brazil-forest-analysis

February 2, 2024

[298]:
```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

[299]:
```
data = pd.read_csv(r"E:\PYTHON\Exploratory Data Analysis Projects\Brazil Forest␣
 ↪Fires\Dataset\Fire Forest in Brazil.csv",␣
 ↪encoding='iso-8859-1',parse_dates=['date'])
```

[300]:
```
data.dtypes
```

[300]:
```
year               int64
state             object
month             object
number           float64
date      datetime64[ns]
dtype: object
```

Display Top5 Rows

[301]:
```
data.head(5)
```

[301]:
```
   year state    month  number       date
0  1998  Acre  Janeiro     0.0 1998-01-01
1  1999  Acre  Janeiro     0.0 1999-01-01
2  2000  Acre  Janeiro     0.0 2000-01-01
3  2001  Acre  Janeiro     0.0 2001-01-01
4  2002  Acre  Janeiro     0.0 2002-01-01
```

Display Last5 Rows

[302]:
```
data.tail(5)
```

[302]:
```
      year      state     month  number       date
6449  2012  Tocantins  Dezembro   128.0 2012-01-01
6450  2013  Tocantins  Dezembro    85.0 2013-01-01
6451  2014  Tocantins  Dezembro   223.0 2014-01-01
6452  2015  Tocantins  Dezembro   373.0 2015-01-01
6453  2016  Tocantins  Dezembro   119.0 2016-01-01
```

Find Shape Of Our Dataset

[303]:
```
data.shape
```

[303]:
```
(6454, 5)
```

[304]:
```
print("No.of Rows:", data.shape[0])
print("No.of Column:", data.shape[1])
```

```
No.of Rows: 6454
No.of Column: 5
```

Getting Overall Informations

[305]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 6454 entries, 0 to 6453
Data columns (total 5 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   year    6454 non-null   int64
 1   state   6454 non-null   object
 2   month   6454 non-null   object
 3   number  6454 non-null   float64
 4   date    6454 non-null   datetime64[ns]
dtypes: datetime64[ns](1), float64(1), int64(1), object(2)
memory usage: 252.2+ KB
```

Check For Duplicate Data and Drop Them

[306]:
```
dup_data = data.duplicated().any()
print("Any Duplicate Values In This Dataset?", dup_data)
```

```
Any Duplicate Values In This Dataset? True
```

[307]:
```
data = data.drop_duplicates()
```

[308]:
```
dup_data = data.duplicated().any()
print("Any Duplicate Values In This Dataset?", dup_data)
```

```
Any Duplicate Values In This Dataset? False
```

[309]:
```
6454- 6422
```

[309]:
```
32
```

Check For Null Values

[310]:
```
data.isnull().sum()
```

```
[310]: year      0
       state     0
       month     0
       number    0
       date      0
       dtype: int64
```

Get Overall Statistics

```
[311]: data.describe(include='all')
```

```
[311]:                year state   month       number                           date
       count   6422.000000  6422    6422  6422.000000                           6422
       unique          NaN    23      12          NaN                            NaN
       top             NaN   Rio  Agosto          NaN                            NaN
       freq            NaN   697     540          NaN                            NaN
       mean    2007.490969   NaN     NaN   108.815178  2007-06-29 10:46:40.622859008
       min     1998.000000   NaN     NaN     0.000000            1998-01-01 00:00:00
       25%     2003.000000   NaN     NaN     3.000000            2003-01-01 00:00:00
       50%     2007.000000   NaN     NaN    24.497000            2007-01-01 00:00:00
       75%     2012.000000   NaN     NaN   114.000000            2012-01-01 00:00:00
       max     2017.000000   NaN     NaN   998.000000            2017-01-01 00:00:00
       std        5.731806   NaN     NaN   191.142482                            NaN
```

