
8            8   A-9         2  2016-02-08 08:00:40  2016-02-08 08:30:40
13          13  A-14         2  2016-02-08 08:37:07  2016-02-08 09:07:07
14          14  A-15         2  2016-02-08 08:39:43  2016-02-08 09:09:43
18          18  A-19         2  2016-02-08 09:25:17  2016-02-08 09:55:17

    Start_Lat  Start_Lng          Street Side          City  … Roundabout  \
1   39.928059 -82.831184       Brice Rd    L  Reynoldsburg  …      False
8   39.778061 -84.172005  Notre Dame Ave    L        Dayton  …      False
13  39.790760 -84.241547       Salem Ave    L        Dayton  …      False
14  39.972038 -82.913521      E Broad St    L      Columbus  …      False
18  39.740669 -84.184135      Rubicon St    L        Dayton  …      False

   Station   Stop Traffic_Calming Traffic_Signal Turning_Loop Sunrise_Sunset  \
1    False  False           False          False        False          Night
8    False  False           False          False        False            Day
13   False  False           False           True        False            Day
14   False  False           False           True        False            Day
18   False  False           False           True        False            Day

              countyState  State_FIPS_Code  County_FIPS_Code
1     Franklin County, OH               39               049
8   Montgomery County, OH               39               113
13  Montgomery County, OH               39               113
14    Franklin County, OH               39               049
18  Montgomery County, OH               39               113

[5 rows x 40 columns]
```

[28]:
```
left_accident_count = accident_happened_on_left_side.groupby(['State'])['ID'].
↪count().to_frame(name="Count").reset_index()
plot_state_wise_usa_count(left_accident_count, "Accidents Happened In Left␣
↪Side", "tropic")
```



11 11. Looking Florida in More details

11.0.1 11.1 Distribution of the accidents in Florida in County Level. While Plotting Bubble size is defined by Severity for better understanding

[30]:
```
accident_happening_in_florida = us_road_accident_df_0.
↪loc[us_road_accident_df_0['State']=="FL"]
accident_happening_in_florida.head()
```

[30]:
```
        Unnamed: 0        ID  Severity           Start_Time  \
111195      112478  A-116062         3  2016-11-30 15:36:03
111196      112479  A-116063         3  2016-11-30 16:25:35
111197      112480  A-116064         2  2016-11-30 16:40:31
111198      112481  A-116065         3  2016-11-30 16:34:57
111199      112482  A-116066         2  2016-11-30 16:38:41

                  End_Time  Start_Lat  Start_Lng  \
111195  2016-11-30 17:09:22  27.981367 -82.326561
111196  2016-11-30 17:12:25  27.981367 -82.326561
111197  2016-11-30 17:10:19  25.627699 -80.374451
111198  2016-11-30 17:04:27  25.899435 -80.346680
111199  2016-11-30 17:08:23  26.272926 -80.296432

                                Street Side           City  … Roundabout  \
111195  E Dr Martin Luther King Jr Blvd    R          Tampa  …      False
111196  E Dr Martin Luther King Jr Blvd    R          Tampa  …      False
111197                      SW 152nd St    R          Miami  …      False
111198                           I-75 N    R        Hialeah  …      False
111199                  Sawgrass Expy    R  Pompano Beach  …      False

       Station   Stop Traffic_Calming Traffic_Signal Turning_Loop  \
111195   False  False           False          False        False
111196   False  False           False          False        False
```

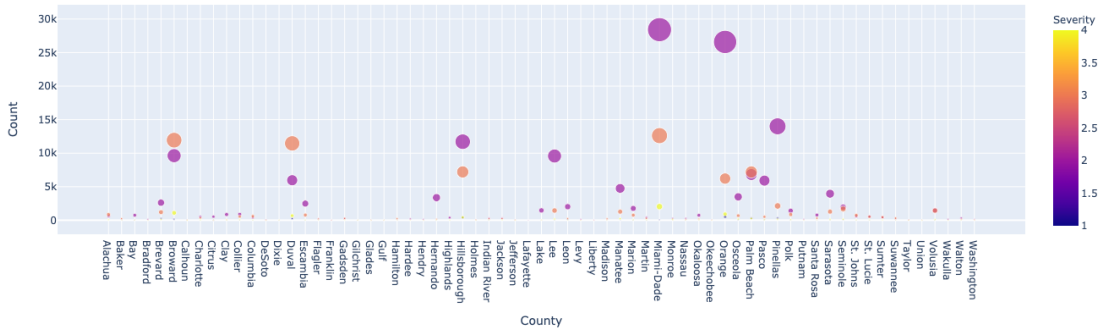
```
111197   False  False           False           True        False
111198   False  False           False          False        False
111199   False  False           False          False        False

