Step 1 Importing Libraries

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import plotly.express as px
import seaborn as sns
sns.set()
import scipy
from sklearn.preprocessing import LabelEncoder
from sklearn.preprocessing import StandardScaler
from scipy.cluster.hierarchy import dendrogram, linkage
import plotly.graph_objs as go
from plotly.offline import init_notebook_mode, iplot
from sklearn.decomposition import PCA
from sklearn.metrics.pairwise import cosine_similarity
```

Step 2 Reading data file into a python data frame

```
data = pd.read_csv('/content/india-districts-census-2011.csv')
data.head(5)
```

	District code	State name	District name	Population	Male	Female	Literate	Male_Literate	Female_Literate	SC	...	Power_Parity_Rs_S
0	1	JAMMU AND KASHMIR	Kupwara	870354	474190	396164	439654	282823	156831	1048	...	
1	2	JAMMU AND KASHMIR	Badgam	753745	398041	355704	335649	207741	127908	368	...	
2	3	JAMMU AND KASHMIR	Leh(Ladakh)	133487	78971	54516	93770	62834	30936	488	...	
3	4	JAMMU AND KASHMIR	Kargil	140802	77785	63017	86236	56301	29935	18	...	
4	5	JAMMU AND KASHMIR	Punch	476835	251899	224936	261724	163333	98391	556	...	

5 rows × 118 columns

Step 3 Statistical Summary

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 640 entries, 0 to 639
Columns: 118 entries, District code to Total_Power_Parity
dtypes: int64(116), object(2)
memory usage: 590.1+ KB
```

```
data.describe().round(2)
```

	District code	Population	Male	Female	Literate	Male_Literate	Female_Literate	SC	Male_SC	Female_SC	.
count	640.00	640.00	640.00	640.00	640.00	640.00	640.00	640.00	640.00	640.00	
mean	320.50	1891960.90	973859.78	918101.12	1193185.64	679318.16	513867.48	314653.71	161773.93	152879.78	
std	184.90	1544380.29	800778.52	744986.39	1068582.63	592414.36	480181.61	312981.76	161121.56	152033.63	
min	1.00	8004.00	4414.00	3590.00	4436.00	2614.00	1822.00	0.00	0.00	0.00	
25%	160.75	817861.00	417168.25	401745.75	482598.25	276436.50	200892.00	83208.50	42307.00	42671.75	
50%	320.50	1557367.00	798681.50	758920.00	957346.50	548352.50	403859.00	246016.00	125548.50	117855.00	
75%	480.25	2583551.25	1338604.50	1264276.75	1602260.25	918858.25	664155.00	447707.75	228460.25	214050.25	
max	640.00	11060148.00	5865078.00	5195070.00	8227161.00	4591396.00	3635765.00	2464032.00	1266504.00	1197528.00	

8 rows × 116 columns

Step 4 Checking for null values

```
data.isnull().sum()
```

```
District code                   0
State name                      0
District name                   0
Population                      0
Male                            0
                               ..
Power_Parity_Rs_330000_425000    0
Power_Parity_Rs_425000_545000    0
Power_Parity_Rs_330000_545000    0
Power_Parity_Above_Rs_545000     0
Total_Power_Parity               0
Length: 118, dtype: int64
```

There are no null values so carrying forword with our analysis.

