```
#Basic python library which need to import
import numpy as np
import pandas as pd
import geopandas as gpd
import matplotlib.pyplot as plt
import seaborn as sns
```

```
!pip install git+git://github.com/geopandas/geopandas.git
```

```
import plotly.express as px
import matplotlib
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

Problem Statement : Analysing profiles of 2019 general election candidates using attributes like criminal cases, caste category , education , gender , age, total votes etc . The sample dataset contains 2263 records with 19 attributes.

```
# reading data into dataframe
import io
df2 = pd.read_csv('Election_Data.csv')
df2.head()
```

	STATE	CONSTITUENCY	NAME	WINNER	PARTY	SYMBOL	GENDER	CRIMINAL\nCASES
0	Telangana	ADILABAD	SOYAM BAPU RAO	1	BJP	Lotus	MALE	52
1	Telangana	ADILABAD	Godam Nagesh	0	TRS	Car	MALE	0
2	Telangana	ADILABAD	RATHOD RAMESH	0	INC	Hand	MALE	3
3	Telangana	ADILABAD	NOTA	0	NOTA	NaN	NaN	NaN
4	Uttar Pradesh	AGRA	Satyapal Singh Baghel	1	BJP	Lotus	MALE	5

```
df2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2263 entries, 0 to 2262
Data columns (total 19 columns):
 #   Column                                      Non-Null Count  Dtype
---  ------                                      --------------  -----
 0   STATE                                       2263 non-null   object
 1   CONSTITUENCY                                2263 non-null   object
 2   NAME                                        2263 non-null   object
 3   WINNER                                      2263 non-null   int64
 4   PARTY                                       2263 non-null   object
 5   SYMBOL                                      2018 non-null   object
 6   GENDER                                      2018 non-null   object
 7   CRIMINAL
CASES                            2018 non-null   object
 8   AGE                                         2018 non-null   float64
 9   CATEGORY                                    2018 non-null   object
 10  EDUCATION                                   2018 non-null   object
 11  ASSETS                                      2018 non-null   object
 12  LIABILITIES                                 2018 non-null   object
 13  GENERAL
VOTES                             2263 non-null   int64
 14  POSTAL
VOTES                              2263 non-null   int64
 15  TOTAL
VOTES                               2263 non-null   int64
 16  OVER TOTAL ELECTORS
IN CONSTITUENCY      2263 non-null   float64
 17  OVER TOTAL VOTES POLLED
IN CONSTITUENCY  2263 non-null   float64
 18  TOTAL ELECTORS                              2263 non-null   int64
dtypes: float64(3), int64(5), object(11)
memory usage: 336.0+ KB
```

```
df2.shape
```

```
(2263, 19)
```

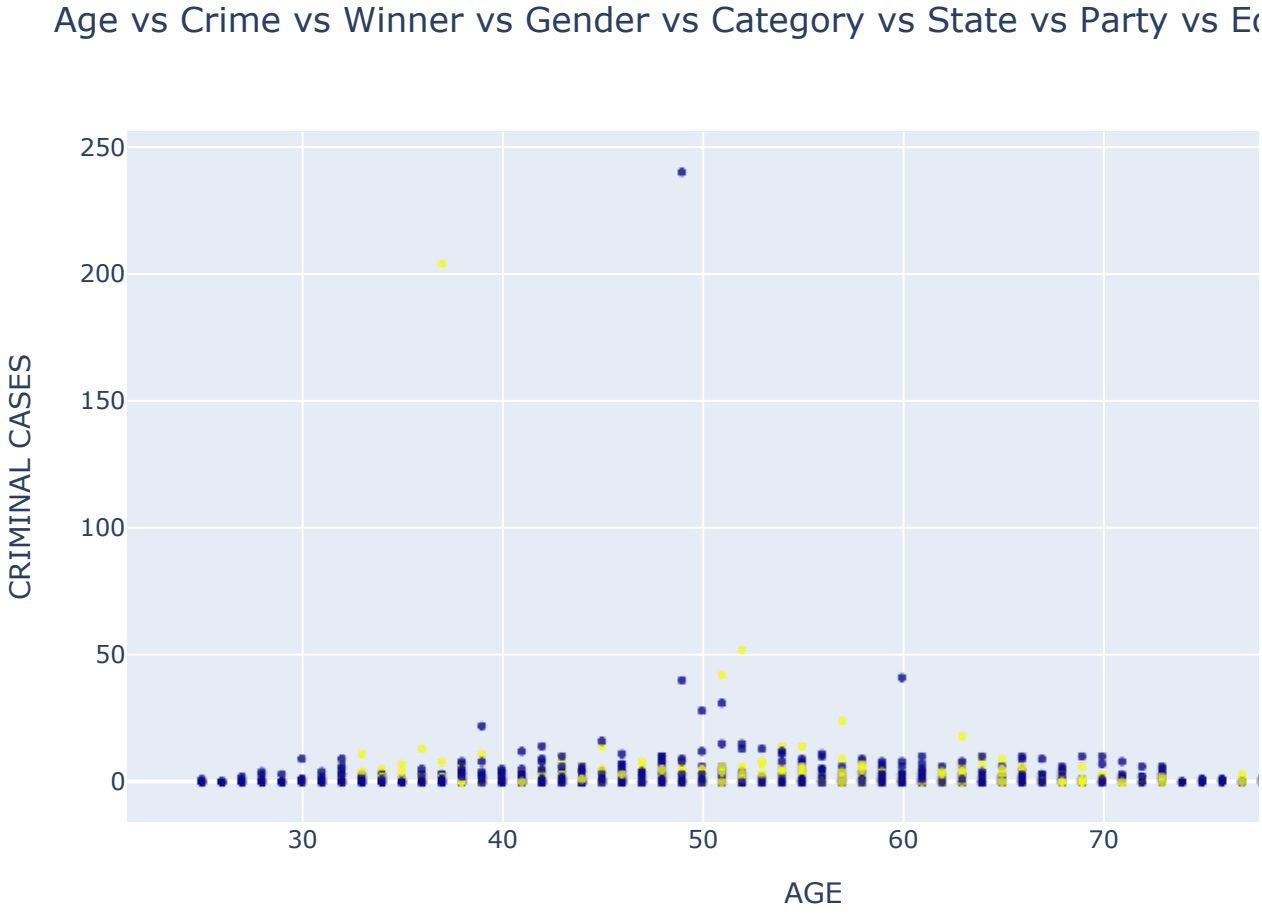
```
# Description of data set
df2.describe()
```

Overview of Profile of Candidates

