Exploitary Data Analysis Project

May 30, 2023

0.1 US Accidents Exploratory Data Analysis

-

0.2 NOTE! Does not contain Data for Newyork

0.2.1 Importing Usueful Libraries

[1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
sns.set_style('darkgrid')
import plotly.graph_objects as go
from plotly.subplots import make_subplots
```

0.2.2 Data Prepration And Cleaning

- Load the file using pandas
- summary
- fix misising incorrect values and

[2]:
```
df = pd.read_csv('US_Accidents_Dec21_updated.csv')
```

[3]:
```
df.head()
```

[3]:

	ID	Severity	Start_Time	End_Time	Start_Lat	\
0	A-1	3	2016-02-08 00:37:08	2016-02-08 06:37:08	40.108910	
1	A-2	2	2016-02-08 05:56:20	2016-02-08 11:56:20	39.865420	
2	A-3	2	2016-02-08 06:15:39	2016-02-08 12:15:39	39.102660	
3	A-4	2	2016-02-08 06:51:45	2016-02-08 12:51:45	41.062130	
4	A-5	3	2016-02-08 07:53:43	2016-02-08 13:53:43	39.172393	

	Start_Lng	End_Lat	End_Lng	Distance(mi)	\
0	-83.092860	40.112060	-83.031870	3.230	
1	-84.062800	39.865010	-84.048730	0.747	
2	-84.524680	39.102090	-84.523960	0.055	

```
3 -81.537840  41.062170 -81.535470         0.123
4 -84.492792  39.170476 -84.501798         0.500

                                        Description  ...  Roundabout Station  \
0  Between Sawmill Rd/Exit 20 and OH-315/Olentang...  ...        False   False
1                 At OH-4/OH-235/Exit 41 - Accident.  ...        False   False
2                   At I-71/US-50/Exit 1 - Accident.  ...        False   False
3                    At Dart Ave/Exit 21 - Accident.  ...        False   False
4                 At Mitchell Ave/Exit 6 - Accident.  ...        False   False

    Stop Traffic_Calming Traffic_Signal Turning_Loop Sunrise_Sunset  \
0  False           False          False        False          Night
1  False           False          False        False          Night
2  False           False          False        False          Night
3  False           False          False        False          Night
4  False           False          False        False            Day

  Civil_Twilight Nautical_Twilight Astronomical_Twilight
0          Night             Night                 Night
1          Night             Night                 Night
2          Night             Night                   Day
3          Night               Day                   Day
4            Day               Day                   Day

[5 rows x 47 columns]
```

0.2.3 Ask and Answer Question

- Are their More accidents on warmer or colder regin
- which 5 states have the higher number of accidents ? How about Per / capita
- does new york show in data ? why count is lower in that
-

0.3 Among the top 100 cities in the aciident which states they belong to most frequently?

- How their are too many accidents on fair weather?
- in cloudy weather most of the accidents takes place
- What is the Visiblity ? ————————————————- ————————————-
- What time the accidents are frequent DONE
- which days/months/ years have most accidents?
- trends of accidents
- How safe is your state?

- WHen is accidents per unit of traffic is highest
-

0.4 IS the distribution of accidents by hours are same on weekend as weekdays?

-

0.5 Amenity, Bump,Crossing,Give_Way,Junction,No_Exit,Railway,Roundabout,Stati these Columns Role

[4]:
```
df.columns
```

[4]:
```
Index(['ID', 'Severity', 'Start_Time', 'End_Time', 'Start_Lat', 'Start_Lng',
       'End_Lat', 'End_Lng', 'Distance(mi)', 'Description', 'Number', 'Street',
       'Side', 'City', 'County', 'State', 'Zipcode', 'Country', 'Timezone',
       'Airport_Code', 'Weather_Timestamp', 'Temperature(F)', 'Wind_Chill(F)',
       'Humidity(%)', 'Pressure(in)', 'Visibility(mi)', 'Wind_Direction',
       'Wind_Speed(mph)', 'Precipitation(in)', 'Weather_Condition', 'Amenity',
       'Bump', 'Crossing', 'Give_Way', 'Junction', 'No_Exit', 'Railway',
       'Roundabout', 'Station', 'Stop', 'Traffic_Calming', 'Traffic_Signal',
       'Turning_Loop', 'Sunrise_Sunset', 'Civil_Twilight', 'Nautical_Twilight',
       'Astronomical_Twilight'],
      dtype='object')
```

[5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2845342 entries, 0 to 2845341
Data columns (total 47 columns):
 #   Column                 Dtype
---  ------                 -----
 0   ID                     object
 1   Severity               int64
 2   Start_Time             object
 3   End_Time               object
 4   Start_Lat              float64
 5   Start_Lng              float64
 6   End_Lat                float64
 7   End_Lng                float64
 8   Distance(mi)           float64
 9   Description            object
 10  Number                 float64
 11  Street                 object
 12  Side                   object
 13  City                   object
 14  County                 object
 15  State                  object
```

```
 16  Zipcode                object
 17  Country                object
 18  Timezone               object
 19  Airport_Code           object
 20  Weather_Timestamp      object
 21  Temperature(F)         float64
 22  Wind_Chill(F)          float64
 23  Humidity(%)            float64
 24  Pressure(in)           float64
 25  Visibility(mi)         float64
 26  Wind_Direction         object
 27  Wind_Speed(mph)        float64
 28  Precipitation(in)      float64
 29  Weather_Condition      object
 30  Amenity                bool
 31  Bump                   bool
 32  Crossing               bool
 33  Give_Way               bool
 34  Junction               bool
 35  No_Exit                bool
 36  Railway                bool
 37  Roundabout             bool
 38  Station                bool
 39  Stop                   bool
 40  Traffic_Calming        bool
 41  Traffic_Signal         bool
 42  Turning_Loop           bool
 43  Sunrise_Sunset         object
 44  Civil_Twilight         object
 45  Nautical_Twilight      object
 46  Astronomical_Twilight  object
dtypes: bool(13), float64(13), int64(1), object(20)
memory usage: 773.4+ MB
```

[6]:
```
# for Numerical data
df.describe()
```

[6]:

	Severity	Start_Lat	Start_Lng	End_Lat	End_Lng
count	2.845342e+06	2.845342e+06	2.845342e+06	2.845342e+06	2.845342e+06
mean	2.137572e+00	3.624520e+01	-9.711463e+01	3.624532e+01	-9.711439e+01
std	4.787216e-01	5.363797e+00	1.831782e+01	5.363873e+00	1.831763e+01
min	1.000000e+00	2.456603e+01	-1.245481e+02	2.456601e+01	-1.245457e+02
25%	2.000000e+00	3.344517e+01	-1.180331e+02	3.344628e+01	-1.180333e+02
50%	2.000000e+00	3.609861e+01	-9.241808e+01	3.609799e+01	-9.241772e+01
75%	2.000000e+00	4.016024e+01	-8.037243e+01	4.016105e+01	-8.037338e+01
max	4.000000e+00	4.900058e+01	-6.711317e+01	4.907500e+01	-6.710924e+01

```
       Distance(mi)        Number  Temperature(F)  Wind_Chill(F)  \
count  2.845342e+06  1.101431e+06    2.776068e+06   2.375699e+06
mean   7.026779e-01  8.089408e+03    6.179356e+01   5.965823e+01
std    1.560361e+00  1.836009e+04    1.862263e+01   2.116097e+01
min    0.000000e+00  0.000000e+00   -8.900000e+01  -8.900000e+01
25%    5.200000e-02  1.270000e+03    5.000000e+01   4.600000e+01
50%    2.440000e-01  4.007000e+03    6.400000e+01   6.300000e+01
75%    7.640000e-01  9.567000e+03    7.600000e+01   7.600000e+01
max    1.551860e+02  9.999997e+06    1.960000e+02   1.960000e+02

        Humidity(%)  Pressure(in)  Visibility(mi)  Wind_Speed(mph)  \
count  2.772250e+06  2.786142e+06    2.774796e+06     2.687398e+06
mean   6.436545e+01  2.947234e+01    9.099391e+00     7.395044e+00
std    2.287457e+01  1.045286e+00    2.717546e+00     5.527454e+00
min    1.000000e+00  0.000000e+00    0.000000e+00     0.000000e+00
25%    4.800000e+01  2.931000e+01    1.000000e+01     3.500000e+00
50%    6.700000e+01  2.982000e+01    1.000000e+01     7.000000e+00
75%    8.300000e+01  3.001000e+01    1.000000e+01     1.000000e+01
max    1.000000e+02  5.890000e+01    1.400000e+02     1.087000e+03

       Precipitation(in)
count       2.295884e+06
mean        7.016940e-03
std         9.348831e-02
min         0.000000e+00
25%         0.000000e+00
50%         0.000000e+00
75%         0.000000e+00
max         2.400000e+01
```

[7]:
```
numerics = ['int16', 'int32', 'int64', 'float16', 'float32', 'float64']

numeric_df = df.select_dtypes(include=numerics)
len(numeric_df.columns)
```

[7]:
```
14
```

[8]:
```
#to find missing value in pandas
df.isna()   # give true for null and falst if not null
```

[8]:
```
             ID  Severity  Start_Time  End_Time  Start_Lat  Start_Lng  End_Lat  \
0         False     False       False     False      False      False    False
1         False     False       False     False      False      False    False
2         False     False       False     False      False      False    False
3         False     False       False     False      False      False    False
4         False     False       False     False      False      False    False
...         ...       ...         ...       ...        ...        ...      ...
```

```
2845337  False     False       False     False      False      False    False
2845338  False     False       False     False      False      False    False
2845339  False     False       False     False      False      False    False
2845340  False     False       False     False      False      False    False
2845341  False     False       False     False      False      False    False

         End_Lng  Distance(mi)  Description  ...  Roundabout  Station   Stop  \
0          False         False        False  ...       False    False  False
1          False         False        False  ...       False    False  False
2          False         False        False  ...       False    False  False
3          False         False        False  ...       False    False  False
4          False         False        False  ...       False    False  False
...          ...           ...          ...  ...         ...      ...    ...
2845337    False         False        False  ...       False    False  False
2845338    False         False        False  ...       False    False  False
2845339    False         False        False  ...       False    False  False
2845340    False         False        False  ...       False    False  False
2845341    False         False        False  ...       False    False  False

         Traffic_Calming  Traffic_Signal  Turning_Loop  Sunrise_Sunset  \
0                  False           False         False           False
1                  False           False         False           False
2                  False           False         False           False
3                  False           False         False           False
4                  False           False         False           False
...                  ...             ...           ...             ...
2845337            False           False         False           False
2845338            False           False         False           False
2845339            False           False         False           False
2845340            False           False         False           False
2845341            False           False         False           False

         Civil_Twilight  Nautical_Twilight  Astronomical_Twilight
0                 False              False                  False
1                 False              False                  False
2                 False              False                  False
3                 False              False                  False
4                 False              False                  False
...                 ...                ...                    ...
2845337           False              False                  False
2845338           False              False                  False
2845339           False              False                  False
2845340           False              False                  False
2845341           False              False                  False

[2845342 rows x 47 columns]
```