Step 5 Dumping unwanted columns

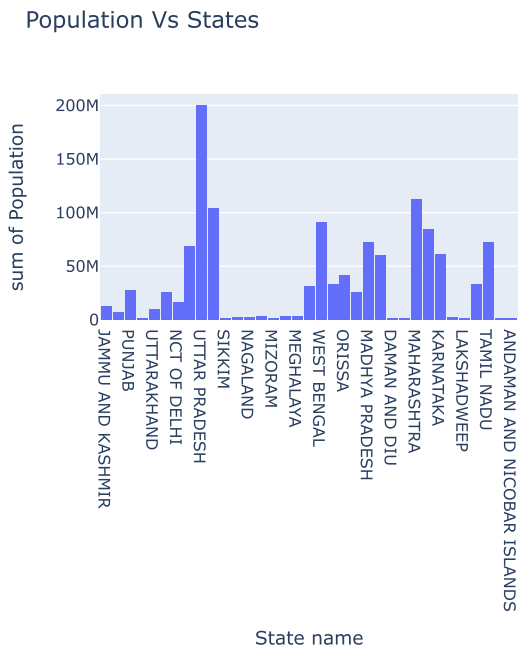
```
data.drop(['SC','Male_SC','Female_SC','ST','Male_ST','Female_ST','Male_Workers','Female_Workers','Hindus','Muslims','Christians','Sikh
                       ,'Housholds_with_Electric_Lighting'], axis=1, inplace= True)
```

```
data.columns
```

```
Index(['District code', 'State name', 'District name', 'Population', 'Male',
       'Female', 'Literate', 'Male_Literate', 'Female_Literate', 'Workers',
       'Main_Workers', 'Marginal_Workers', 'Non_Workers', 'Cultivator_Workers',
       'Agricultural_Workers', 'Household_Workers', 'Other_Workers',
       'Households_with_Internet', 'Households_with_Computer',
       'Rural_Households', 'Urban_Households', 'Households',
       'Below_Primary_Education', 'Primary_Education', 'Middle_Education',
       'Secondary_Education', 'Higher_Education', 'Graduate_Education',
       'Other_Education', 'Literate_Education', 'Illiterate_Education',
       'Total_Education', 'Age_Group_0_29', 'Age_Group_30_49', 'Age_Group_50',
       'Age not stated', 'Power_Parity_Less_than_Rs_45000',
       'Power_Parity_Rs_45000_90000', 'Power_Parity_Rs_90000_150000',
       'Power_Parity_Rs_45000_150000', 'Power_Parity_Rs_150000_240000',
       'Power_Parity_Rs_240000_330000', 'Power_Parity_Rs_150000_330000',
       'Power_Parity_Rs_330000_425000', 'Power_Parity_Rs_425000_545000',
       'Power_Parity_Rs_330000_545000', 'Power_Parity_Above_Rs_545000',
       'Total_Power_Parity'],
      dtype='object')
```

Step 6 Exploring for insights at State level

```
fig = px.histogram(data,
                   x="State name",
                   y = "Population",
                   title='Population Vs States')
fig.update_layout(bargap=0.1)
fig.show()
```



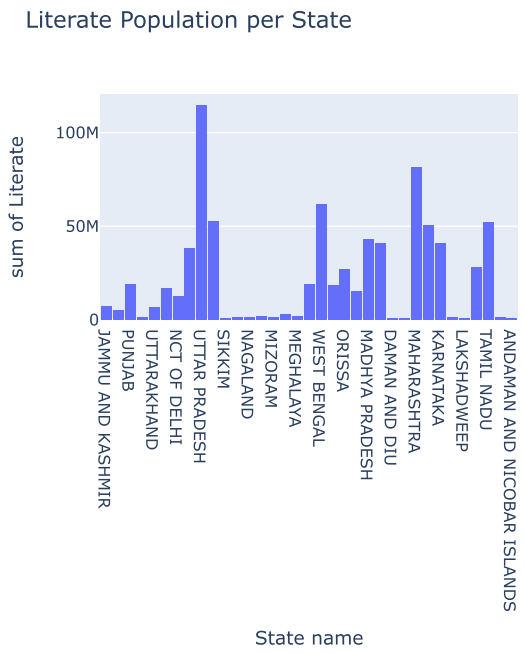
So there are many states which can be selected for our start up to launch their services in solely based on population count.

Most likely more business will be generssated from states like :

- Rajasthan
- Uttarpradesh
- Bihar
- West Bengal
- Madhya Pradesh
- Gujarat
- Maharastra
- Andhar Pradesh
- Karnataka
- Tamil Nadu

Note :- These are states with population greater than 50 Millions and this does not visualize whole scenario it is just a speculation based on Total population count of the above given states. Now, let's explore number of literate people residing in every state as literacy rate is directly Corrolated by regular medical check ups.

```
fig = px. histogram(data,
                    x = "State name",
                    y = "Literate",
                    title = "Literate Population per State")
fig.update_layout(bargap = 0.1)
fig.show()
```



Step 7 Exploring for Insights at District level

Firstly, we are going to make separate data frame for data of above listed states