```
sns.set_style('darkgrid')
matplotlib.rcParams['font.size'] = 14
matplotlib.rcParams['figure.figsize'] = (10, 6)
matplotlib.rcParams['figure.facecolor'] = '#00000000'
```

```
fig = px.scatter(df2,
                 x='AGE',
                 y='CRIMINAL\nCASES',
                 color='WINNER',
                 opacity=0.8,
```

```
                  hover_data=['GENDER','CATEGORY','STATE','PARTY','NAME','EDUCATION'],
                  title='Age vs Crime vs Winner vs Gender vs Category vs State vs Party vs
fig.update_traces(marker_size=5)
fig.show()
```



Interactive filter plot based on Education,Constituency & State

```
fig = px.scatter(df2,
                  x="AGE",
                  y="EDUCATION",
                  animation_frame="STATE",
                  animation_group="PARTY",
#                   size="pop",
                  color="PARTY",
                  hover_name="CONSTITUENCY",
                  log_x=True,
                  size_max=80,
                  range_x=[20,90],
                  range_y=[0,7])

fig.show()
```


```
#Correlation between data
df2.corr()
```

	WINNER	AGE	GENERAL\nVOTES	POSTAL\nVOTES	TOTAL\nVOTES	C
WINNER	1.000000	0.110294	0.725678	0.520286	0.726125	
AGE	0.110294	1.000000	0.208567	0.129360	0.208600	
GENERAL\nVOTES	0.725678	0.208567	1.000000	0.616742	0.999988	
POSTAL\nVOTES	0.520286	0.129360	0.616742	1.000000	0.620614	
TOTAL\nVOTES	0.726125	0.208600	0.999988	0.620614	1.000000	
OVER TOTAL ELECTORS \nIN CONSTITUENCY	0.738976	0.207304	0.962219	0.630882	0.962441	
OVER TOTAL VOTES POLLED						

Missing Value Treatment

```
# Checking the Null Value in the Dataset
df2.isnull().values.any()
```

```
True
```

```
# Crime Cases Count
df2['CRIMINAL\nCASES'].value_counts()
df2['CRIMINAL\nCASES'] = df2['CRIMINAL\nCASES'].replace(['Not Available'],'0')
df2['CRIMINAL\nCASES'] = pd.to_numeric(df2['CRIMINAL\nCASES'] , errors='coerce')
df2['CRIMINAL\nCASES'].value_counts()
df2['CRIMINAL\nCASES'].isna()
```

```
0       False
1       False
2       False
3        True
4       False
        ...
2258    False
2259    False
2260    False
2261    False
2262     True
Name: CRIMINAL\nCASES, Length: 2263, dtype: bool
```

```
# Here we are removing the null values from the column criminal in the dataset
df2['CRIMINAL\nCASES'].isnull().sum().sum()
```