[9]:
```
df.isna().sum()
```

[9]:
```
ID                        0
Severity                  0
Start_Time                0
End_Time                  0
Start_Lat                 0
Start_Lng                 0
End_Lat                   0
End_Lng                   0
Distance(mi)              0
Description               0
Number              1743911
Street                    2
Side                      0
City                    137
County                    0
State                     0
Zipcode                1319
Country                   0
Timezone               3659
Airport_Code           9549
Weather_Timestamp     50736
Temperature(F)        69274
Wind_Chill(F)        469643
Humidity(%)           73092
Pressure(in)          59200
Visibility(mi)        70546
Wind_Direction        73775
Wind_Speed(mph)      157944
Precipitation(in)    549458
Weather_Condition     70636
Amenity                   0
Bump                      0
Crossing                  0
Give_Way                  0
Junction                  0
No_Exit                   0
Railway                   0
Roundabout                0
Station                   0
Stop                      0
Traffic_Calming           0
Traffic_Signal            0
Turning_Loop              0
Sunrise_Sunset         2867
Civil_Twilight         2867
```

```
Nautical_Twilight          2867
Astronomical_Twilight      2867
dtype: int64
```

percentage of missing values per column

[10]:
```
#df.isna().sum().sort_values(ascending=False)
missing_percentages = df.isna().sum().sort_values(ascending=False)/len(df)
missing_percentages
```

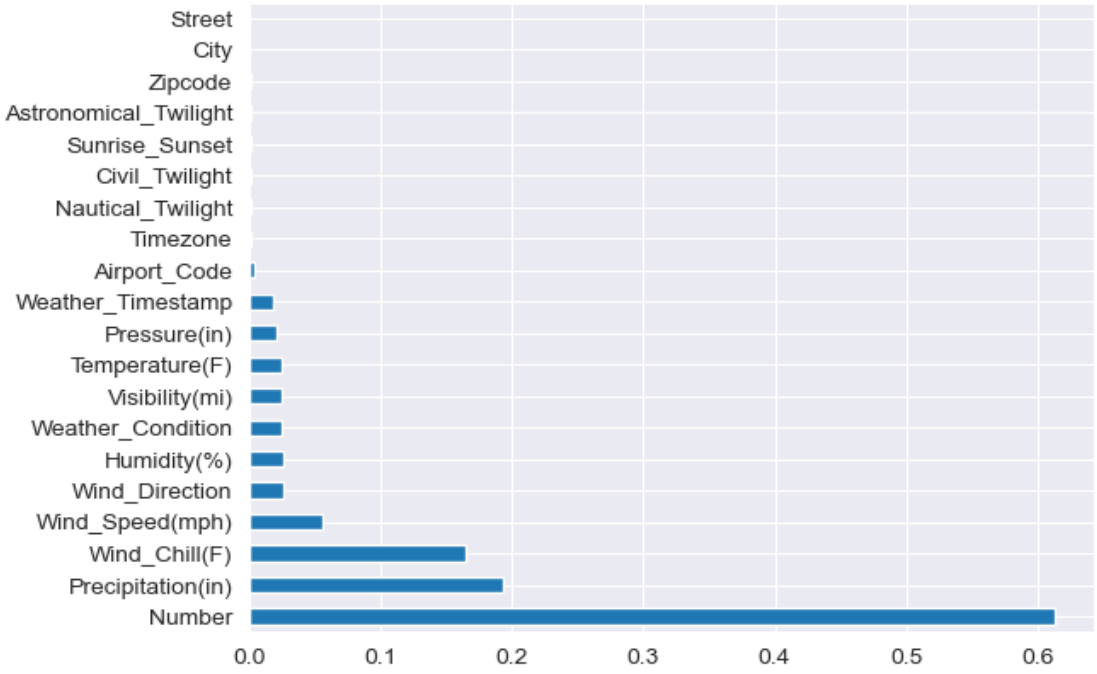
[10]:
```
Number                   6.129003e-01
Precipitation(in)        1.931079e-01
Wind_Chill(F)            1.650568e-01
Wind_Speed(mph)          5.550967e-02
Wind_Direction           2.592834e-02
Humidity(%)              2.568830e-02
Weather_Condition        2.482514e-02
Visibility(mi)           2.479350e-02
Temperature(F)           2.434646e-02
Pressure(in)             2.080593e-02
Weather_Timestamp        1.783125e-02
Airport_Code             3.356011e-03
Timezone                 1.285961e-03
Nautical_Twilight        1.007612e-03
Civil_Twilight           1.007612e-03
Sunrise_Sunset           1.007612e-03
Astronomical_Twilight    1.007612e-03
Zipcode                  4.635647e-04
City                     4.814887e-05
Street                   7.029032e-07
Country                  0.000000e+00
Junction                 0.000000e+00
Start_Time               0.000000e+00
End_Time                 0.000000e+00
Start_Lat                0.000000e+00
Turning_Loop             0.000000e+00
Traffic_Signal           0.000000e+00
Traffic_Calming          0.000000e+00
Stop                     0.000000e+00
Station                  0.000000e+00
Roundabout               0.000000e+00
Railway                  0.000000e+00
No_Exit                  0.000000e+00
Crossing                 0.000000e+00
Give_Way                 0.000000e+00
Bump                     0.000000e+00
Amenity                  0.000000e+00
Start_Lng                0.000000e+00
```

```
End_Lat                 0.000000e+00
End_Lng                 0.000000e+00
Distance(mi)            0.000000e+00
Description             0.000000e+00
Severity                0.000000e+00
Side                    0.000000e+00
County                  0.000000e+00
State                   0.000000e+00
ID                      0.000000e+00
dtype: float64
```

[11]:
```
type(missing_percentages)
refined_missing = missing_percentages[missing_percentages!=0]
```

[12]:
```
missing_percentages[missing_percentages!=0].plot(kind='barh')
```

[12]:
```
<AxesSubplot:>
```



[13]:
```
##use dataframe.drop()   df.drop(columns=['Unnamed: 0'])   to remove unwanted
↪columns
# Remove columns dont want to use
```

0.6 Exploratory Analysis and Visulization

- Columns we'll analysis

- City
- Sart Time
- Start Lat, Start Long
- Temprature
- Weather Condition

[14]:
```
cities = df.City.unique()
len(cities)
cities[:100]
```

[14]:
```
array(['Dublin', 'Dayton', 'Cincinnati', 'Akron', 'Williamsburg',
       'Cleveland', 'Lima', 'Westerville', 'Jamestown', 'Freeport',
       'Columbus', 'Toledo', 'Roanoke', 'Ft Mitchell', 'Edinburgh',
       'Fairborn', 'Shelbyville', 'Greensburg', 'Saint Paul',
       'Parkersburg', 'Indianapolis', 'Dundee', 'Jeffersonville',
       'Pittsburgh', 'Lewis Center', 'Dunkirk', 'Redkey', 'Milton',
       'Willshire', 'Straughn', 'Cambridge Springs', 'Fremont',
       'Louisville', 'South Charleston', 'Edinboro', 'Buckhannon',
       'Lockbourne', 'Painesville', 'Washington', 'Dunbar', 'Angola',
       'Edon', 'Medina', 'De Mossville', 'New Albany', 'Charleston',
       'Fort Wayne', 'Burnsville', 'Bedford', 'Clarksville', 'Lakewood',
       'Richfield', 'Sewickley', 'Independence', 'Westlake', 'Erlanger',
       'Grove City', 'Monroe', 'West Middlesex', 'Gaston', 'Economy',
       'Fairmount', 'Hagerstown', 'Walton', 'Crittenden', 'Coraopolis',
       'Holland', 'Greenfield', 'Anderson', 'Englewood', 'Knightstown',
       'Bentleyville', 'Memphis', 'Henryville', 'Kendallville', 'Avilla',
       'Ohio City', 'Van Wert', 'Rocky River', 'Sturgis', 'West Chester',
       'Orient', 'Madison', 'Deputy', 'Keystone', 'Mercer', 'Bryant',
       'Pennville', 'Kimbolton', 'Thornville', 'Wexford', 'Fishers',
       'Noblesville', 'Macedonia', 'Youngstown', 'Fairdale', 'Sutton',
       'Mount Sterling', 'Northwood', 'Huntington'], dtype=object)
```

[15]:
```
cities_by_accident= df.City.value_counts()
cities_by_accident[:20]
```

[15]:
```
Miami           106966
Los Angeles      68956
Orlando          54691
Dallas           41979
Houston          39448
Charlotte        33152
Sacramento       32559
San Diego        26627
Raleigh          22840
Minneapolis      22768
Portland         20944
Nashville        20267
Austin           18301
```

```
Baton Rouge      18182
Phoenix          17143
Saint Paul       16869
New Orleans      16251
Atlanta          15622
Jacksonville     14967
Richmond         14349
Name: City, dtype: int64
```

[16]:
```
'New York' in df.City ## Does not have data for Newyork
```

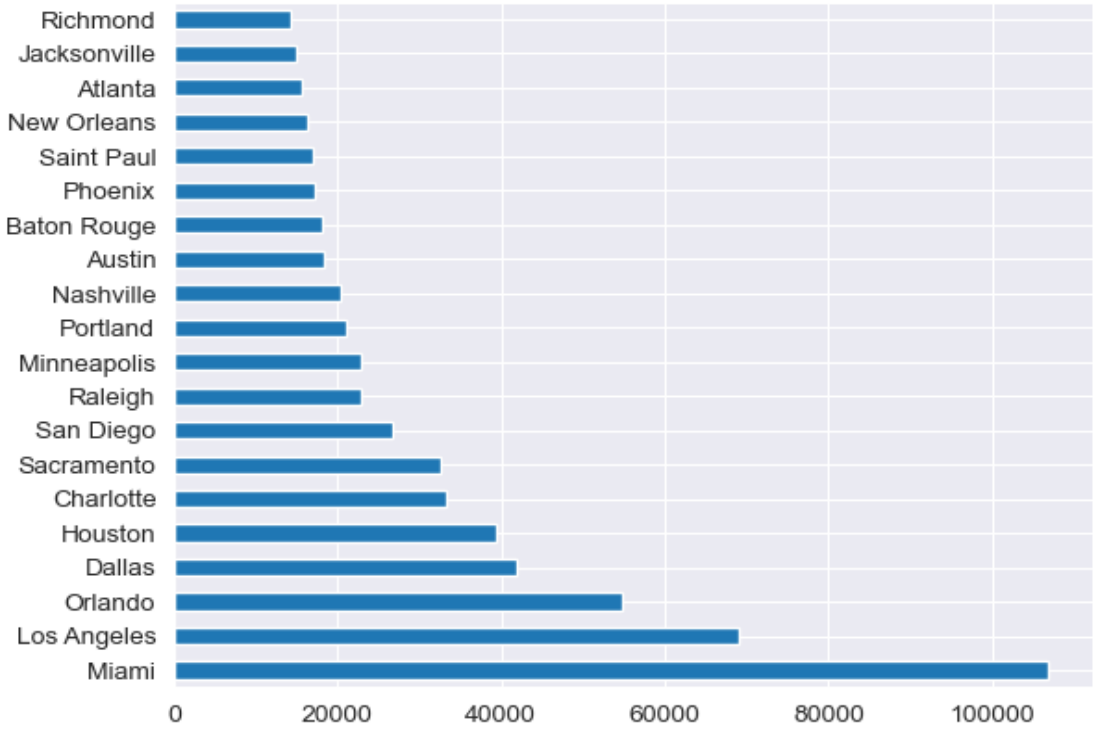
[16]:
```
False
```

[17]:
```
len(df.State.unique()) ## total 50 states are their new york is not presents here
```