Rename Month Names To English

```
[312]: data['month'].unique()
```

```
[312]: array(['Janeiro', 'Fevereiro', 'Março', 'Abril', 'Maio', 'Junho', 'Julho',
              'Agosto', 'Setembro', 'Outubro', 'Novembro', 'Dezembro'],
             dtype=object)
```

```
[313]: data['month_new']  =  data['month'].map({'Janeiro' : 'jan',
                                  'Fevereiro' : 'feb',
                                  'Março' : 'march',
                                  'Abril' : 'April',
                                  'Maio' : 'may',
                                  'Junho' : 'jun',
                                  'Julho' : 'july',
                                  'Agosto' : 'august',
                                  'Setembro' : 'sep',
                                  'Outubro' : 'oct',
                                  'Novembro' : 'nov',
                                  'Dezembro' : 'dec'})
```

Total Number Of Fires Registered

```
[314]: data.shape
```

```
[314]: (6422, 6)
```

In Which Month Max Number of Forest Fires Were Reported?

```
[315]: data.columns
```

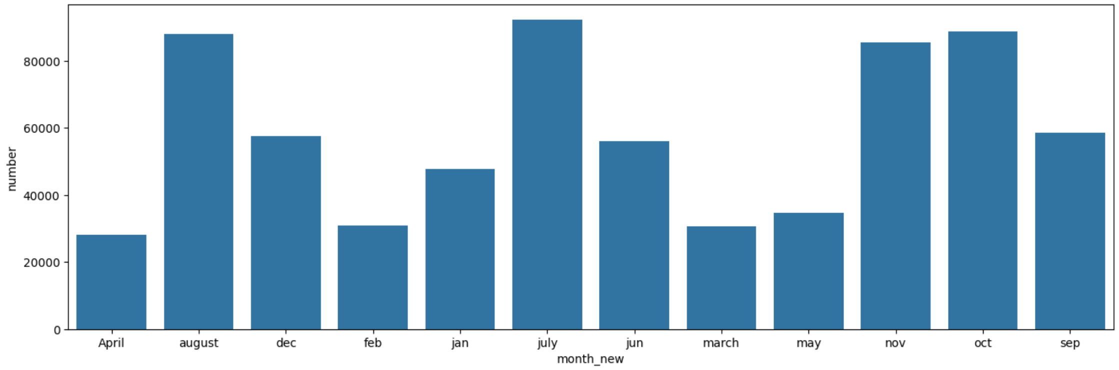
```
[315]: Index(['year', 'state', 'month', 'number', 'date', 'month_new'], dtype='object')
```

```
[316]: data1 = data.groupby('month_new')['number'].sum().reset_index()
       data1
```

```
[316]:    month_new     number
       0      April  28184.770
       1     august  88050.435
       2        dec  57535.480
       3        feb  30839.050
       4        jan  47681.844
       5       july  92319.113
       6        jun  55997.675
       7      march  30709.405
       8        may  34725.363
       9        nov  85508.054
       10       oct  88681.579
       11       sep  58578.305
```

```
[317]: plt.figure(figsize=(16,5))
       sns.barplot(x='month_new', y='number', data=data1)
```

```
[317]: <Axes: xlabel='month_new', ylabel='number'>
```