```
245
```

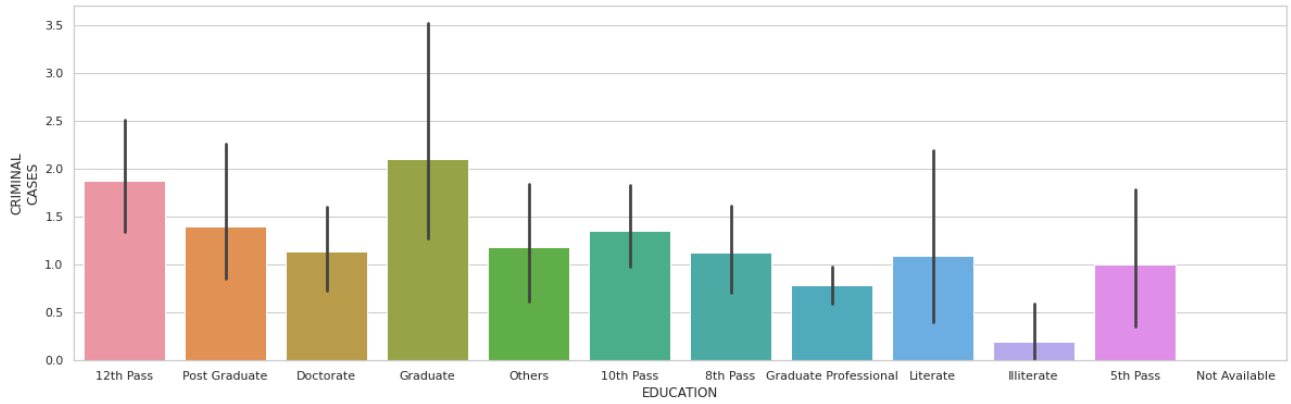
```
df2.head()
```

	STATE	CONSTITUENCY	NAME	WINNER	PARTY	SYMBOL	GENDER	CRIMINAL\nCASES
0	Telangana	ADILABAD	SOYAM BAPU RAO	1	BJP	Lotus	MALE	52.0
1	Telangana	ADILABAD	Godam Nagesh	0	TRS	Car	MALE	0.0
2	Telangana	ADILABAD	RATHOD RAMESH	0	INC	Hand	MALE	3.0
3	Telangana	ADILABAD	NOTA	0	NOTA	NaN	NaN	NaN
4	Uttar Pradesh	AGRA	Satyapal Singh Baghel	1	BJP	Lotus	MALE	5.0

Key Performance Indicators

1.Education Vs Crimes committed by the candidates

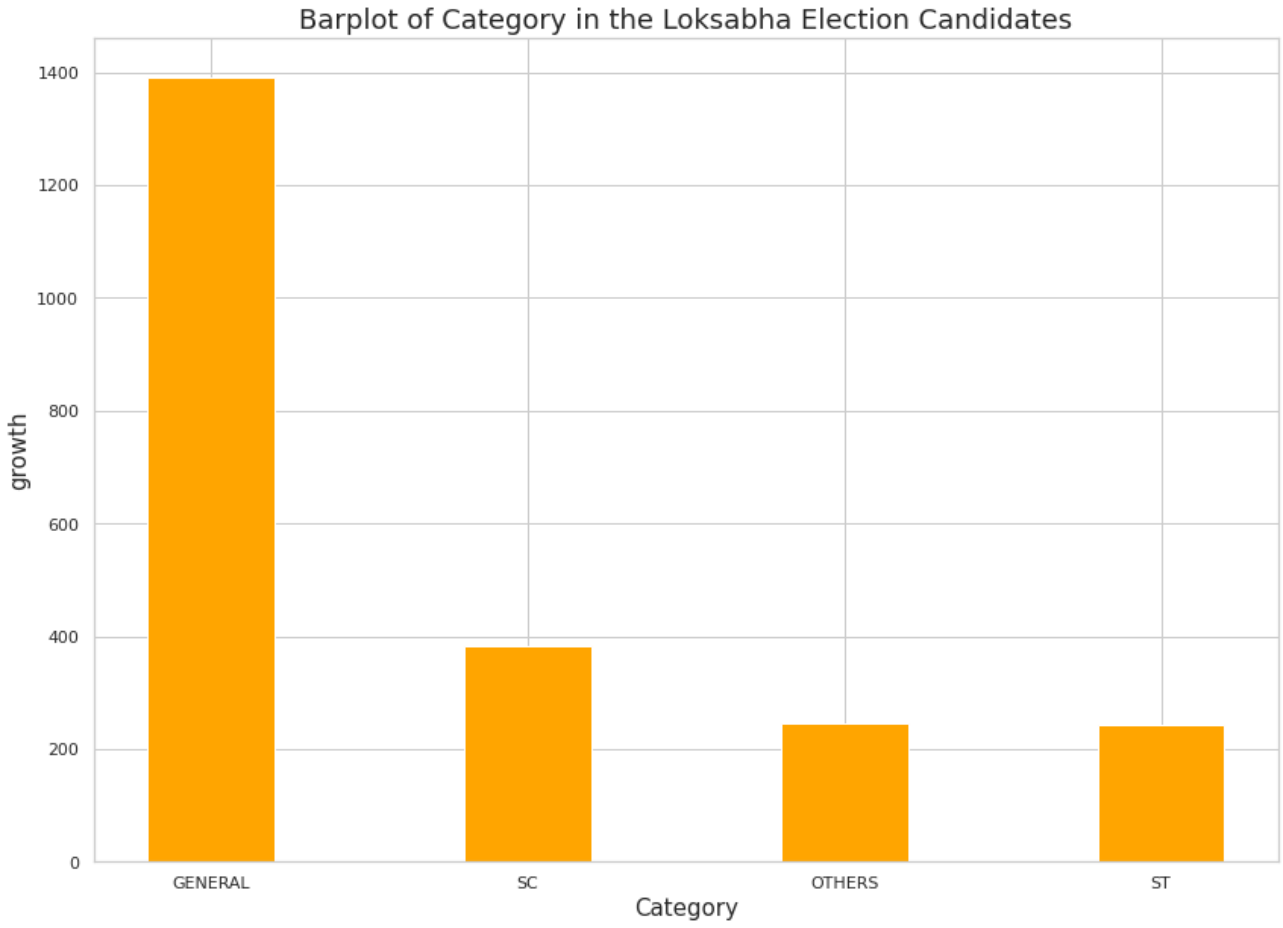
```
import seaborn as sns
sns.set_theme(style="whitegrid")
plt.figure(figsize=(20,6))
ax = sns.barplot(x="EDUCATION", y="CRIMINAL\nCASES", data=df2)
```



2.Candidates based on the category