[17]:
```
49
```

[18]:
```
cities_by_accident[:20].plot(kind='barh')
```

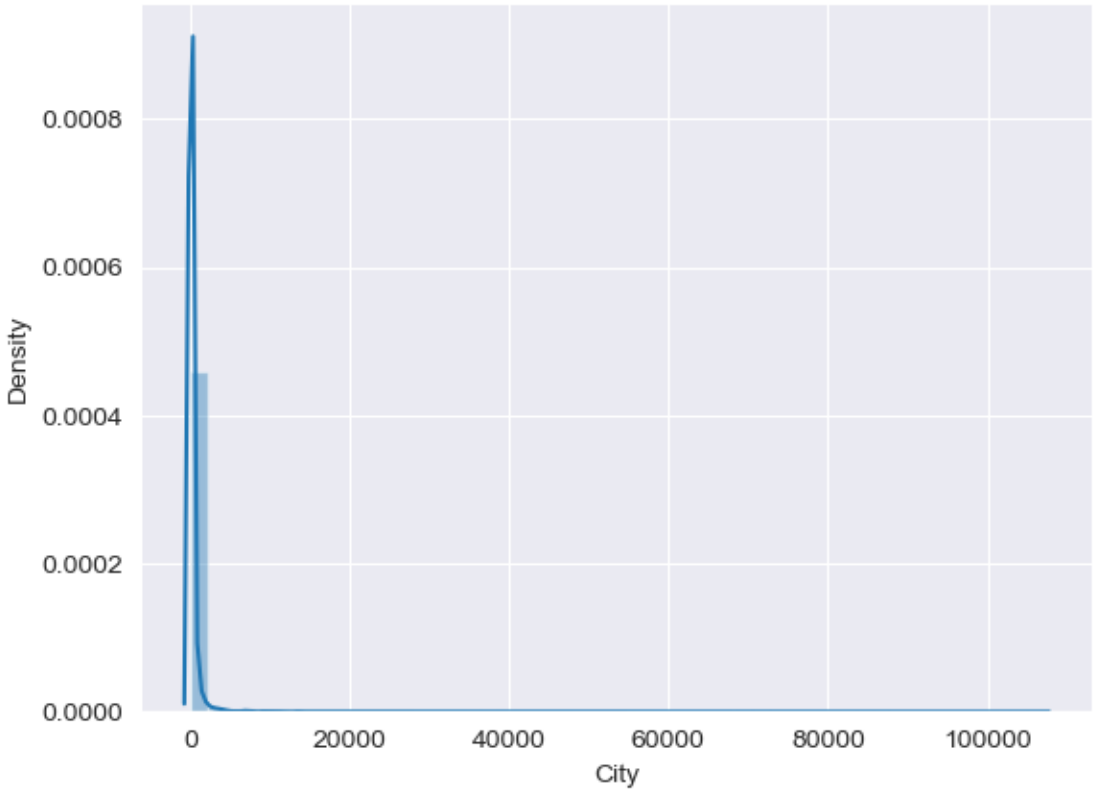
[18]:
```
<AxesSubplot:>
```



[19]:
```
sns.distplot(cities_by_accident)
```

```
C:\Users\sutka\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

[19]:
```
<AxesSubplot:xlabel='City', ylabel='Density'>
```



[20]:
```
high_accident_cities = cities_by_accident[cities_by_accident>=1000]
low_accident_cities = cities_by_accident[cities_by_accident<1000]
```

[21]:
```
len(high_accident_cities) / len(cities) *100
```

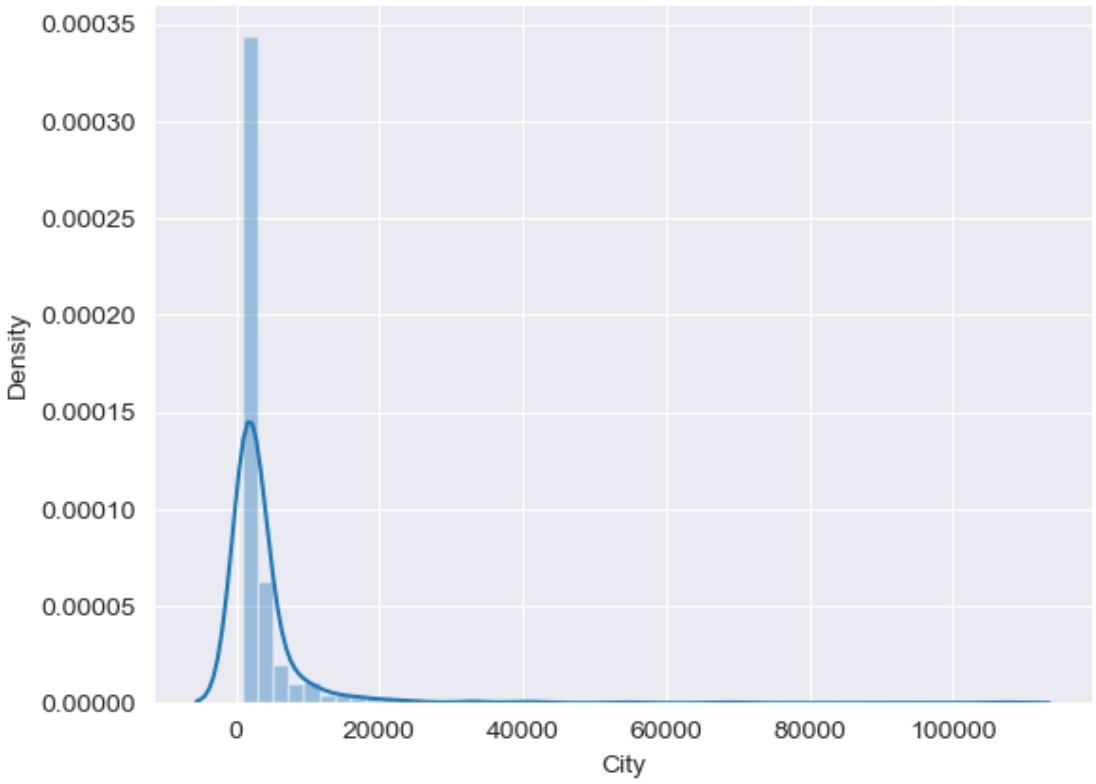
[21]:
```
4.245848313644924
```

[22]:
```
sns.distplot(high_accident_cities)
```

```
C:\Users\sutka\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
```

```
histograms).
  warnings.warn(msg, FutureWarning)
```

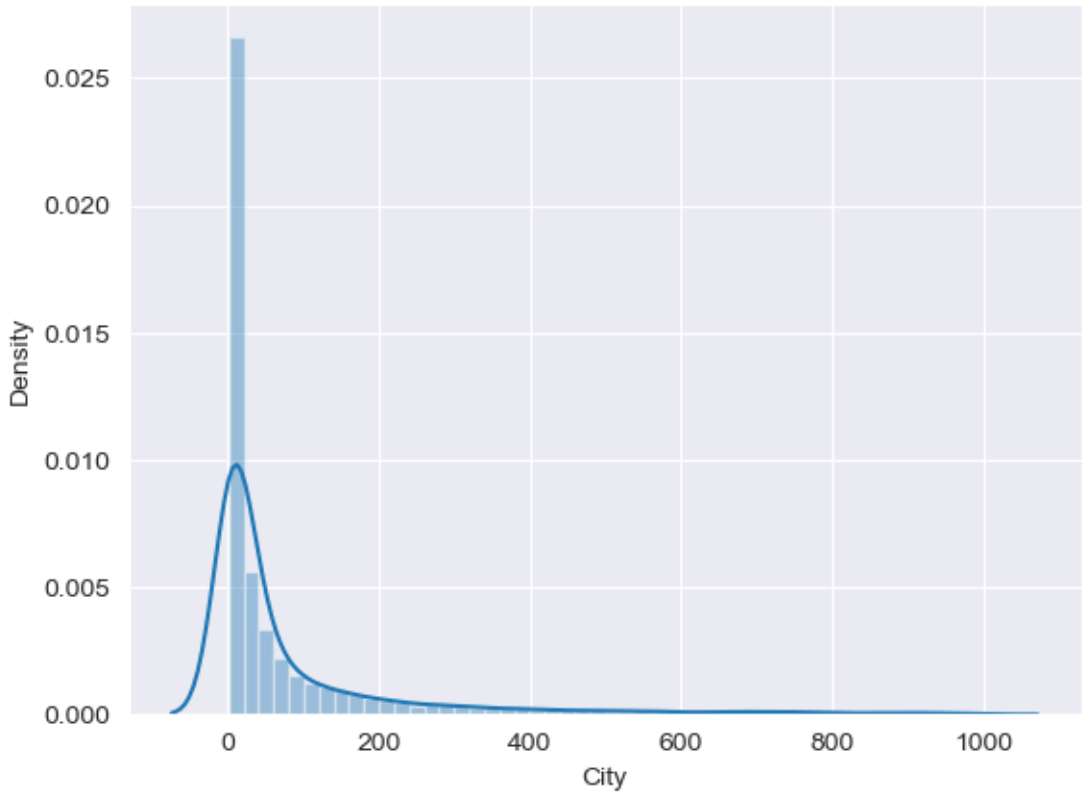
[22]: <AxesSubplot:xlabel='City', ylabel='Density'>



[23]:
```
sns.distplot(low_accident_cities)    ## Folowing some sort of exponantial␣
↪distribution
```

```
C:\Users\sutka\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

[23]: <AxesSubplot:xlabel='City', ylabel='Density'>

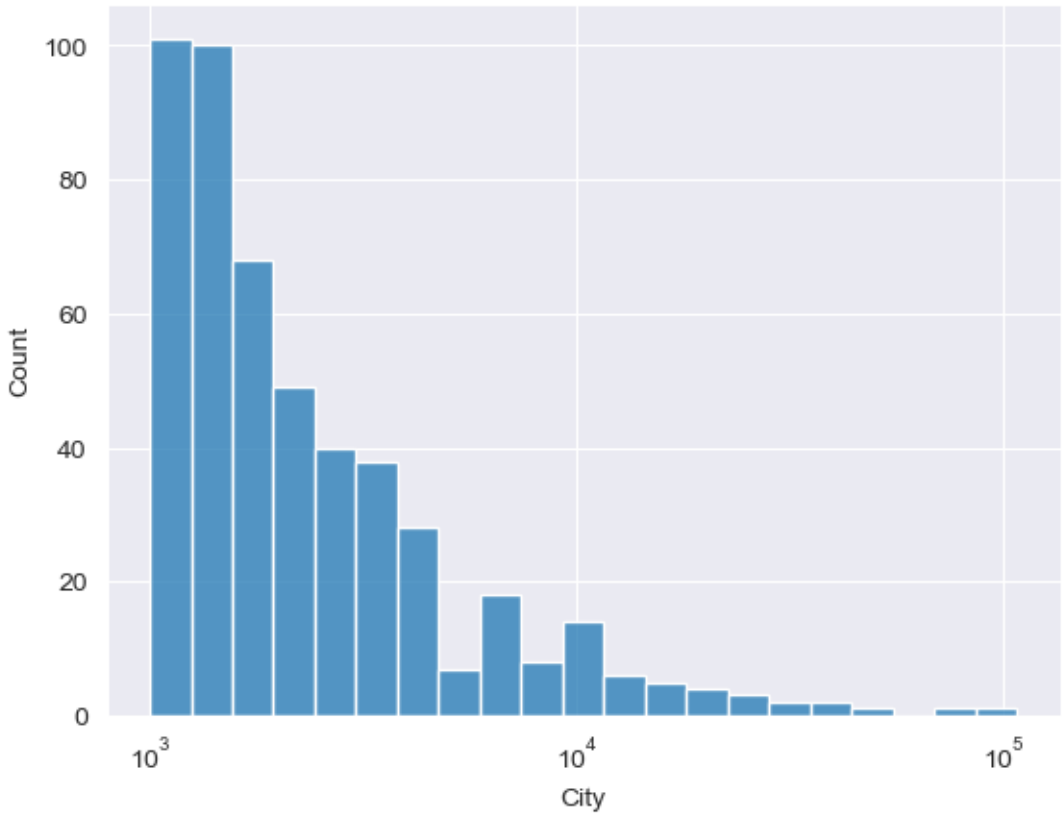


[24]:
```
len(low_accident_cities)/len(cities)*100
```

[24]: 95.74559150830338

[25]:
```
## We can go with log Scale
sns.histplot(high_accident_cities , log_scale=True)
```