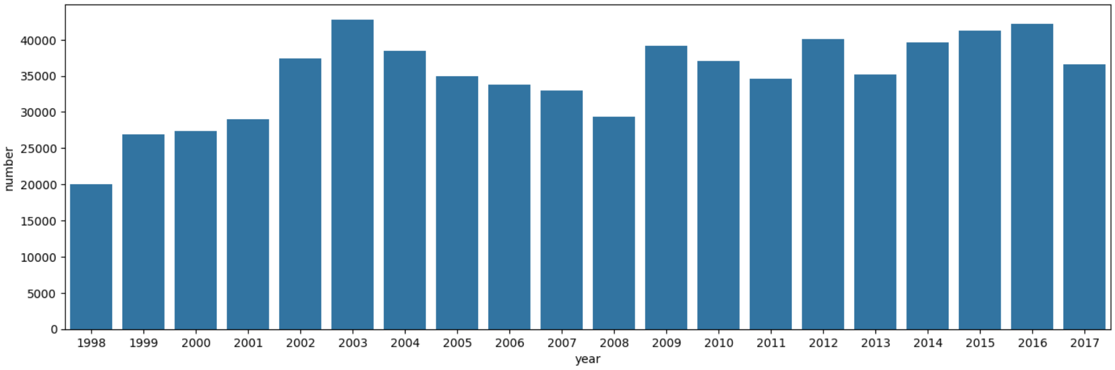
in Which Year Maximum Number of Forest Were Reported?

```
[318]: data2 = data.groupby('year')['number'].sum().reset_index()
       data2
```

```
[318]:     year     number
       0   1998  20013.971
       1   1999  26882.821
       2   2000  27351.251
       3   2001  29054.612
       4   2002  37390.600
       5   2003  42760.674
       6   2004  38450.163
       7   2005  35004.965
       8   2006  33824.161
       9   2007  33028.413
       10  2008  29378.964
       11  2009  39116.178
       12  2010  37037.449
       13  2011  34633.545
       14  2012  40084.860
       15  2013  35137.118
       16  2014  39621.183
       17  2015  41208.292
       18  2016  42212.229
       19  2017  36619.624
```

```
[319]: plt.figure(figsize=(16,5))
       sns.barplot(x='year', y='number', data=data2)
```

```
[319]: <Axes: xlabel='year', ylabel='number'>
```



in Which State Maximum Number of Forest Were Reported?

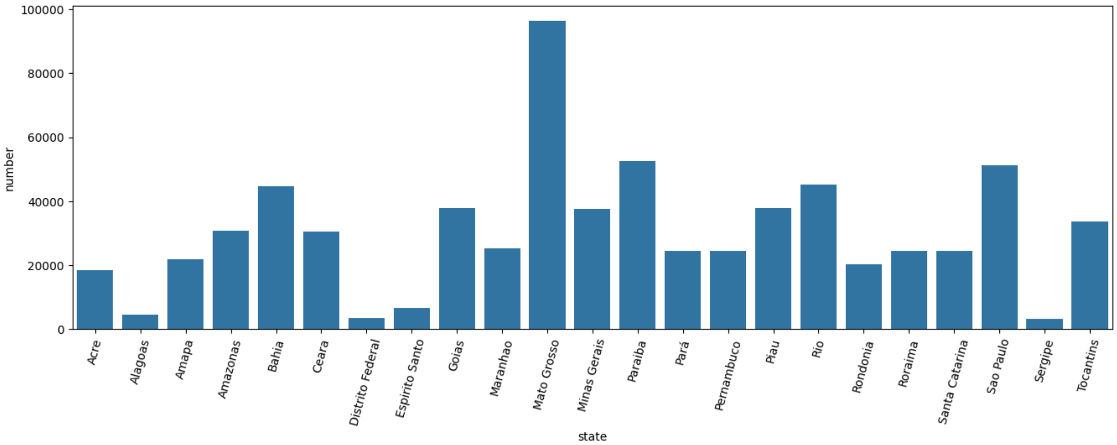
```
[320]: data3 = data.groupby('state')['number'].sum().reset_index()
       data3
```

```
[320]:                   state     number
       0                  Acre  18464.030
```

```
1             Alagoas   4606.000
2               Amapa  21831.576
3            Amazonas  30650.129
4               Bahia  44746.226
5               Ceara  30428.063
6    Distrito Federal   3561.000
7      Espirito Santo   6546.000
8               Goias  37695.520
9            Maranhao  25129.131
10        Mato Grosso  96246.028
11       Minas Gerais  37475.258
12            Paraiba  52426.918
13               Pará  24512.144
14         Pernambuco  24498.000
15               Piau  37803.747
16                Rio  45094.865
17           Rondonia  20285.429
18            Roraima  24385.074
19     Santa Catarina  24359.852
20          Sao Paulo  51121.198
21            Sergipe   3237.000
22          Tocantins  33707.885
```

[321]:

```
plt.figure(figsize=(16,5))
sns.barplot(x='state', y='number', data=data3)
plt.xticks(rotation=75)
plt.show()
```



Find Total Number of Fires Were Reported in Amazons (year wise)