```
consumption = ['SC','ST','GENERAL','OTHERS']
cat1= int (0)
cat2= int (0)
cat3= int (0)
cat4= int (0)
for i in df2['CATEGORY']:
  if i=='SC':
    cat1+=1
  elif i=='ST':
    cat2+=1
  elif i=='GENERAL':
    cat3+=1
  else:
    cat4+=1
growth = [cat1,cat2,cat3,cat4]
# Create a pandas dataframe
df = pd.DataFrame({"consumption": consumption,
"growth": growth})
df_sorted_desc= df.sort_values('growth',ascending=False)
plt.figure(figsize=(14,10))
```

```
# make bar plot with matplotlib
plt.bar('consumption', 'growth',data=df_sorted_desc,color ='orange',
width = 0.4)
plt.xlabel("Category", size=15)
plt.ylabel("growth", size=15)
plt.title("Barplot of Category in the Loksabha Election Candidates", size=18)
plt.savefig("bar_plot_matplotlib_Python.png")
```



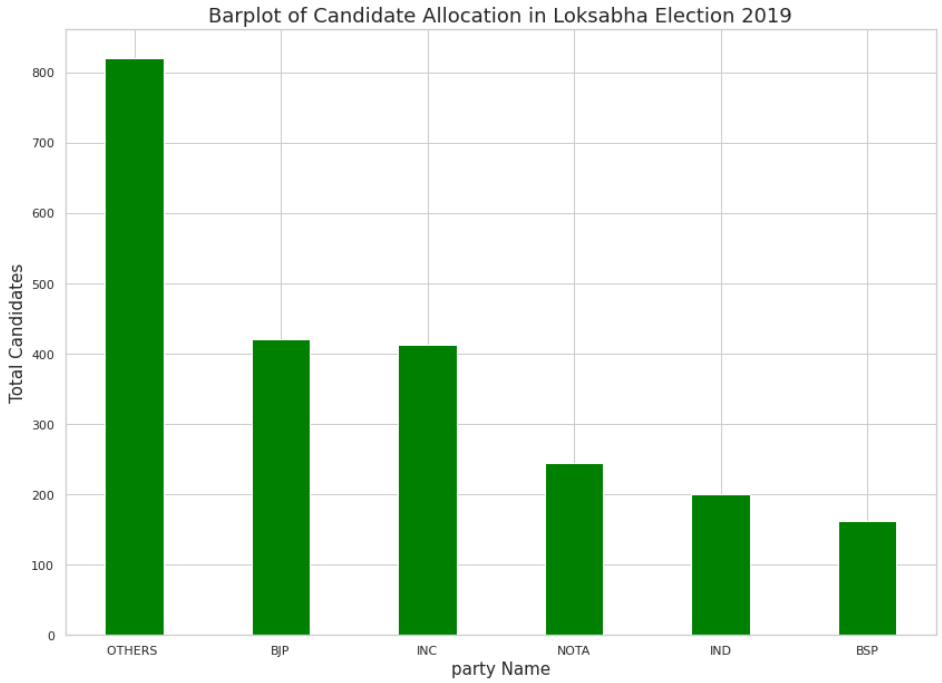
3. Total number of allocation of candidates for different parties in different constituencies in India.