[25]: <AxesSubplot:xlabel='City', ylabel='Count'>



[26]:
```
cities_by_accident[cities_by_accident==1]
```

[26]:
```
Carney                          1
Waverly Hall                    1
Center Sandwich                 1
Glen Flora                      1
Sulphur Springs                 1
                               ..
Ridgedale                       1
Sekiu                           1
Wooldridge                      1
Bullock                         1
American Fork-Pleasant Grove    1
Name: City, Length: 1110, dtype: int64
```

0.6.1 Another Columns

- weather

[27]:
```
df.Weather_Condition
```

[27]:
```
0             Light Rain
1             Light Rain
2               Overcast
3               Overcast
4             Light Rain
               ...
2845337            Fair
2845338            Fair
2845339    Partly Cloudy
2845340            Fair
2845341            Fair
Name: Weather_Condition, Length: 2845342, dtype: object
```

[28]:
```
weather = df.Weather_Condition.unique()
len(weather)
weather[:50]
```

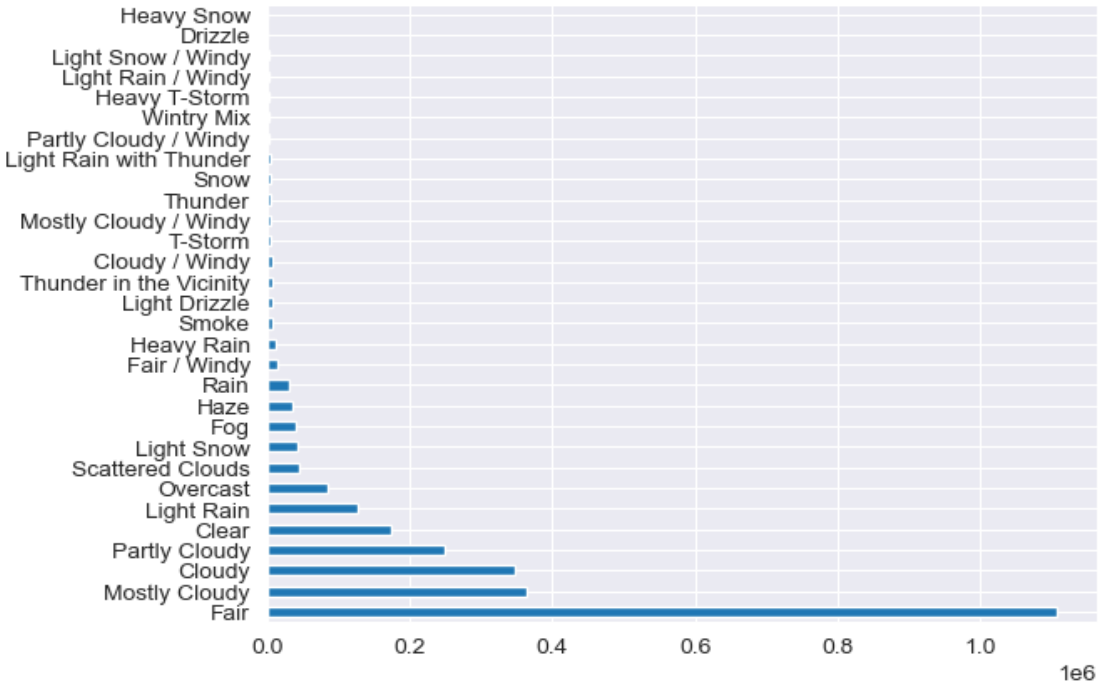
[28]:
```
array(['Light Rain', 'Overcast', 'Mostly Cloudy', 'Snow', 'Light Snow',
       'Cloudy', nan, 'Scattered Clouds', 'Clear', 'Partly Cloudy',
       'Light Freezing Drizzle', 'Light Drizzle', 'Haze', 'Rain',
       'Heavy Rain', 'Fair', 'Drizzle', 'Fog', 'Thunderstorms and Rain',
       'Patches of Fog', 'Light Thunderstorms and Rain', 'Mist',
       'Rain Showers', 'Light Rain Showers', 'Heavy Drizzle', 'Smoke',
       'Light Freezing Fog', 'Light Freezing Rain', 'Blowing Snow',
       'Heavy Thunderstorms and Rain', 'Heavy Snow', 'Snow Grains',
       'Squalls', 'Light Fog', 'Shallow Fog', 'Thunderstorm',
       'Light Ice Pellets', 'Thunder', 'Thunder in the Vicinity',
       'Fair / Windy', 'Light Rain with Thunder',
       'Heavy Thunderstorms and Snow', 'Light Snow Showers',
       'Cloudy / Windy', 'Ice Pellets', 'N/A Precipitation',
       'Light Thunderstorms and Snow', 'T-Storm', 'Rain / Windy',
       'Wintry Mix'], dtype=object)
```

[29]:
```
weather_by_accidents= df.Weather_Condition.value_counts()
type(weather_by_accidents)
```