[322]:

```
data[data['state'] == 'Amazonas']['number'].sum()
```

[322]: 30650.129

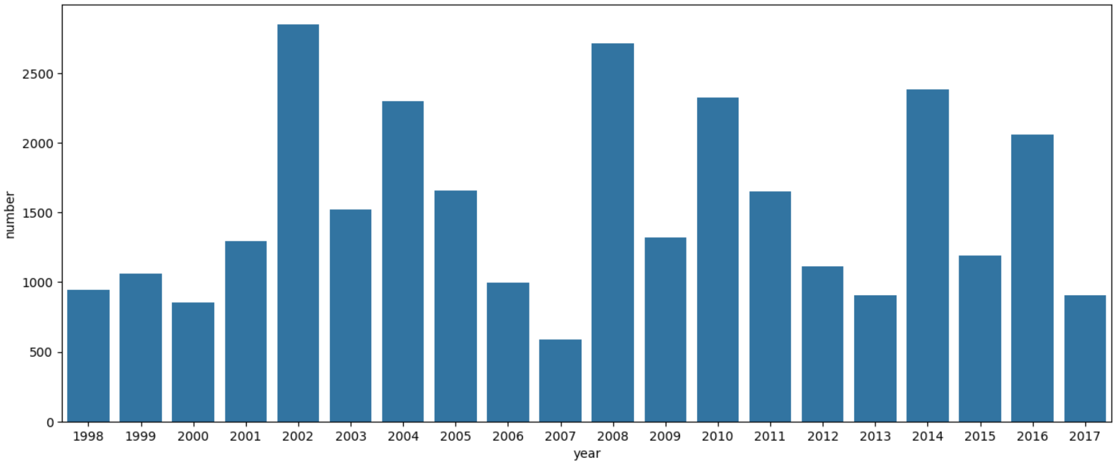
Display Number of Fires Were Reported in Amazones (year wise)

[323]:
```
data4 = data[data['state'] == 'Amazonas']
data5 = data4.groupby('year')['number'].sum().reset_index()
data5
```

[323]:
```
    year    number
0   1998   946.000
1   1999  1061.000
2   2000   853.000
3   2001  1297.000
4   2002  2852.000
5   2003  1524.268
6   2004  2298.207
7   2005  1657.128
8   2006   997.640
9   2007   589.601
10  2008  2717.000
11  2009  1320.601
12  2010  2324.508
13  2011  1652.538
14  2012  1110.641
15  2013   905.217
16  2014  2385.909
17  2015  1189.994
18  2016  2060.972
19  2017   906.905
```

[324]:
```
plt.figure(figsize=(15,6))
sns.barplot(x='year', y='number', data=data5)
```

[324]:
```
<Axes: xlabel='year', ylabel='number'>
```



Display Number of Fires Were Reported in Amazonas (day wise)

[325]:

```
data6 = data[data['state'] == 'Amazonas']
```

[337]:

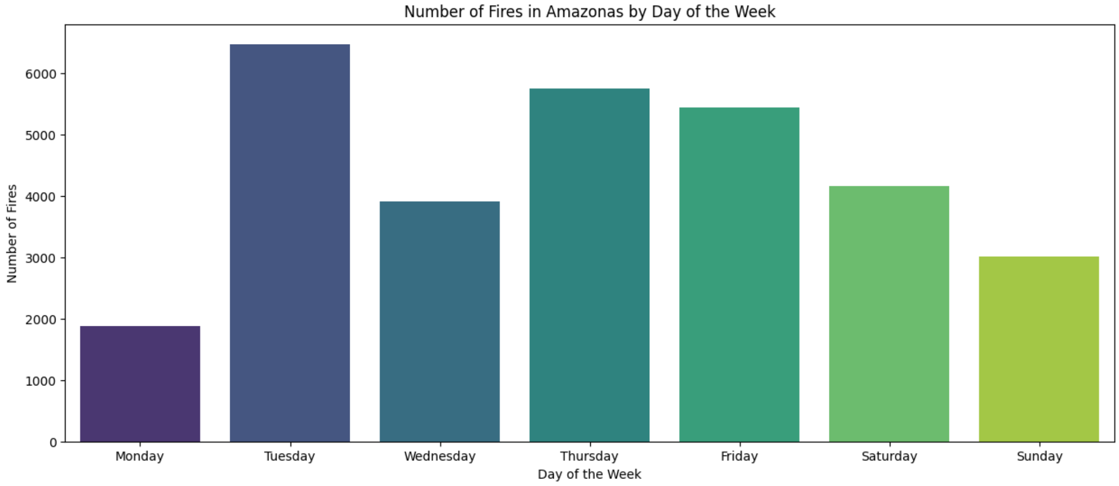
```
daily_fires = data6.groupby('date')['number'].sum().reset_index()
```