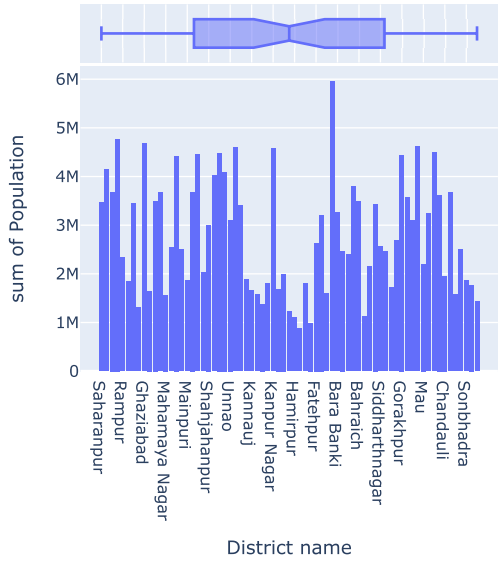
```
NCT_of_Delhi = data[data['State name'] == "NCT OF DELHI"]
Uttar_Pradesh = data[data['State name'] == "UTTAR PRADESH"]
West_Bengal = data[data['State name'] == "WEST BENGAL"]
Gujarat = data[data['State name'] == "GUJARAT"]
Maharashtra = data[data['State name'] == "MAHARASHTRA"]
Andra_Pradesh = data[data['State name'] == "ANDRA PRADESH"]
Karnataka = data[data['State name'] == "KARNATAKA"]
Kerala = data[data['State name'] == "KERALA"]
Tamil_Nadu = data[data['State name'] == "TAMIL NADU"]
```

It will be a very tedious task to write code for each and every state vise dataframes that we made recently. So we are going to define a function for that purpose.

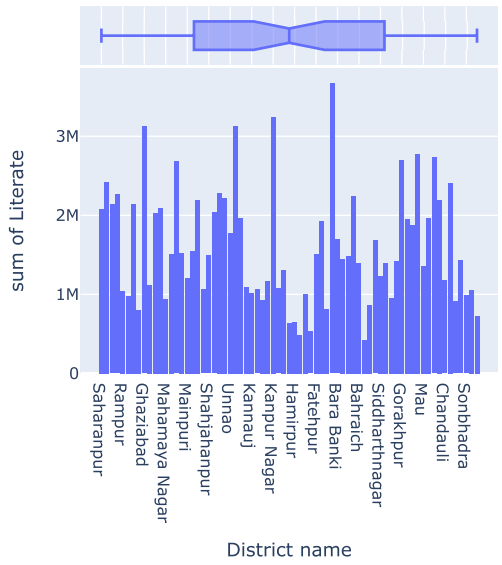
```
def Explore_districts_of(state):
    fig = px.histogram(state,
                       marginal = 'box',
                       x="District name",
                       y = "Population",
                       title='Population Vs Districts')
    fig.update_layout(bargap=0.1)
    fig.show()

    fig = px.histogram(state,
                       marginal = 'box',
                       x="District name",
                       y = "Literate",
                       title='Number of Literate Vs Districts')
    fig.update_layout(bargap=0.1)
    fig.show()

    fig = px.histogram(state,
                      marginal = 'box',
                      x = "District name",
                      y = "Households_with_Internet",
                      title = "Households with Internet in every District")
    fig.show()
```

```
Explore_districts_of(Uttar_Pradesh)
```