[29]:
```
pandas.core.series.Series
```

[30]:
```
weather_by_accidents[:30].plot(kind='barh')
```

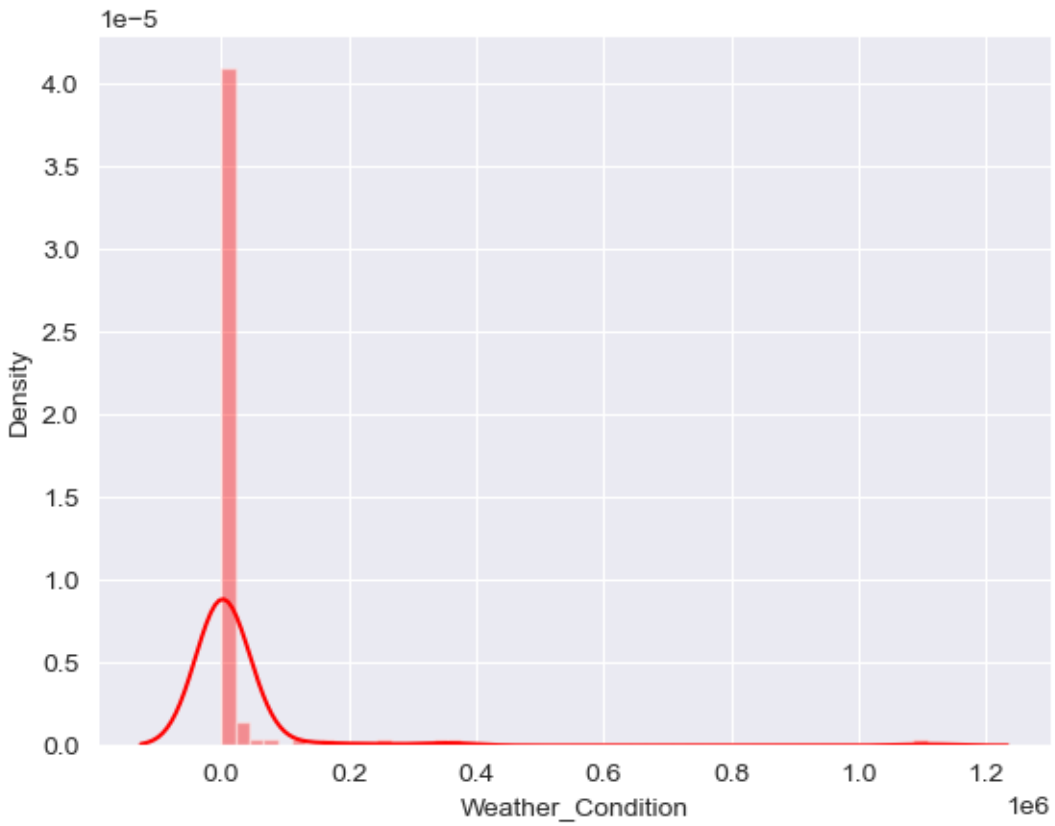
[30]:
```
<AxesSubplot:>
```



[31]:
```
sns.distplot(weather_by_accidents , color ='red')
```

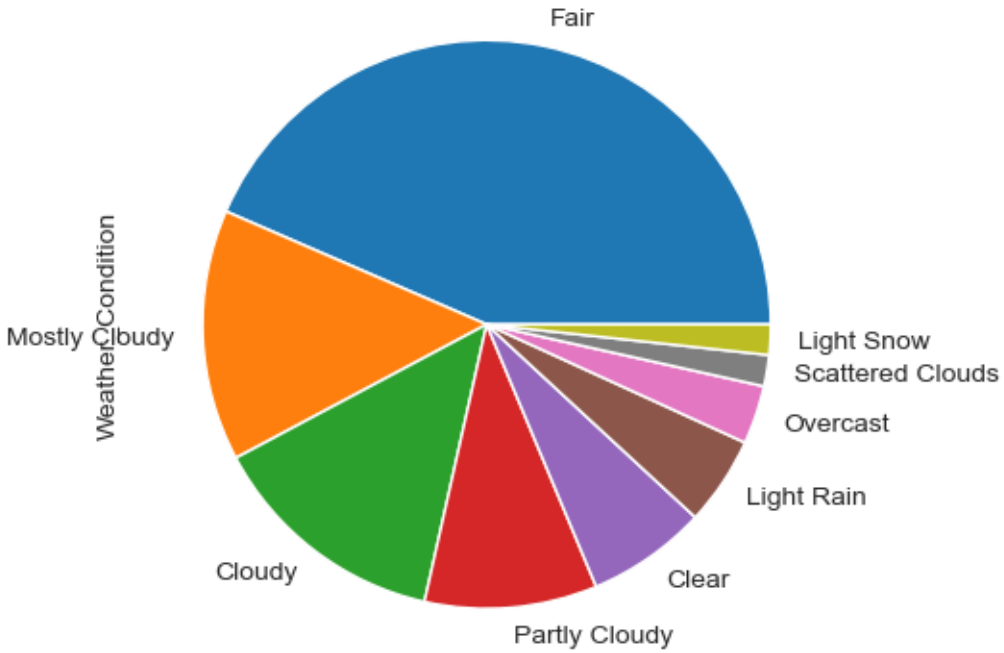
```
C:\Users\sutka\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

[31]:
```
<AxesSubplot:xlabel='Weather_Condition', ylabel='Density'>
```



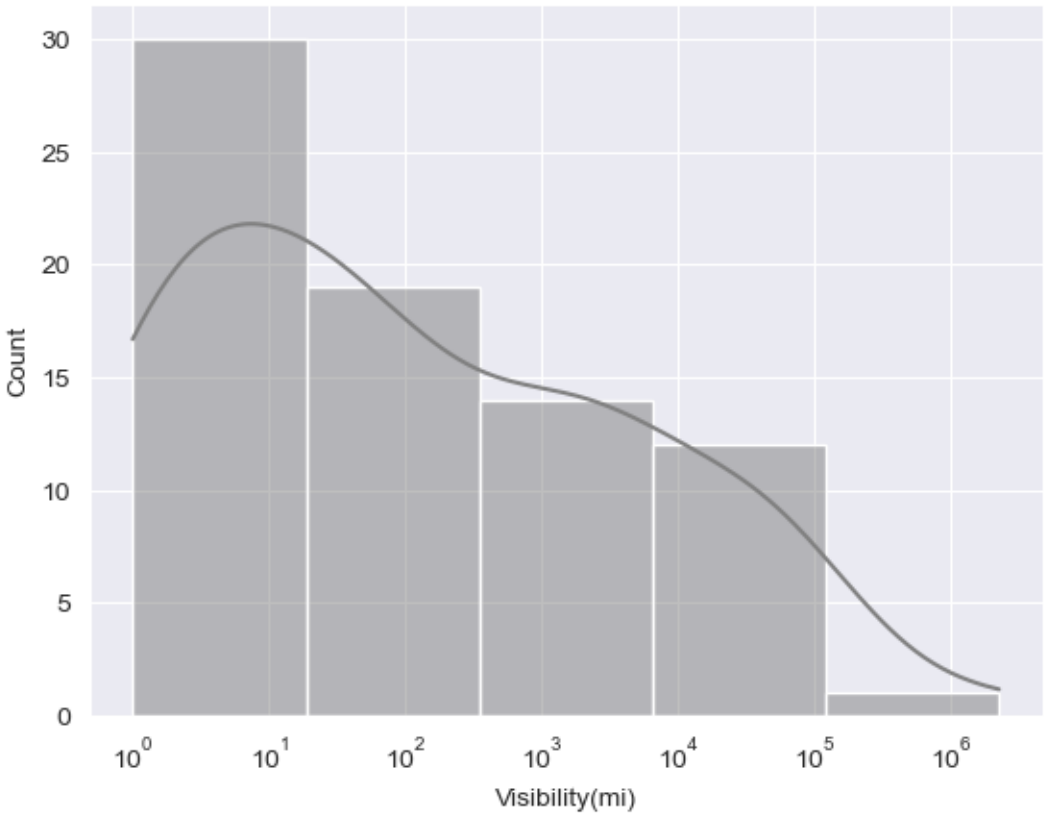
[32]:
```
df.Weather_Condition.value_counts()[:9].plot(kind='pie')
```

[32]: <AxesSubplot:ylabel='Weather_Condition'>



[33]:
```
sns.histplot(df['Visibility(mi)'].value_counts(), bins= 5, kde=True,␣
↪log_scale=True, color='grey')
```

[33]: <AxesSubplot:xlabel='Visibility(mi)', ylabel='Count'>

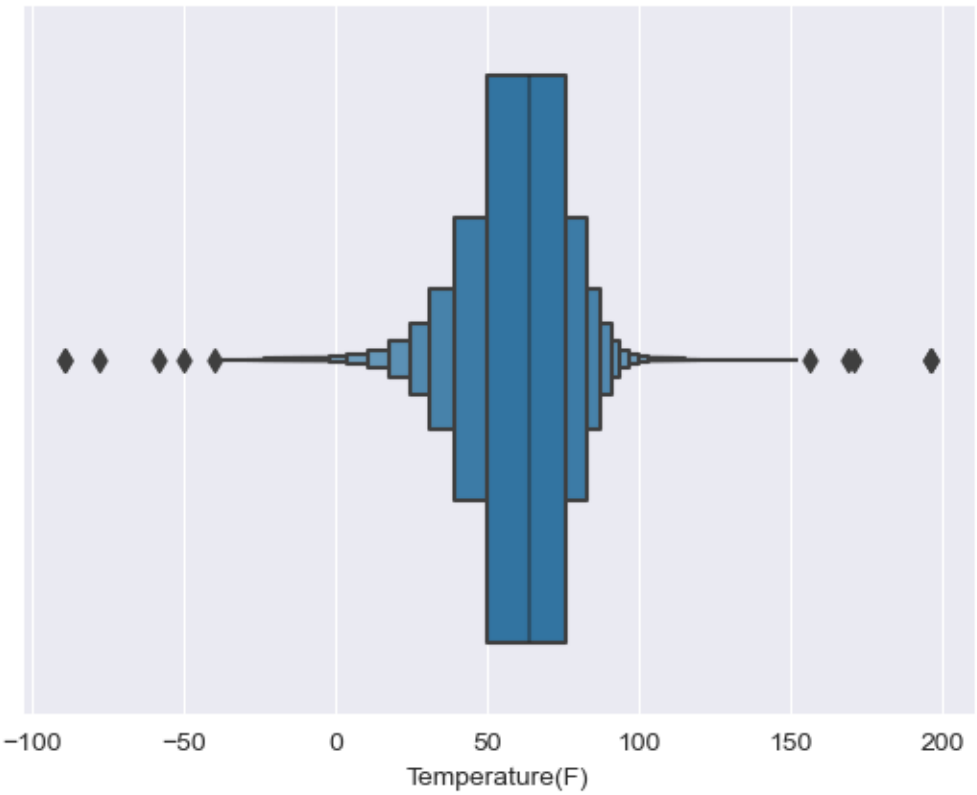


0.6.2 Visiblity

[34]:
```
df['Temperature(F)'].value_counts()
sns.boxenplot(df['Temperature(F)'])
```

```
C:\Users\sutka\anaconda3\lib\site-packages\seaborn\_decorators.py:36:
FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other
arguments without an explicit keyword will result in an error or
misinterpretation.
  warnings.warn(
```

[34]:
```
<AxesSubplot:xlabel='Temperature(F)'>
```



0.6.3 Time Analysis

[35]:
```
df.Start_Time[0]
```

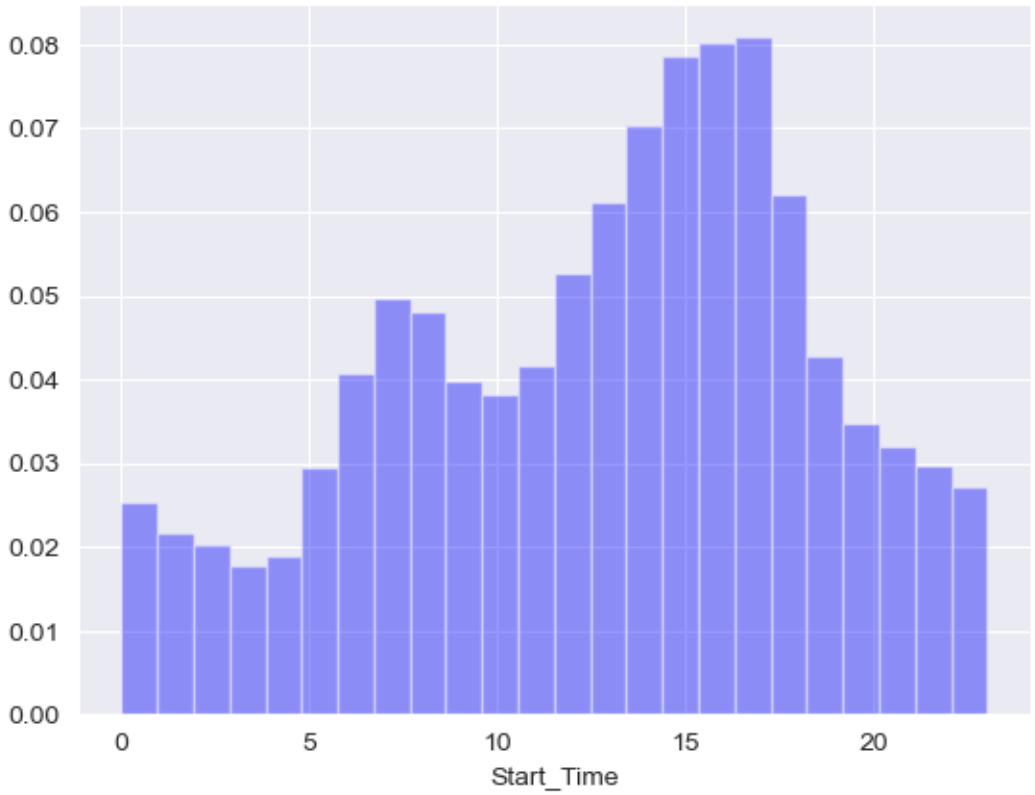
[35]:
```
'2016-02-08 00:37:08'
```

[36]:
```
df.Start_Time= pd.to_datetime(df.Start_Time)
```

[37]:
```
hour_of_day=df.Start_Time.dt.hour
sns.distplot(hour_of_day, bins=24,norm_hist=True, kde= False,color='blue')
## Figure how to show percentages in the Y axis
```

```
C:\Users\sutka\anaconda3\lib\site-packages\seaborn\distributions.py:2619:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

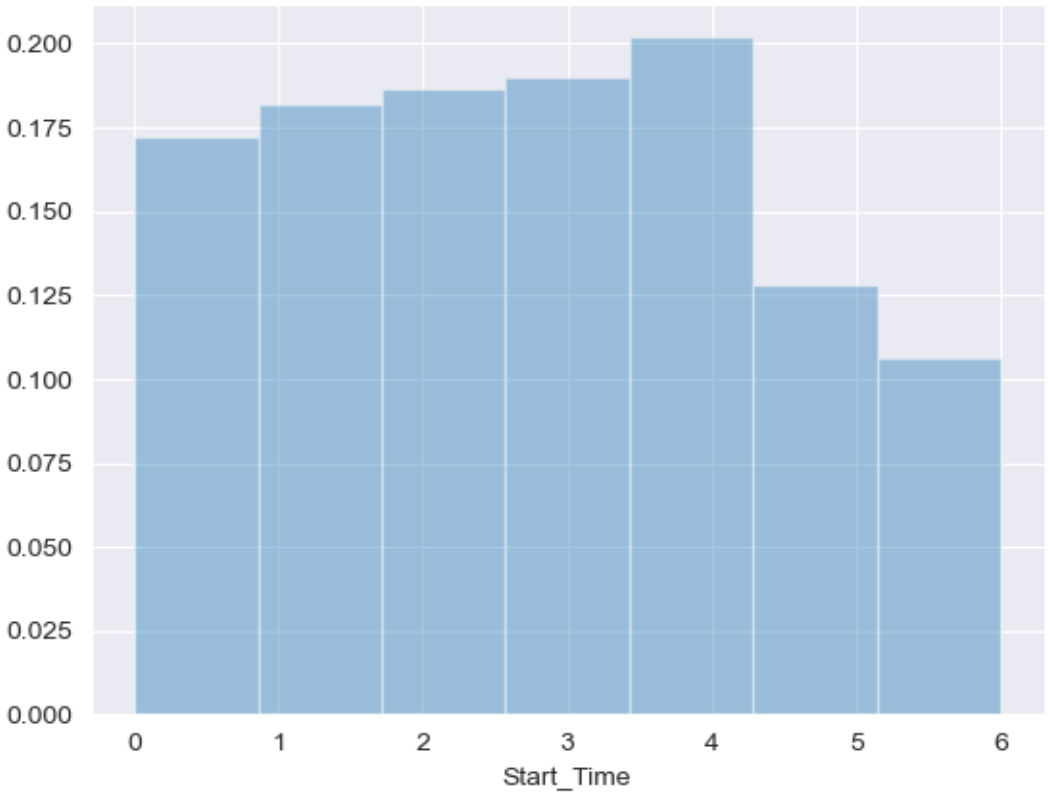
[37]:
```
<AxesSubplot:xlabel='Start_Time'>
```