[341]:

```
data6['date'] = pd.to_datetime(data6['date'], format='%d-%m-%Y')

data6['day_of_week'] = data6['date'].dt.day_name()

daily_fires = data6.groupby('day_of_week')['number'].sum().reset_index()

order = ['Monday', 'Tuesday', 'Wednesday', 'Thursday', 'Friday', 'Saturday',␣
 ↪'Sunday']
daily_fires['day_of_week'] = pd.Categorical(daily_fires['day_of_week'],␣
 ↪categories=order, ordered=True)
daily_fires = daily_fires.sort_values('day_of_week')

plt.figure(figsize=(15, 6))
sns.barplot(x='day_of_week', y='number', data=daily_fires, palette='viridis')
plt.title('Number of Fires in Amazonas by Day of the Week')
plt.xlabel('Day of the Week')
plt.ylabel('Number of Fires')
plt.show()
```

```
C:\Users\Admin\AppData\Local\Temp\ipykernel_13332\3639335285.py:1:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data6['date'] = pd.to_datetime(data6['date'], format='%d-%m-%Y')
C:\Users\Admin\AppData\Local\Temp\ipykernel_13332\3639335285.py:3:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  data6['day_of_week'] = data6['date'].dt.day_name()
C:\Users\Admin\AppData\Local\Temp\ipykernel_13332\3639335285.py:12:
FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in
```

```
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same
effect.

  sns.barplot(x='day_of_week', y='number', data=daily_fires, palette='viridis')
```



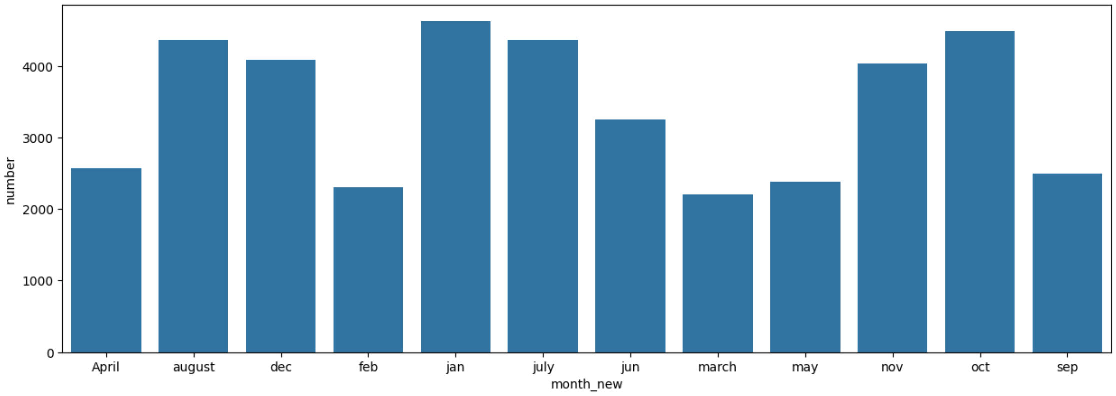
Find Total Numbers Of Reported In 2015 And Visualize Data Based On Each 'Month'

[345]:
```
fire = data[data['year']==2015].groupby('month_new')['number'].sum().
  ↪reset_index()
fire
```