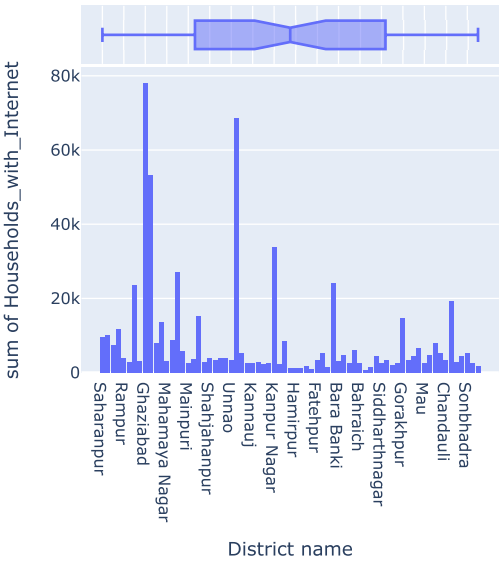
Population Vs Districts



Number of Literate Vs Districts



Households with Internet in every District



Step 8 Gathering Insights for few selected states

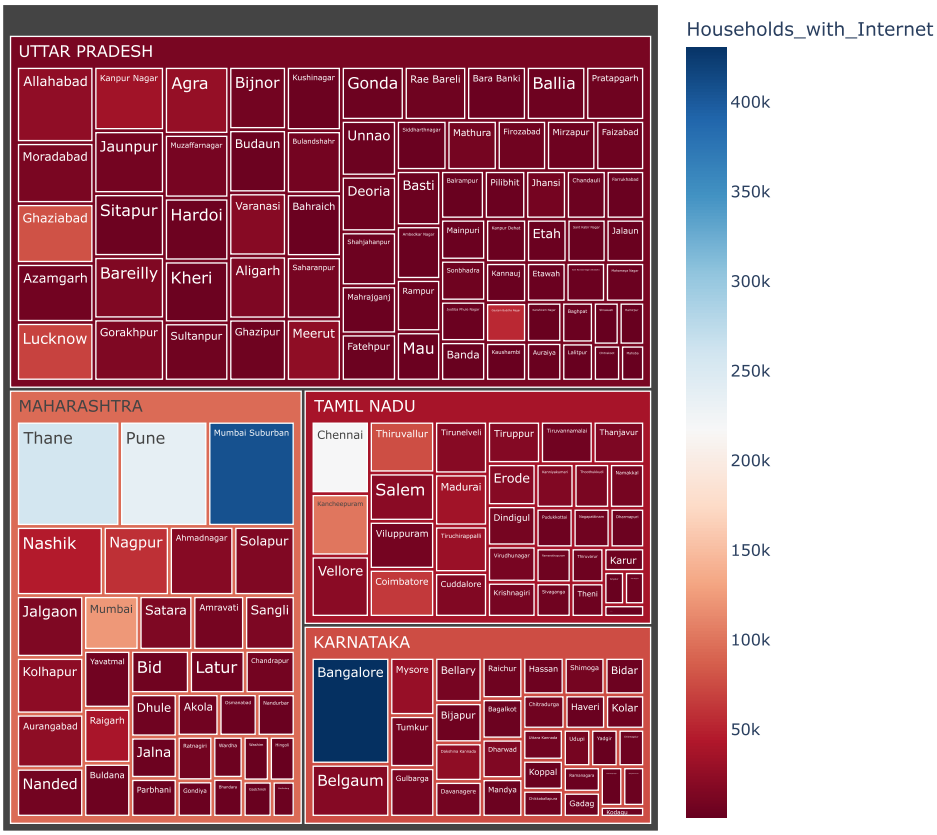
```
Selected_States = pd.concat([Uttar_Pradesh, Maharashtra, Tamil_Nadu, Karnataka], axis=0)
Selected_States
```

	District code	State name	District name	Population	Male	Female	Literate	Male_Literate	Female_Literate	Workers	...	Powe
131	132	UTTAR PRADESH	Saharanpur	3466382	1834106	1632276	2077108	1220114	856994	1037344	...	
132	133	UTTAR PRADESH	Muzaffarnagar	4143512	2193434	1950078	2417339	1448528	968811	1291644	...	
133	134	UTTAR PRADESH	Bijnor	3682713	1921215	1761498	2135393	1241471	893922	1088036	...	
134	135	UTTAR PRADESH	Moradabad	4772006	2503186	2268820	2263848	1357435	906413	1417811	...	
135	136	UTTAR PRADESH	Rampur	2335819	1223889	1111930	1043666	630408	413258	737261	...	
...	...	...	...	...	...	...	...	...	...	...	...	
579	580	KARNATAKA	Yadgir	1174271	590329	583942	510003	306751	203252	547696	...	
580	581	KARNATAKA	Kolar	1536401	776396	760005	1016219	564110	452109	717872	...	
581	582	KARNATAKA	Chikkaballapura	1255104	636437	618667	783222	442158	341064	639778	...	
582	583	KARNATAKA	Bangalore Rural	990923	509172	481751	688749	385311	303438	459891	...	
583	584	KARNATAKA	Ramanagara	1082636	548008	534628	674758	378461	296297	531459	...	