Most of the accidents are happenig around 3PM-5PM due to people comming back to the Home due to tierdness

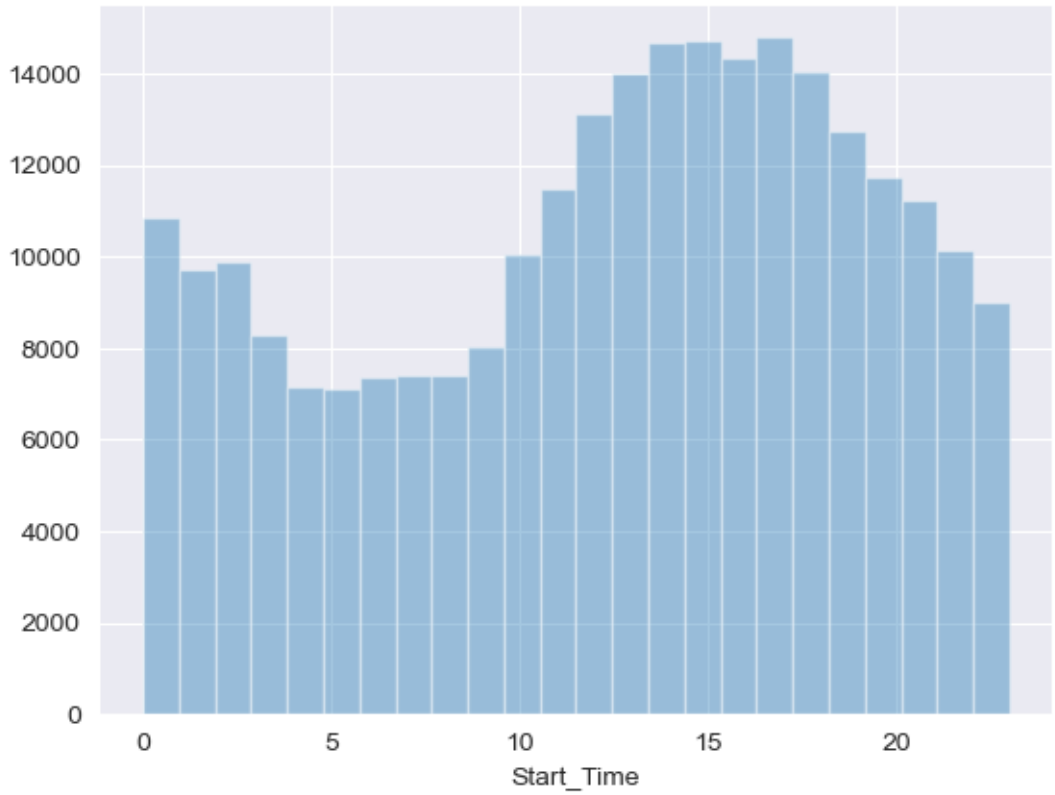
[38]:
```
sns.distplot(df.Start_Time.dt.dayofweek, bins=7,norm_hist=True, kde= False)
```

[38]:
```
<AxesSubplot:xlabel='Start_Time'>
```



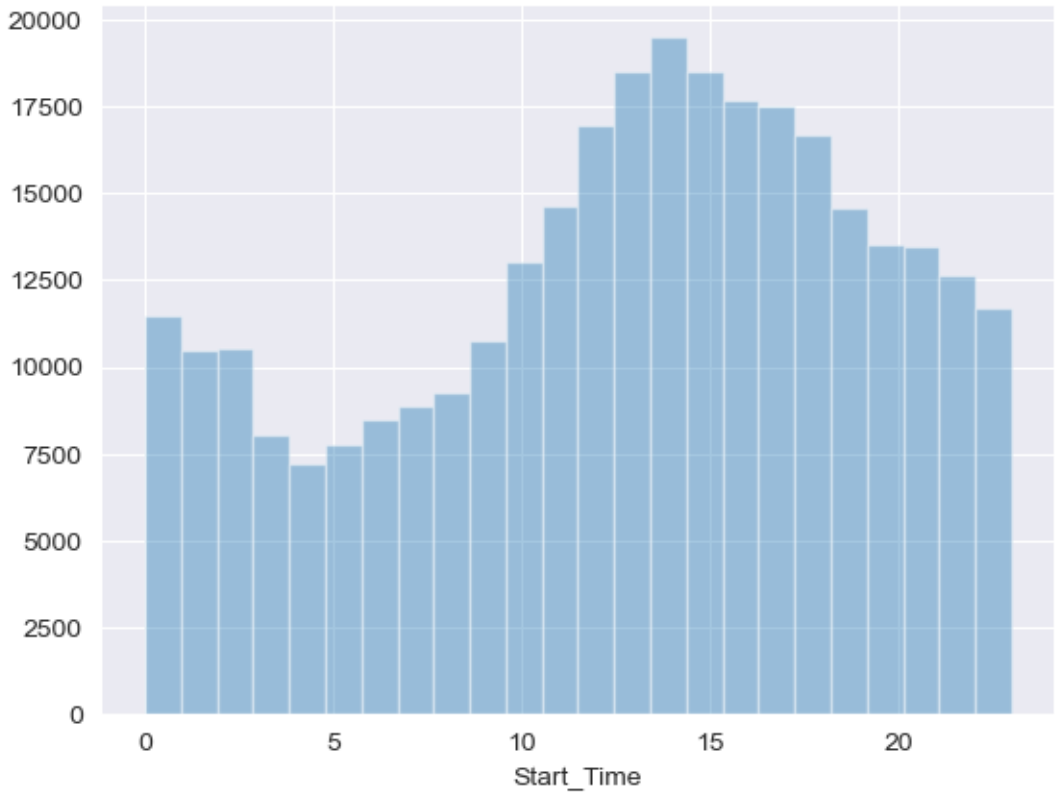
[39]:
```
sunday_start_time=df.Start_Time[df.Start_Time.dt.dayofweek== 6]    ## data for
 ↪day of weekends
sns.distplot(sunday_start_time.dt.hour, bins=24 ,norm_hist= False, kde= False)
```

[39]: <AxesSubplot:xlabel='Start_Time'>



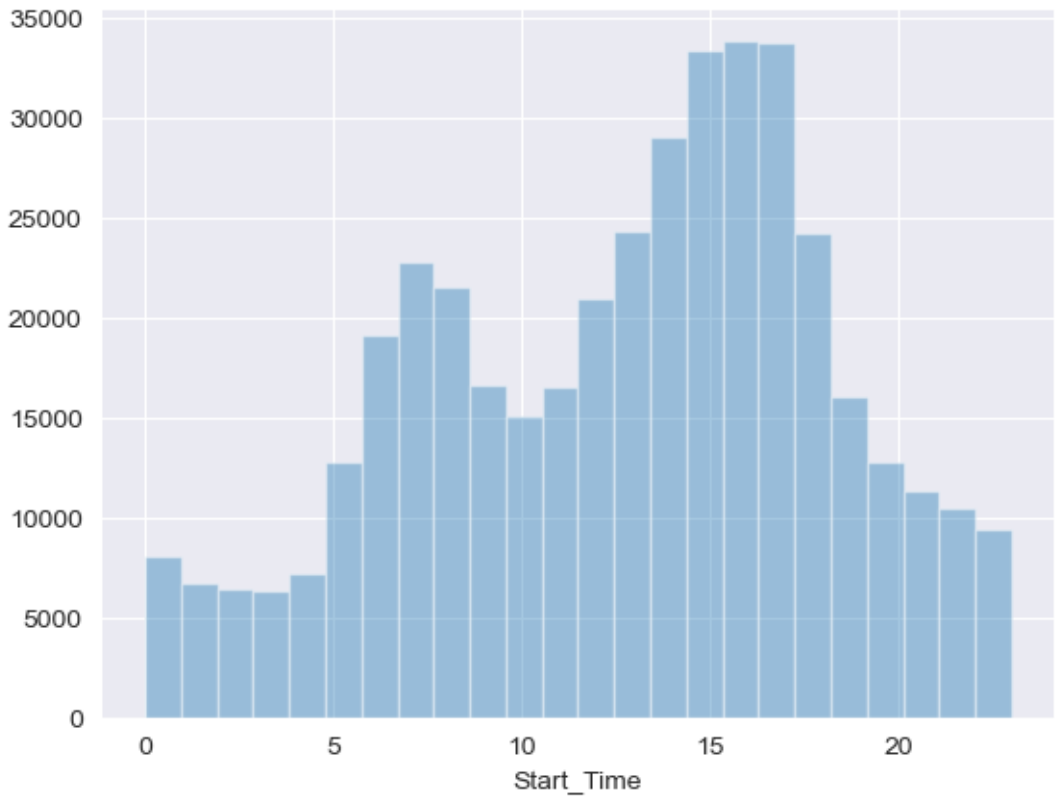
[40]:
```
saturday_start_time=df.Start_Time[df.Start_Time.dt.dayofweek== 5]    ## data for
↪day of Monday
sns.distplot(saturday_start_time.dt.hour, bins=24 ,norm_hist= False, kde= False)
```

[40]: <AxesSubplot:xlabel='Start_Time'>



[41]:
```
monday_start_time=df.Start_Time[df.Start_Time.dt.dayofweek== 0]    ## data for
↪day of Monday
sns.distplot(monday_start_time.dt.hour, bins=24 ,norm_hist= False, kde= False)
```