```
df2.PARTY.value_counts()
```

```
BJP     420
INC     413
NOTA    245
IND     201
BSP     163
       ...
```

```
WPOI      1
SJDD      1
MSHP      1
JHP       1
ASDC      1
Name: PARTY, Length: 133, dtype: int64
```

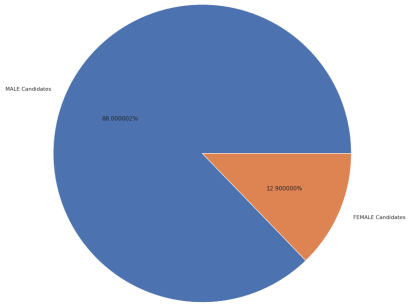
```
consumption = ['BJP','INC','NOTA','IND','BSP','OTHERS ']
party1= int (0)
party2= int (0)
party3= int (0)
party4= int (0)
party5= int (0)
party6= int (0)
for i in df2['PARTY']:
  if i=='BJP':
    party1+=1
  elif i=='INC':
    party2+=1
  elif i=='NOTA':
    party3+=1
  elif i=='IND':
    party4+=1
  elif i=='BSP':
    party5+=1
  else :
    party6+=1
growth = [party1,party2,party3,party4,party5,party6]
df = pd.DataFrame({"consumption": consumption,
"growth": growth})
df_sorted_desc= df.sort_values('growth',ascending=False)
plt.figure(figsize=(14,10))
# make bar plot with matplotlib
plt.bar('consumption', 'growth',data=df_sorted_desc,color ='green',
width = 0.4)
plt.xlabel("party Name", size=15)
plt.ylabel("Total Candidates", size=15)
plt.title("Barplot of Candidate Allocation in Loksabha Election 2019", size=18)
plt.savefig("bar_plot_matplotlib_Python.png")
```

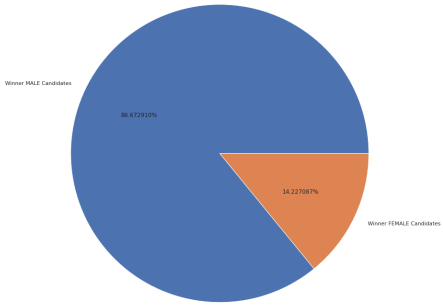


4.Gender wise split up of candidates allocation in Loksabha Election

```
male=0
female=0
male_w=0
female_w=0

for i in range (len(df2)):
  gender=df2.iloc[i,6]
  w=df2.iloc[i,3]
  if gender == 'MALE':
    male=male+1
  if gender == 'FEMALE':
    female=female+1
  if gender == 'MALE' and w >0:
    male_w=male_w + 1
  if gender == 'FEMALE' and w >0:
    female_w=female_w + 1
y = np.array([male,female])
t1=sum(y)
mylabelsy = ["MALE Candidates","FEMALE Candidates"]
z= np.array([male_w,female_w])
t2=sum(z)
mylabelsz = ["Winner MALE Candidates","Winner FEMALE Candidates"]
fig = plt.figure()
ax1 = fig.add_axes([0, 0, 1.5, 1.5], aspect=1)
ax1.pie(y, labels=mylabelsy, radius = 1.2, autopct=lambda p: '{:0f}%'.format(p*t1 / 2000)
ax2 = fig.add_axes([1.5, .0, 1.5, 1.5], aspect=1)
ax2.pie(z, labels=mylabelsz, radius = 1.2, autopct=lambda p: '{:0f}%'.format(p*t1 / 2000))
plt.show()
```





5.Statewise Criminal cases on Candidates

```
shp_gdf = gpd.read_file('/content/StateBoundary.shp')
shp_gdf
```

	state	geometry
0	ANDAMAN & NICOBAR	MULTIPOLYGON (((10341718.474 1449533.161, 1034...
1	CHANDIGARH	POLYGON ((8546255.616 3606050.813, 8546315.400...
2	DADAR & NAGAR HAVELI	MULTIPOLYGON (((8137193.486 2315664.964, 81373...
3	DAMAN & DIU	MULTIPOLYGON (((8111624.471 2328002.898, 81117...
4	DELHI	POLYGON ((8583390.570 3359116.190, 8583476.212...
5	HARYANA	POLYGON ((8524318.539 3516490.865, 8524451.392...
6	JHARKHAND	POLYGON ((9762288.285 2772949.712, 9762301.816...
7	KARNATAKA	MULTIPOLYGON (((8608594.474 2090389.205, 86086...
8	KERALA	POLYGON ((8347733.191 1436381.747, 8347795.745...

```
import io
df2 = pd.read_csv('Election_Data.csv')
df2= df2.replace(['NCT OF Delhi'],'Delhi')
df2['STATE'] = df2['STATE'].str.upper()
df2.head()
df2.shape
(2263, 19)
df2.info()
df2.describe()
df2.isnull().values.any()
df2.rename(columns={'CRIMINAL\nCASES': 'criminal'}, inplace=True)
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2263 entries, 0 to 2262
Data columns (total 19 columns):
 #   Column                                    Non-Null Count  Dtype
---  ------                                    --------------  -----
 0   STATE                                     2263 non-null   object
 1   CONSTITUENCY                              2263 non-null   object
 2   NAME                                      2263 non-null   object
 3   WINNER                                    2263 non-null   int64
 4   PARTY                                     2263 non-null   object
 5   SYMBOL                                    2018 non-null   object
 6   GENDER                                    2018 non-null   object
 7   CRIMINAL
CASES                          2018 non-null   object
 8   AGE                                       2018 non-null   float64
 9   CATEGORY                                  2018 non-null   object
 10  EDUCATION                                 2018 non-null   object
 11  ASSETS                                    2018 non-null   object
 12  LIABILITIES                               2018 non-null   object
```