       Sunrise_Sunset              countyState  State_FIPS_Code  \
111195            Day  Hillsborough County, FL               12
111196            Day  Hillsborough County, FL               12
111197            Day    Miami-Dade County, FL               12
111198            Day    Miami-Dade County, FL               12
111199            Day       Broward County, FL               12

        County_FIPS_Code
111195               057
111196               057
111197               086
111198               086
111199               011

[5 rows x 40 columns]
```

[31]:
```
accident_happening_in_florida_count = accident_happening_in_florida.
↪groupby(['County',"Severity"])['ID'].count().to_frame(name="Count").
↪reset_index()
accident_happening_in_florida_count.head()
```

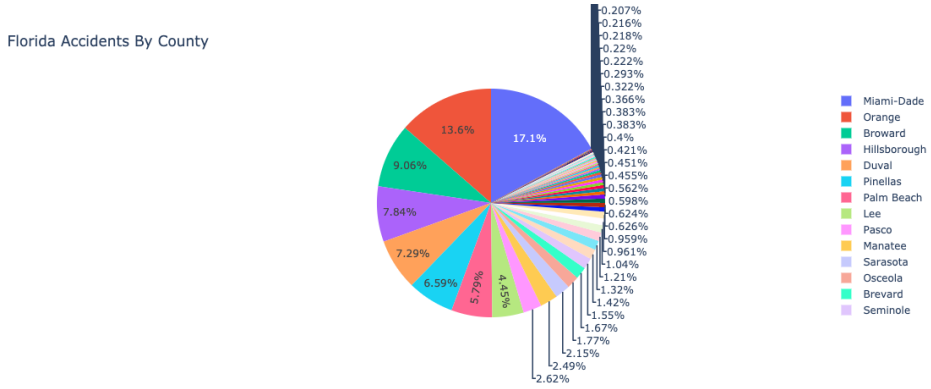
[31]:

	County	Severity	Count
0	Alachua	2	619
1	Alachua	3	847
2	Alachua	4	106
3	Baker	1	18
4	Baker	2	162

[32]:
```
import plotly.express as px
fig = px.scatter(accident_happening_in_florida_count,x="County", y="Count",␣
↪size="Count", color="Severity",hover_name="County", log_x=False)
fig.show()
```



[33]:
```
import plotly.express as px
fig = px.pie(accident_happening_in_florida_count, values='Count',␣
 ↪names='County', title='Florida Accidents By County')
fig.show()
```



11.0.2 11.2 Looking more details in wind direction

After looking county level distribution of the data in FL we also plotted a Cylindrical graph representing wind direction and severity in FL. More accidents are happening while wind is calm and is in N direction. Severe accidents are happening when there is no flow of wind in any particular direction.

[34]:
```
accident_happening_in_florida_wind_count = accident_happening_in_florida.
 ↪groupby(["Wind_Direction","Severity"])['ID'].count().to_frame(name="Count").
 ↪reset_index()
accident_happening_in_florida_wind_count.head()
```

[34]:

	Wind_Direction	Severity	Count
0	CALM	1	288
1	CALM	2	8070
2	CALM	3	2978
3	CALM	4	494
4	Calm	1	4

[35]:
```
import plotly.express as px
fig = px.scatter_polar(accident_happening_in_florida_wind_count, r="Count",␣
 ↪theta="Wind_Direction", color="Severity",
                color_discrete_sequence=px.colors.sequential.Plasma_r)
fig.show()
```

12 12. Conclusion

- This is visualization notebook where different plot based on railways, wind, severity are plotted. It means these are key factor to understand and forcast accidents happening in USA.