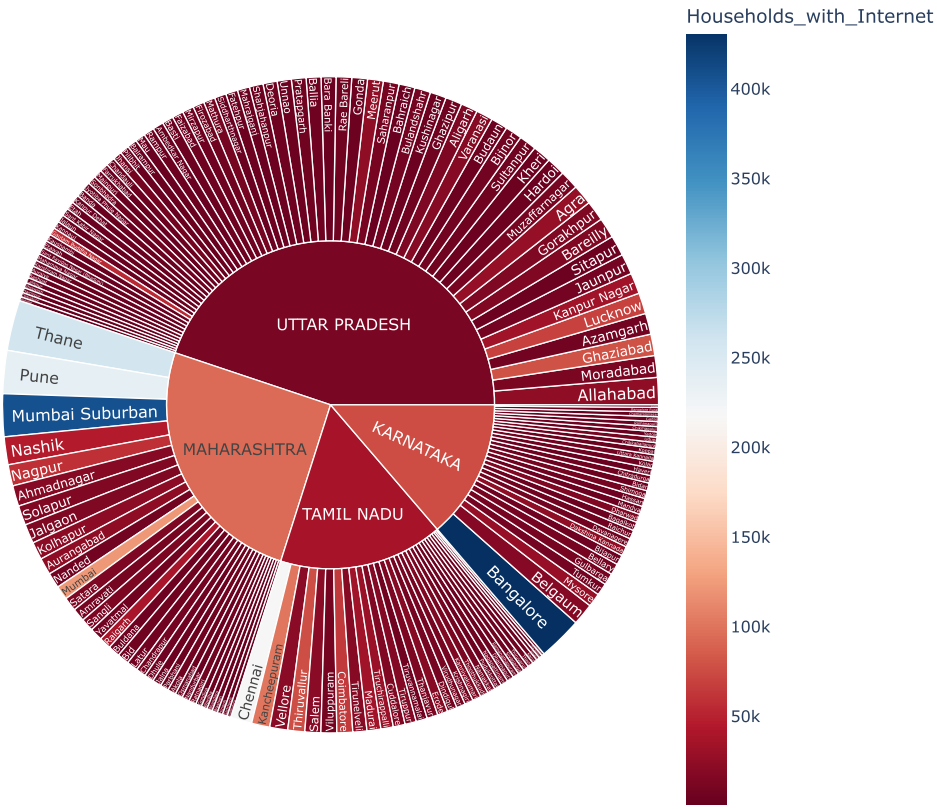
168 rows × 48 columns

```
fig = px.treemap(Selected_States,
                 path=['State name','District name'],
                 values='Population',
                 color='Households_with_Internet',
                 color_continuous_scale='RdBu',
                title = 'Finding out best Market')
fig.update_layout(bargap=1,autosize=False,
    width=800,
    height=800,)
fig.show()

fig = px.sunburst(Selected_States,
                 path=['State name','District name'],
                 values='Population',
                 color='Households_with_Internet',
                 color_continuous_scale='RdBu',
                title = 'Finding out best Market')
fig.update_layout(
    autosize=False,
    width=800,
    height=800)
fig.show()
```

Finding out best Market



Finding out best Market



larger the portion of district in above visuals shows larger total population and color inclination towards darker shades of blue means larger number of households with internet connection. So it seems there are five districts that looks like promising greater business opportunity for us. especially three of which are in Maharashtra.

Step 9 Recommendations based on our EDA

- Our company should encorrporate some advance data collection methods like foccus groups and mass public surveys to this states and specially to the states corresponding to five districts that show great promise of business gains.public surveys can be conducted online too by giving out incentives or discounts to customers that take part in it. By doing so we are also finalizing our customer base by marketing and also collecting data that can be used to create pyschographic profiles of the participants which will give us enough understanding of the local community, their values and their attitude towards online health services.
- This type of data collection needs to be done at a large scale to get rid of bias which is a very dangerous for our analysis.
- My personal judgement leans towards Maharashtran market as this state has more districts that are attractivve for our profits but also has quality population which has internet services and higher literacy rates.
- Marketing department should first penetrate larger cities which has denser population because more the density of population faster will be the word of mouth marketing like a wildfire spreading across dense forest.
- After establishing concrete business there we should move towards cities with lesser public and then towards the rural areas as rural segment is very hard to deal with for many reasons like providing fast customer service is very challenging, inventory storage in near by areas is very costly and also possibility of people adopting this change of online healthcare services is very less to allocate our resources to.

```
Selected_States.drop(['Power_Parity_Less_than_Rs_45000','Power_Parity_Rs_45000_90000','Power_Parity_Rs_90000_150000','Power_Parity_Rs_
Selected_States.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 168 entries, 131 to 583
Data columns (total 16 columns):
 #   Column                    Non-Null Count  Dtype 
---  ------                    --------------  ----- 
 0   District code             168 non-null    int64 
 1   State name                168 non-null    object
 2   District name             168 non-null    object
 3   Population                168 non-null    int64 
 4   Male                      168 non-null    int64 
 5   Female                    168 non-null    int64 
 6   Literate                  168 non-null    int64 
 7   Households_with_Internet  168 non-null    int64 
 8   Households_with_Computer  168 non-null    int64 
 9   Rural_Households          168 non-null    int64 
 10  Urban_Households          168 non-null    int64 
 11  Households                168 non-null    int64 
 12  Age_Group_0_29            168 non-null    int64 
 13  Age_Group_30_49           168 non-null    int64 
 14  Age_Group_50              168 non-null    int64 
 15  Age not stated            168 non-null    int64 
dtypes: int64(14), object(2)
memory usage: 22.3+ KB
```