```
 13  GENERAL
VOTES                              2263 non-null   int64
 14  POSTAL
VOTES                               2263 non-null   int64
 15  TOTAL
VOTES                                2263 non-null   int64
 16  OVER TOTAL ELECTORS
IN CONSTITUENCY      2263 non-null   float64
 17  OVER TOTAL VOTES POLLED
IN CONSTITUENCY  2263 non-null   float64
 18  TOTAL ELECTORS                              2263 non-null   int64
dtypes: float64(3), int64(5), object(11)
memory usage: 336.0+ KB
```

```
df2['criminal'].value_counts()
df2['criminal'] = df2['criminal'].replace(['Not Available'],'0')
df2['criminal'] = pd.to_numeric(df2['criminal'] , errors='coerce')
df2['criminal'].value_counts()
df2['criminal'].isna()
```

```
0       False
1       False
2       False
3        True
4       False
        ...
2258    False
2259    False
2260    False
2261    False
2262     True
Name: criminal, Length: 2263, dtype: bool
```

```
df2['criminal'].isnull().sum().sum()
df2.head()
```

STATE CONSTITUENCY NAME WINNER PARTY SYMBOL

```
state_criminal = df2.groupby('STATE')[['criminal']].sum().sort_values(by=
['criminal']).sort_values(by=['STATE'])
state_criminal_winner = df2[df2['WINNER']>0].groupby('STATE')[['criminal']].sum().sort_val
['criminal']).sort_values(by=['STATE'])
state_criminal.to_csv('/content/xx.csv')
df=pd.read_csv('xx.csv')
```

```
merged = shp_gdf.set_index('state').join(df.set_index('STATE'))
merged
```

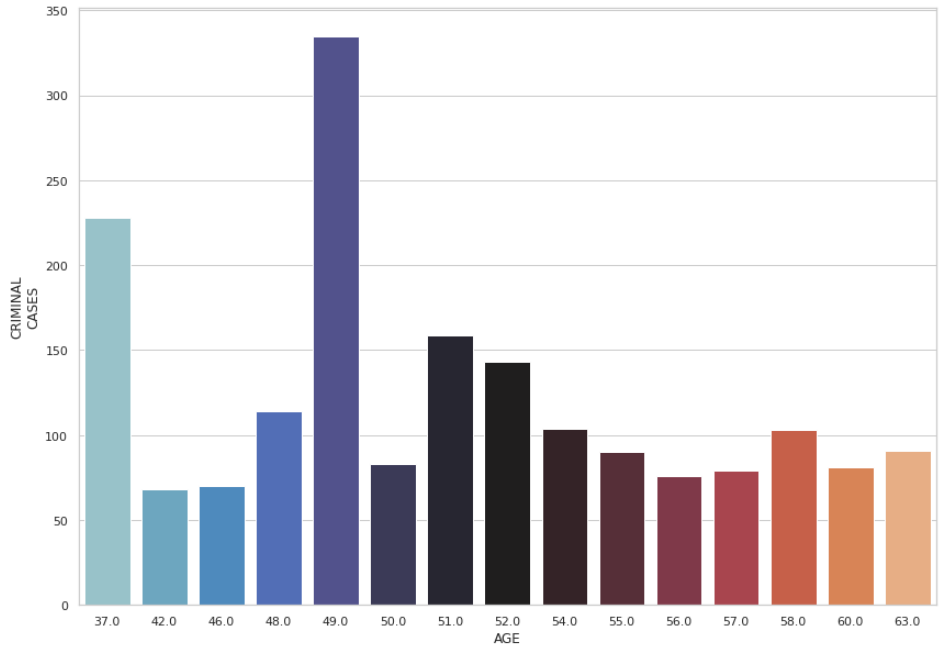
	geometry	criminal
ANDAMAN & NICOBAR	MULTIPOLYGON (((10341718.474 1449533.161, 1034...	NaN
ANDHRA PRADESH	POLYGON ((9426056.496 2174632.352, 9426228.484...	81.0
ARUNACHAL PRADESH	POLYGON ((10696175.277 3434232.650, 10696981.8...	2.0
ASSAM	POLYGON ((10380499.251 2872443.723, 10380499.2...	21.0
BIHAR	POLYGON ((9362949.333	212.0

```
fig, ax = plt.subplots(1, figsize=(12, 12))
ax.axis('off')
ax.set_title('Statewise Criminal Cases on Candidates',
             fontdict={'fontsize': '15', 'fontweight' : '3'})
fig = merged.plot(column='criminal', cmap='Oranges', linewidth=0.5, ax=ax, edgecolor='0.2'
```

Statewise Criminal Cases on Candidates

5. Age wise criminal case on Candidates