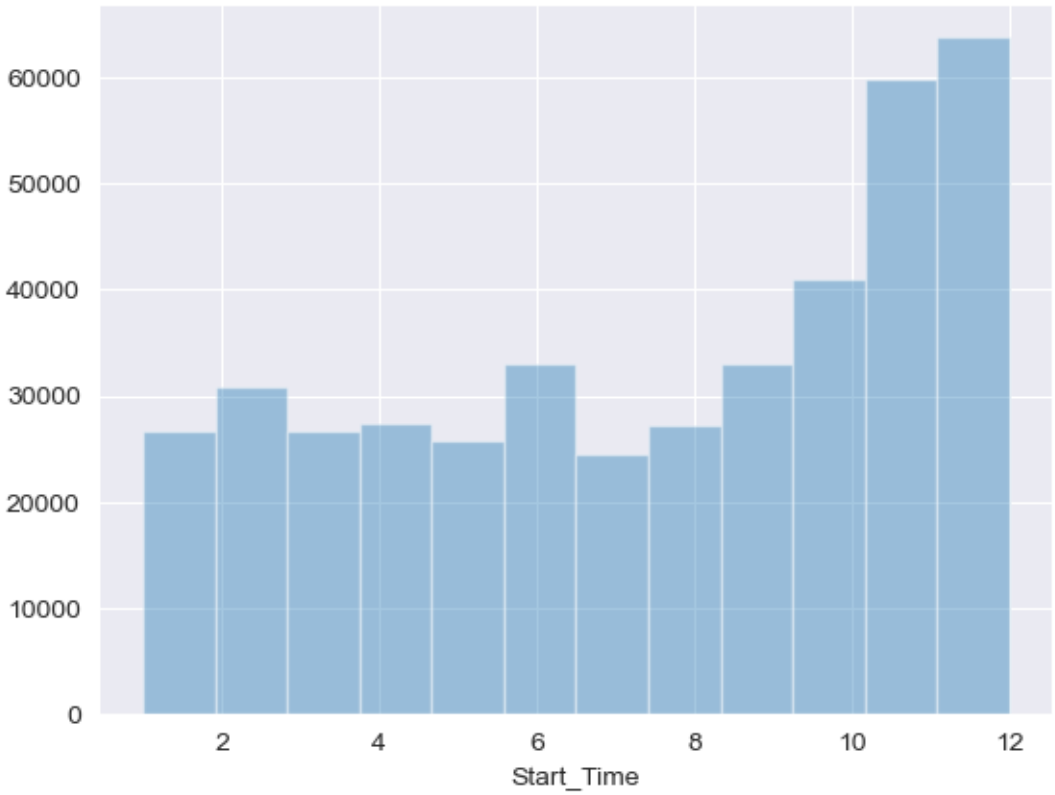
[41]: <AxesSubplot:xlabel='Start_Time'>



- on sundays peak occurs between 10 AM and 9PM and trend is same as for saturday also
- where on mondays the data says diffrents accident occurs between 2 PM to 7 PM

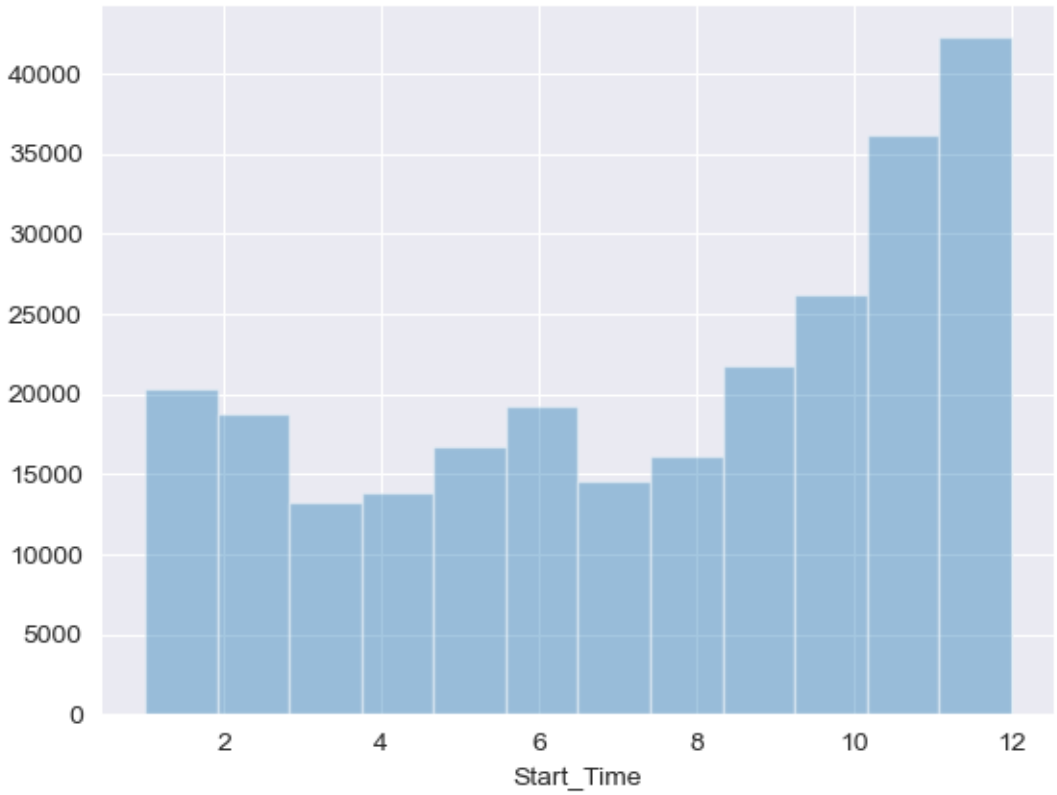
[42]:
```
sns.distplot(monday_start_time.dt.month, bins=12 ,norm_hist= False, kde= False)
```

[42]:
```
<AxesSubplot:xlabel='Start_Time'>
```



[43]:
```
sns.distplot(sunday_start_time.dt.month, bins=12 ,norm_hist= False, kde= False)
```

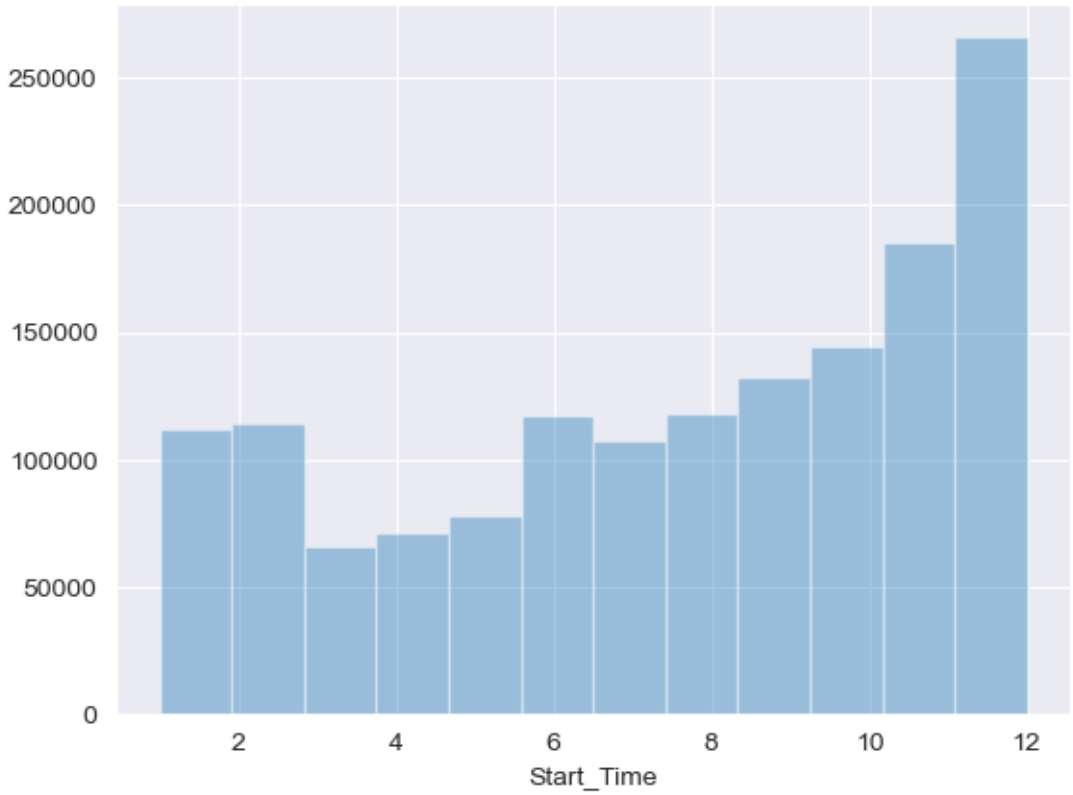
[43]: <AxesSubplot:xlabel='Start_Time'>



- It says wheather on weekdays or weeks the accidents is highers at the end of the years most frequently

[44]:
```
df_2018=df[df.Start_Time.dt.year==2021]
sns.distplot(df_2018.Start_Time.dt.month, bins=12 ,norm_hist= False, kde= False)
```

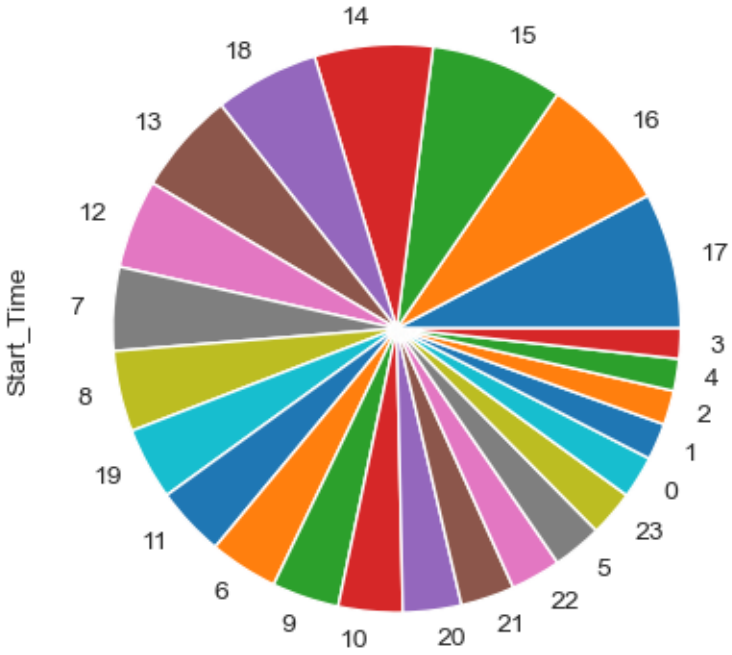
[44]:
```
<AxesSubplot:xlabel='Start_Time'>
```



- In diffrent years the trend is changing every year
- data collection is not done properly for the 2016
- in 2021 leass aciidents happen due to COVID in starting Months

[45]:
```
hour_of_day.value_counts().plot(kind='pie')
```

[45]:
```
<AxesSubplot:ylabel='Start_Time'>
```



0.7 Start Latitude and Longitude

[46]:
```
df.Start_Lat
```

[46]:
```
0          40.108910
1          39.865420
2          39.102660
3          41.062130
4          39.172393
               ...
2845337    34.002480
2845338    32.766960
2845339    33.775450
2845340    33.992460
2845341    34.133930
Name: Start_Lat, Length: 2845342, dtype: float64
```