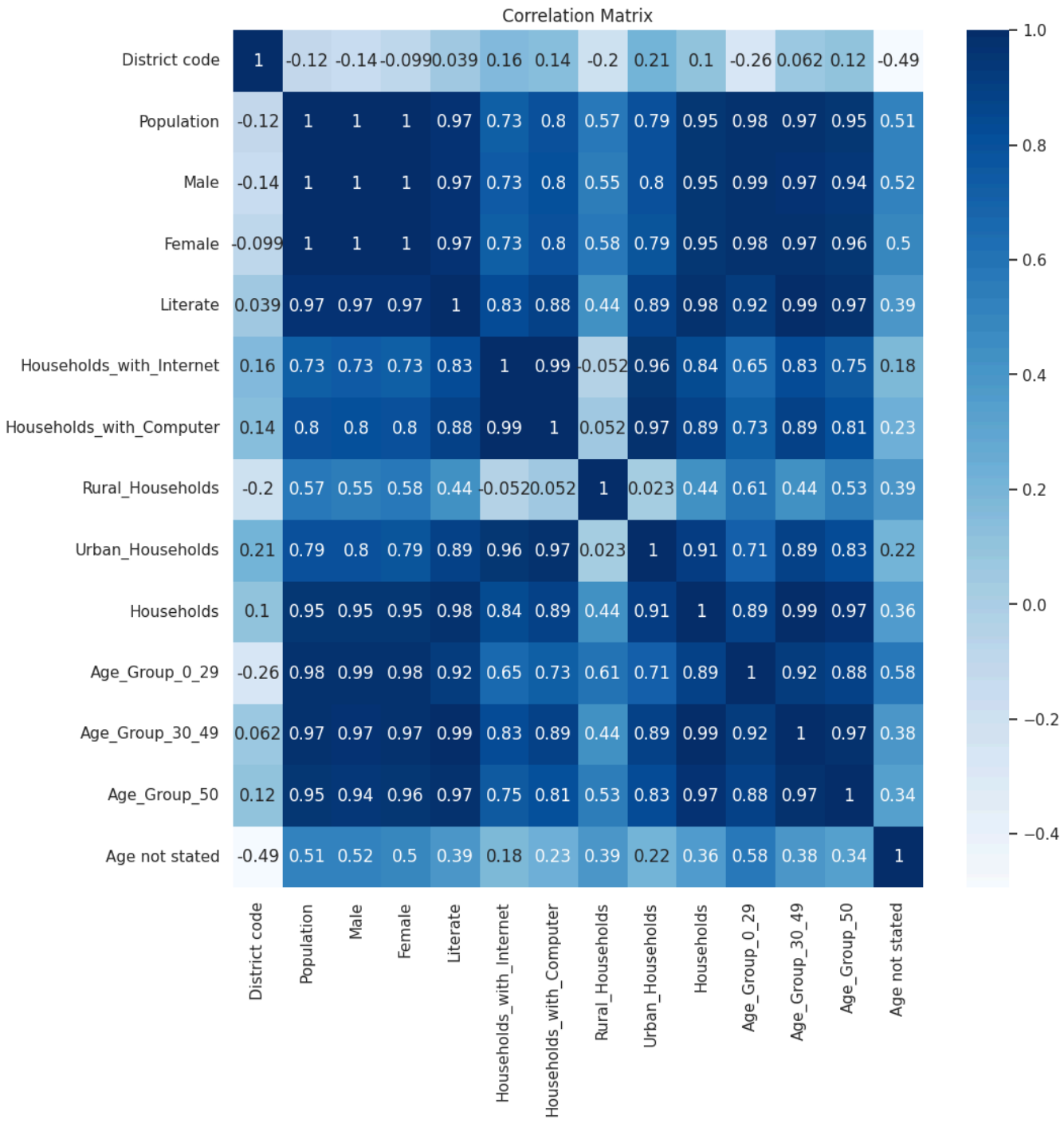
```
Selected_States.corr()
```

```
<ipython-input-163-15cfe9aa2c44>:1: FutureWarning:

The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid
```