```
df2['CRIMINAL\nCASES'] = pd.to_numeric(df2['CRIMINAL\nCASES'] , errors='coerce')
age_criminal = df2[df2['CRIMINAL\nCASES']>0].groupby('AGE')[['CRIMINAL\nCASES']].sum().sor
                        ['CRIMINAL\nCASES']).tail(15).sort_values(by=['AGE'])
age_criminal
plt.figure(figsize=(14,10))
sns.barplot(x = age_criminal.index , y = age_criminal['CRIMINAL\nCASES'] , palette='icefir
```

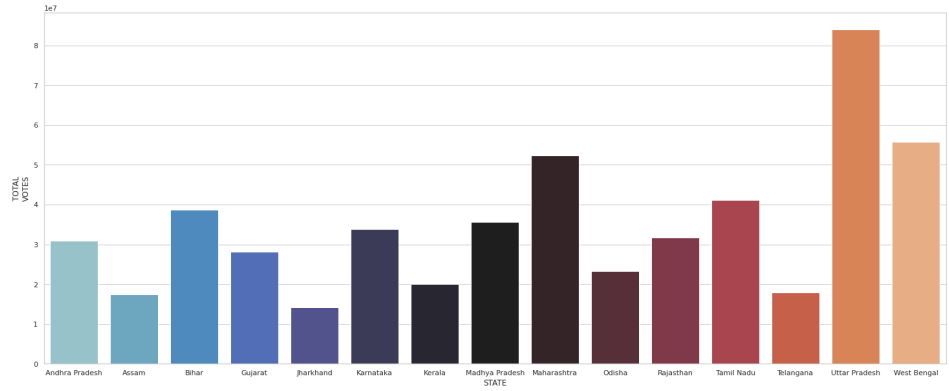


7.State Vs Total votes

```
total_voter1 = df2[df2['TOTAL\nVOTES']>0].groupby('STATE')[['TOTAL\nVOTES']].sum().sort_va
                        ['TOTAL\nVOTES']).tail(15).sort_values(by=['STATE'])

total_voter1
```

```
plt.figure(figsize=(25,10))
sns.barplot(x = total_voter1.index , y = total_voter1['TOTAL\nVOTES'] , palette='icefire')
```



8.Average Age of Candidates Statewise

```
state_criminal = df2.groupby('STATE')[['AGE']].mean().apply(np.ceil)
state_criminal.to_csv('/content/age.csv')
df3=pd.read_csv('age.csv')
df3
```

	STATE	AGE
0	Andaman & Nicobar Islands	51.0
1	Andhra Pradesh	54.0
2	Arunachal Pradesh	52.0
3	Assam	53.0
4	Bihar	49.0
5	Chandigarh	65.0
6	Chhattisgarh	50.0
7	Dadra & Nagar Haveli	41.0
8	Daman & Diu	50.0
9	Goa	60.0
10	Gujarat	55.0
11	Haryana	51.0
12	Himachal Pradesh	55.0
13	Jammu & Kashmir	57.0
14	Jharkhand	50.0
15	Karnataka	55.0
16	Kerala	56.0
17	Lakshadweep	48.0
18	Madhya Pradesh	52.0
19	Maharashtra	52.0
20	Manipur	56.0

9.Parties Promoting Young Candidates

```
bjp_count=0
inc_count=0
bsp_count=0
ind_count=0
total_bjp=0
total_inc=0
total_bsp=0
total_ind=0
for i in range (len(df2)):
  a=df2.iloc[i,8]
  p=df2.iloc[i,4]
  if p== 'BJP' :
    total_bjp=total_bjp + 1
  if a < 40 and p == 'BJP':
```

```
      bjp_count=bjp_count + 1

for i in range (len(df2)):
  a=df2.iloc[i,8]
  p=df2.iloc[i,4]
  if p== 'INC' :
    total_inc=total_inc + 1
  if a < 40 and p == 'INC':
    inc_count=inc_count + 1


for i in range (len(df2)):
  a=df2.iloc[i,8]
  p=df2.iloc[i,4]
  if p== 'BSP' :
    total_bsp=total_bsp + 1
  if a < 40 and p == 'BSP':
    bsp_count=bsp_count + 1


for i in range (len(df2)):
  a=df2.iloc[i,8]
  p=df2.iloc[i,4]
  if p== 'IND' :
    total_ind=total_ind + 1
  if a < 40 and p == 'IND':
    ind_count=ind_count + 1

consumption = ['BJP','INC','IND','BSP']
total=[total_bjp , total_inc , total_ind , total_bsp]
young= [bjp_count , inc_count , ind_count , bsp_count]
X_axis = np.arange(len(consumption))
plt.bar(X_axis - 0.2, total, 0.4, label = 'Total Candidates')
plt.bar(X_axis + 0.2, young, 0.4, label = 'Candidates below 40 age')
plt.xticks(X_axis, consumption)
plt.xlabel("Party Name")
plt.ylabel("Number of Candidates")
plt.title("Young Candidates in Loksabha Election 2019")
plt.legend()
plt.show()
```

10.General Profile of Candidates in National Parties

```
import io
df2 = pd.read_csv('Election_Data.csv')
df2.head()
```

	STATE	CONSTITUENCY	NAME	WINNER	PARTY	SYMBOL	GENDER	CRIMINAL\nCASES
0	Telangana	ADILABAD	SOYAM BAPU RAO	1	BJP	Lotus	MALE	52
1	Telangana	ADILABAD	Godam Nagesh	0	TRS	Car	MALE	0
2	Telangana	ADILABAD	RATHOD RAMESH	0	INC	Hand	MALE	3
3	Telangana	ADILABAD	NOTA	0	NOTA	NaN	NaN	NaN
4	Uttar Pradesh	AGRA	Satyapal Singh Baghel	1	BJP	Lotus	MALE	5

11.Test