[345]:
```
   month_new    number
0      April  2573.000
1     august  4363.125
2        dec  4088.522
3        feb  2309.000
4        jan  4635.000
5       july  4364.392
6        jun  3260.552
7      march  2202.000
8        may  2384.000
9        nov  4034.518
10       oct  4499.525
11       sep  2494.658
```

[351]:
```
plt.figure(figsize=(15,5))
sns.barplot(x='month_new', y='number' ,data=fire)
```

[351]:
```
<Axes: xlabel='month_new', ylabel='number'>
```



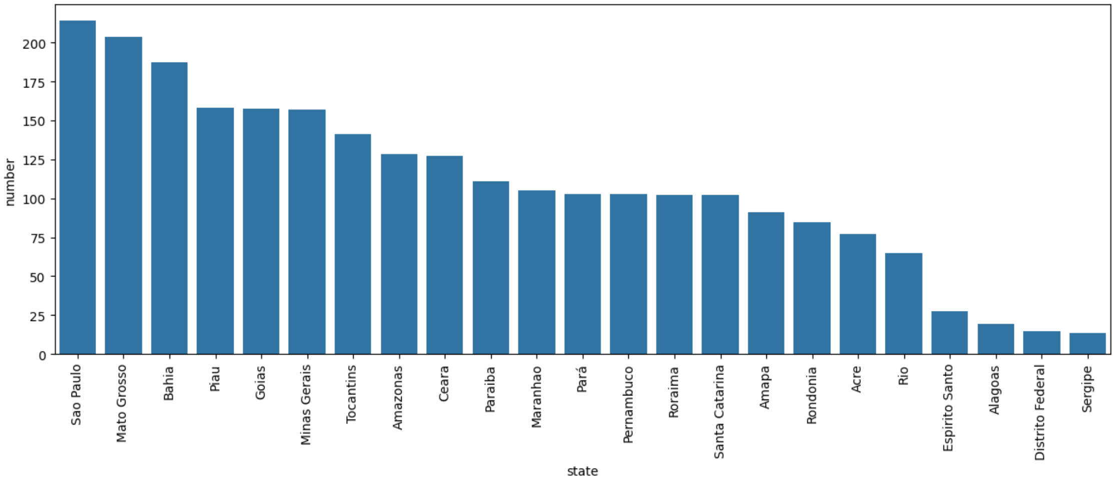
Find Average Number Of Fires Were Reported From Highest To Lowest (State-Wise)

[355]:
```
data7 = data.groupby('state')['number'].mean().sort_values(ascending=False).
 ↪reset_index()
data7
```

[355]:
```
                 state      number
0            Sao Paulo  213.896226
1          Mato Grosso  203.479975
2                Bahia  187.222703
3                Piau   158.174674
4                Goias  157.721841
5         Minas Gerais  156.800243
6            Tocantins  141.037176
7             Amazonas  128.243218
8                Ceara  127.314071
9              Paraiba  111.073979
10            Maranhao  105.142808
11                Pará  102.561272
12          Pernambuco  102.502092
13             Roraima  102.029598
14      Santa Catarina  101.924067
15               Amapa   91.345506
16            Rondonia   84.876272
17                Acre   77.255356
18                 Rio   64.698515
19      Espirito Santo   27.389121
20             Alagoas   19.271967
21    Distrito Federal   14.899582
22             Sergipe   13.543933
```

[359]:
```
plt.figure(figsize=(15,5))
sns.barplot(x='state', y='number' ,data=data7)
```

```
plt.xticks(rotation = 90)
plt.show()
```



To Find The State Names Where Fires Were Reported in 'DEC' Month

[360]:
```
data[data['month_new']=='dec']['state'].unique()
```

[360]:
```
array(['Acre', 'Alagoas', 'Amapa', 'Amazonas', 'Bahia', 'Ceara',
       'Distrito Federal', 'Espirito Santo', 'Goias', 'Maranhao',
       'Mato Grosso', 'Minas Gerais', 'Pará', 'Paraiba', 'Pernambuco',
       'Piau', 'Rio', 'Rondonia', 'Roraima', 'Santa Catarina',
       'Sao Paulo', 'Sergipe', 'Tocantins'], dtype=object)
```