	District code	Population	Male	Female	Literate	Households_with_Internet	Households_with_Computer	F
District code	1.000000	-0.121331	-0.141542	-0.098584	0.038961	0.159186	0.142389	
Population	-0.121331	1.000000	0.999066	0.998844	0.969780	0.731503	0.800683	
Male	-0.141542	0.999066	1.000000	0.995832	0.966991	0.734823	0.802280	
Female	-0.098584	0.998844	0.995832	1.000000	0.970752	0.726202	0.797149	
Literate	0.038961	0.969780	0.966991	0.970752	1.000000	0.826475	0.882609	
Households_with_Internet	0.159186	0.731503	0.734823	0.726202	0.826475	1.000000	0.989140	
Households_with_Computer	0.142389	0.800683	0.802280	0.797149	0.882609	0.989140	1.000000	
Rural_Households	-0.204762	0.567404	0.554203	0.580840	0.440882	-0.051928	0.051724	
Urban_Households	0.209499	0.794356	0.797215	0.789432	0.887783	0.958281	0.972786	
Households	0.101705	0.951945	0.948948	0.953189	0.982464	0.838044	0.894741	
Age_Group_0_29	-0.260047	0.984909	0.986749	0.980700	0.918900	0.652522	0.726316	
Age_Group_30_49	0.061744	0.972116	0.969173	0.973254	0.992420	0.827668	0.885342	
Age_Group_50	0.119018	0.948381	0.940003	0.955617	0.973885	0.752498	0.813343	
Age not stated	-0.493138	0.509430	0.520352	0.496164	0.385775	0.181041	0.227474	

```
plt.figure(figsize=(11,11))
sns.heatmap(Selected_States.corr(), cmap='Blues', annot=True)
plt.title('Correlation Matrix')
```

```
<ipython-input-164-847717f52760>:2: FutureWarning:

The default value of numeric_only in DataFrame.corr is deprecated. In a future version, it will default to False. Select only valid
```

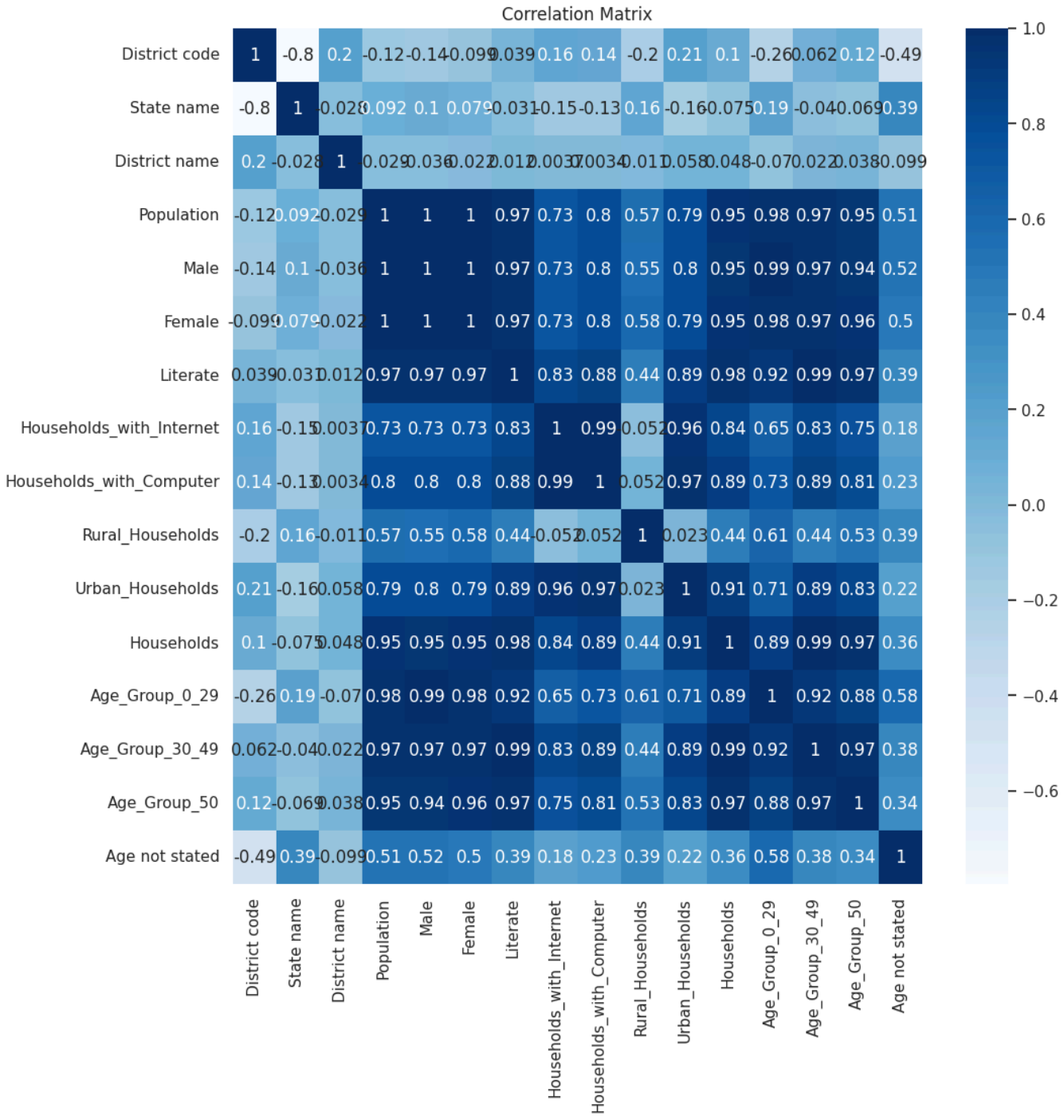



```
LB = LabelEncoder()
```

```
Selected_States['State name'] = LB.fit_transform(Selected_States['State name'])
Selected_States['District name'] = LB.fit_transform(Selected_States['District name'])
advance_data = Selected_States
scaler = StandardScaler()
segmentation_std = scaler.fit_transform(advance_data)
segmentation_std = pd.DataFrame(segmentation_std,columns=advance_data.columns)
advance_data.corr()
```