```
df2.dropna(subset=["criminal"], inplace=True)
df2.head()
```

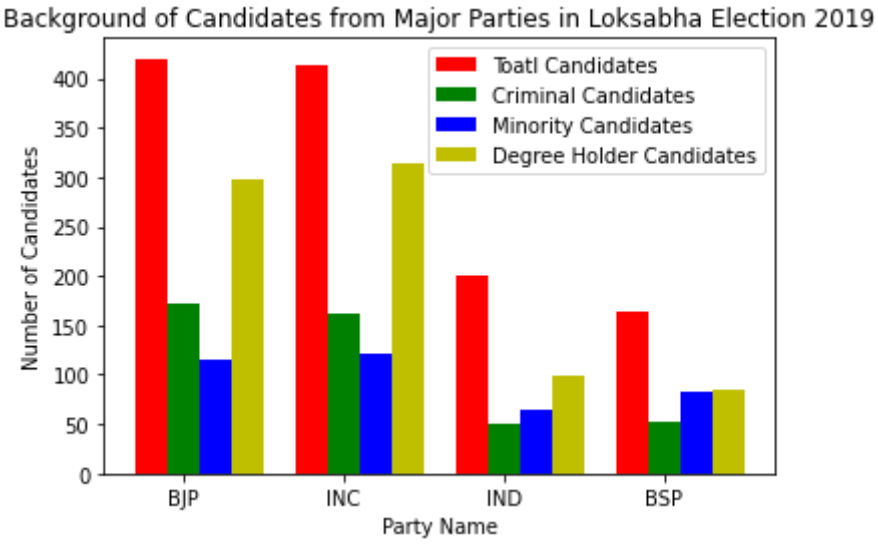
	STATE	CONSTITUENCY	NAME	WINNER	PARTY	SYMBOL	GENDER	criminal	A(
0	TELANGANA	ADILABAD	SOYAM BAPU RAO	1	BJP	Lotus	MALE	52.0	52
1	TELANGANA	ADILABAD	Godam Nagesh	0	TRS	Car	MALE	0.0	54

```
bjp_crim=0
inc_crim=0
bsp_crim=0
ind_crim=0
bjp_min=0
inc_min=0
bsp_min=0
ind_min=0
bjp_edu=0
inc_edu=0
bsp_edu=0
ind_edu=0

for i in range (len(df2)):
  a=df2.iloc[i,7]
  p=df2.iloc[i,4]
  b=df2.iloc[i,9]
  c=df2.iloc[i,10]
  if a > 0 and p == 'BJP':
    bjp_crim=bjp_crim + 1
  if a > 0 and p == 'INC':
    inc_crim=inc_crim + 1
  if a > 0 and p == 'BSP':
    bsp_crim=bsp_crim + 1
  if a > 0 and p == 'IND':
    ind_crim=ind_crim + 1
  if b != 'GENERAL' and p == 'BJP':
    bjp_min=bjp_min + 1
  if b != 'GENERAL' and p == 'INC':
    inc_min=inc_min + 1
  if b != 'GENERAL' and  p == 'BSP':
    bsp_min=bsp_min + 1
  if b != 'GENERAL' and p == 'IND':
    ind_min=ind_min + 1
  if c == 'Graduate' or  c == 'Post Graduate' or c == 'Graduate Professional' or c == 'Doc
    if p== 'BJP':
      bjp_edu=bjp_edu + 1
    elif p == 'INC':
      inc_edu=inc_edu + 1
    elif p == 'BSP':
      bsp_edu=bsp_edu + 1
```

```
        elif p == 'IND':
          ind_edu=ind_edu + 1
```

```
N = 4
ind = np.arange(N)
width = 0.2
total= [total_bjp , total_inc, total_ind , total_bsp]
bar1 = plt.bar(ind, total, width, color = 'r')
crim= [bjp_crim , inc_crim, ind_crim , bsp_crim]
bar2 = plt.bar(ind+width, crim, width, color = 'g')
min= [bjp_min , inc_min, ind_min , bsp_min]
bar3 = plt.bar(ind+width*2, min, width, color = 'b')
edu= [bjp_edu , inc_edu, ind_edu , bsp_edu]
bar4 = plt.bar(ind+width*3, edu, width, color = 'y')
plt.xlabel("Party Name")
plt.ylabel('Number of Candidates')
plt.title("Background of Candidates from Major Parties in Loksabha Election 2019")
plt.xticks(ind+width,['BJP', 'INC', 'IND', 'BSP'])
plt.legend( (bar1, bar2, bar3, bar4), ('Toatl Candidates', 'Criminal Candidates', 'Minorit
plt.show()
```



✓ 0s completed at 10:26 PM