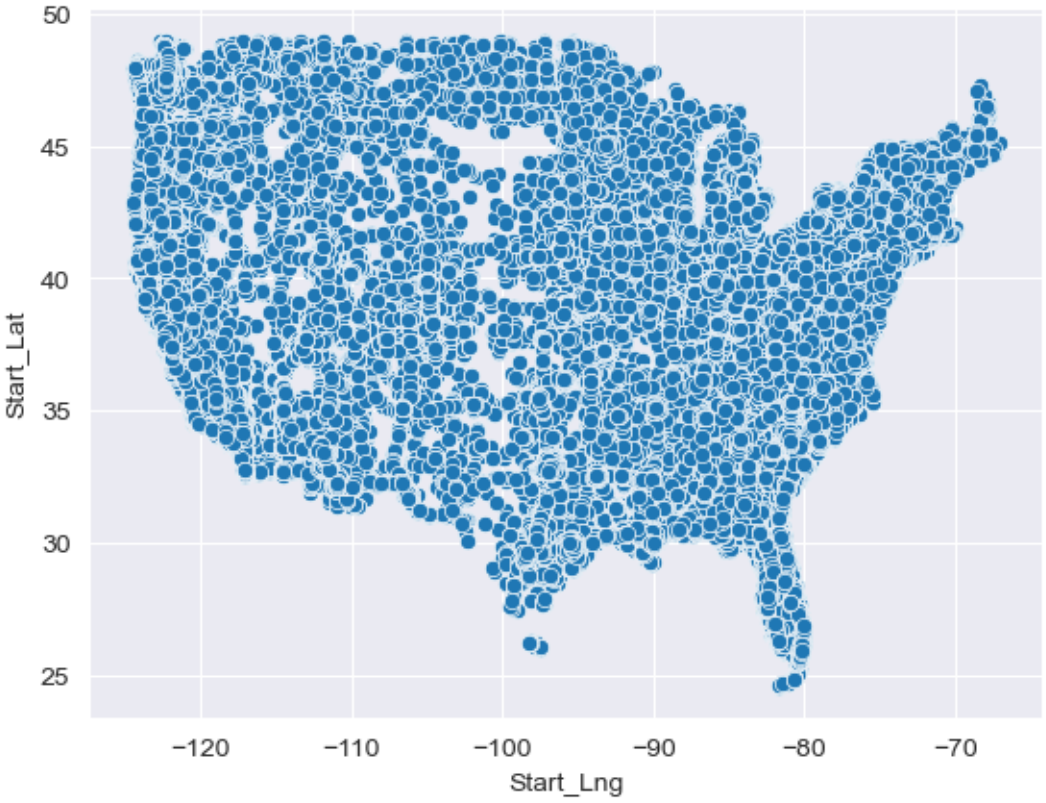
[47]:
```
df.Start_Lng
```

[47]:
```
0          -83.092860
1          -84.062800
2          -84.524680
3          -81.537840
```

```
4          -84.492792
              ...
2845337   -117.379360
2845338   -117.148060
2845339   -117.847790
2845340   -118.403020
2845341   -117.230920
Name: Start_Lng, Length: 2845342, dtype: float64
```

[48]:
```
sns.scatterplot(x=df.Start_Lng , y = df.Start_Lat)    ### Map Of USA
```

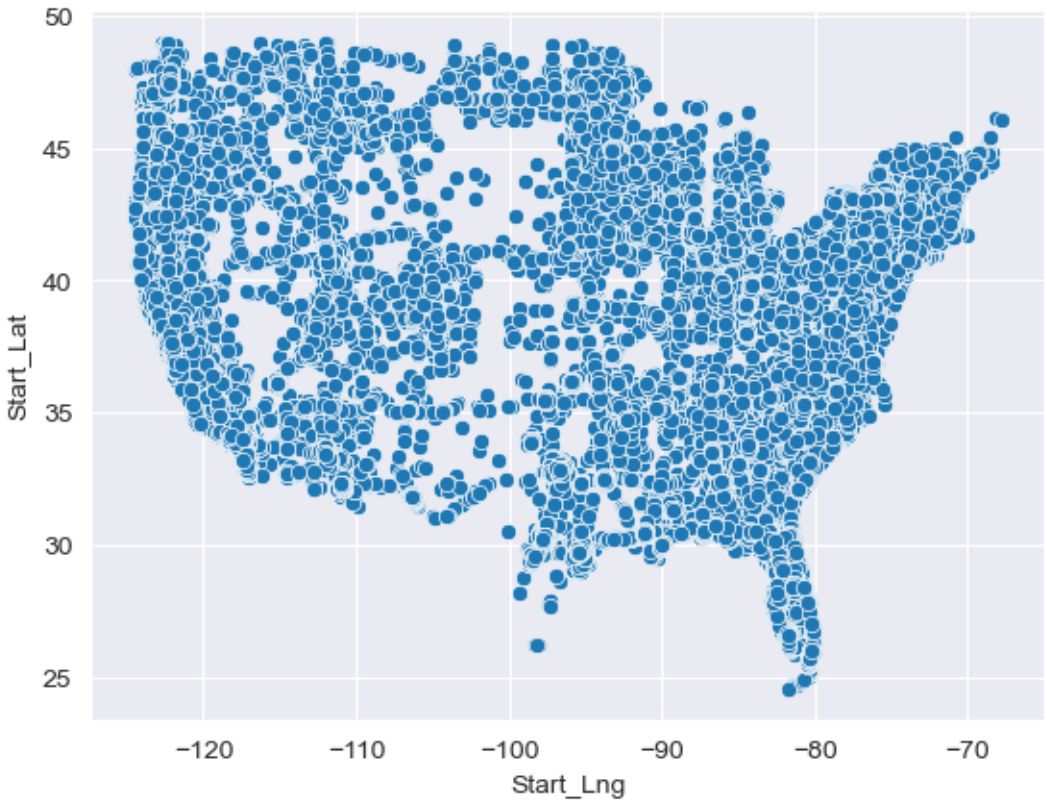
[48]:
```
<AxesSubplot:xlabel='Start_Lng', ylabel='Start_Lat'>
```



[49]:
```
sample_df= df.sample(int(0.1 * len(df)))
```

[50]:
```
sns.scatterplot(x=sample_df.Start_Lng , y = sample_df.Start_Lat)
```

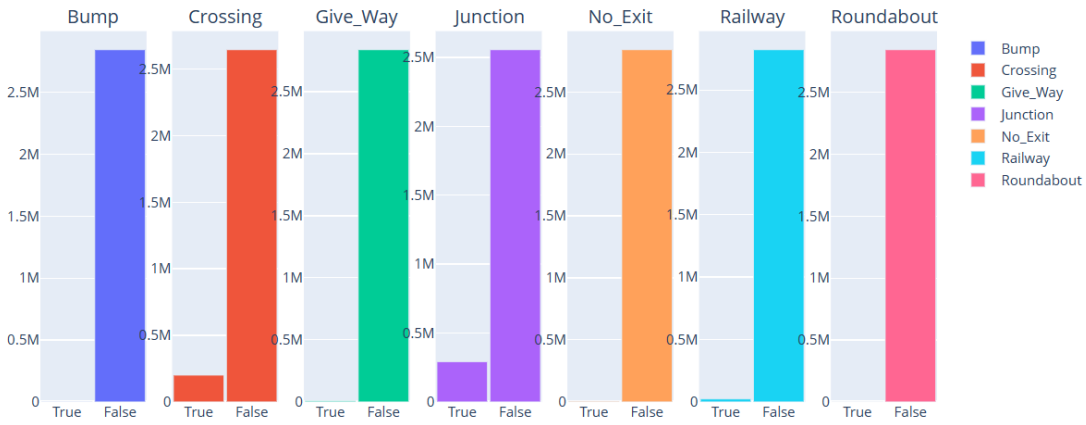
[50]:
```
<AxesSubplot:xlabel='Start_Lng', ylabel='Start_Lat'>
```



0.7.1 Reasons Of Accidents

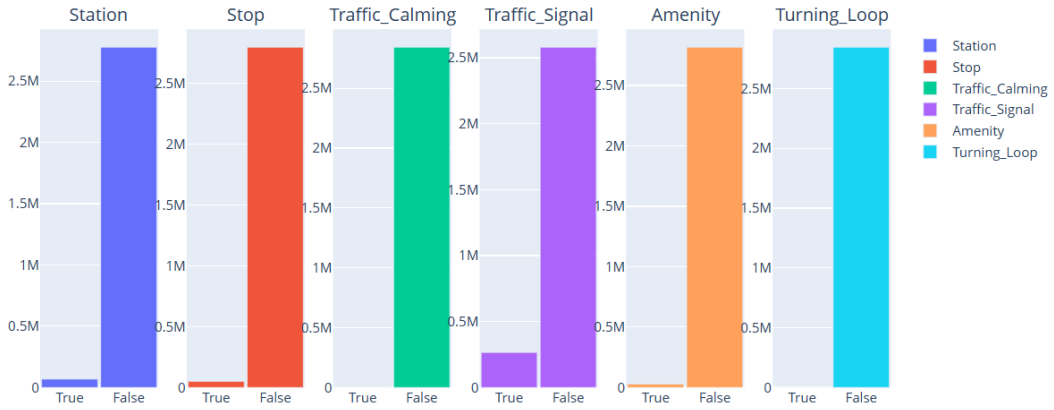
[51]:
```
fig = make_subplots(rows=1, cols=7, subplot_titles=('Bump', 'Crossing',␣
↪'Give_Way', 'Junction', 'No_Exit', 'Railway',
       'Roundabout'))
```

[52]:
```
cnames = ['Bump', 'Crossing', 'Give_Way', 'Junction', 'No_Exit', 'Railway',
       'Roundabout']
L = len(df)
for k, name in enumerate(cnames):
    n_true = df[name].sum()
    fig.add_trace(go.Bar(x=['True', 'False'], y=[n_true, L-n_true], name=name ),␣
↪1,k+1)
fig.update_layout(barmode='relative',  bargap=0.05, width=1000, height=500)
```



[53]:
```
fig = make_subplots(rows=1, cols=6, subplot_titles=('Station', 'Stop',␣
↪'Traffic_Calming', 'Traffic_Signal' ,'Amenity', 'Turning_Loop'))
```

[54]:
```
cnames = ['Station', 'Stop', 'Traffic_Calming', 'Traffic_Signal' ,'Amenity',␣
↪'Turning_Loop' ]
L = len(df)
for k, name in enumerate(cnames):
    n_true = df[name].sum()
    fig.add_trace(go.Bar(x=['True', 'False'], y=[n_true, L-n_true], name=name ),␣
↪1,k+1)
fig.update_layout(barmode='relative',  bargap=0.05, width=1000, height=500)
```



0.8 Summary Conclusion

- Insights(City Column)
- Less that 4.5% cities have more accidents
- No Data For Newyork
- over 1100 cities reported only one accident(need to investigate)
- decreases exponentially
- Insight (Strat Time)
  - Most of the accidents are happenig around 3PM-5PM due to people comming back to the Home due to tierdness
  - Next Highest percentage is 5 AM to 7AM
  - Evenely Distubuted in the weekdays but not on weekends
- Insight(Wheather)
  - The most frequently used word is "Fair", followed by "Clear" and "Mostly Cloudy". Now, the question arises that how did most of the recorded accidents occur under such weather conditions?
  - So, a chunk of the accidents happens to be in areas experiencing temperatures in the range of (50–60) degrees Fahrenheit. Most accidents occur in colder weather or regions.
  - The majority of accidents happened when the visibility was between 1 to 10 miles.On the surface of things, visibility is not a strong enough reason for the accidents.
- Insight(other Sub reason from the column)
- Traffic Signal , Crossing and juction are the major reasons for the accidents so . The rason can be drawn from that Traffic management is not good in the USA which is leading to many accidents
- and also a question that a their may be some anamoly in the data such that Turning loop has no accidents , Bump is also not a Reason may be their is missing data or data is counterfitted.

0.9 Adios

0.10 Enjoy Data Analysis !!!!