	District code	State name	District name	Population	Male	Female	Literate	Households_with_Internet	Househ
District code	1.000000	-0.795655	0.203548	-0.121331	-0.141542	-0.098584	0.038961	0.159186	
State name	-0.795655	1.000000	-0.027725	0.092411	0.104025	0.079290	-0.031222	-0.145091	
District name	0.203548	-0.027725	1.000000	-0.029396	-0.035803	-0.022206	0.012210	0.003727	
Population	-0.121331	0.092411	-0.029396	1.000000	0.999066	0.998844	0.969780	0.731503	
Male	-0.141542	0.104025	-0.035803	0.999066	1.000000	0.995832	0.966991	0.734823	
Female	-0.098584	0.079290	-0.022206	0.998844	0.995832	1.000000	0.970752	0.726202	
Literate	0.038961	-0.031222	0.012210	0.969780	0.966991	0.970752	1.000000	0.826475	
Households_with_Internet	0.159186	-0.145091	0.003727	0.731503	0.734823	0.726202	0.826475	1.000000	
Households_with_Computer	0.142389	-0.132109	0.003445	0.800683	0.802280	0.797149	0.882609	0.989140	
Rural_Households	-0.204762	0.163939	-0.011346	0.567404	0.554203	0.580840	0.440882	-0.051928	
Urban_Households	0.209499	-0.161085	0.058343	0.794356	0.797215	0.789432	0.887783	0.958281	
Households	0.101705	-0.075464	0.047573	0.951945	0.948948	0.953189	0.982464	0.838044	
Age_Group_0_29	-0.260047	0.188273	-0.069565	0.984909	0.986749	0.980700	0.918900	0.652522	
Age_Group_30_49	0.061744	-0.039677	0.022360	0.972116	0.969173	0.973254	0.992420	0.827668	
Age_Group_50	0.119018	-0.068558	0.038497	0.948381	0.940003	0.955617	0.973885	0.752498	
Age not stated	-0.493138	0.391986	-0.098979	0.509430	0.520352	0.496164	0.385775	0.181041	

```
plt.figure(figsize=(11,11))
sns.heatmap(advance_data.corr(), cmap='Blues', annot=True)
plt.title('Correlation Matrix')
```




```
segmentation_std= pd.DataFrame(segmentation_std)
print(segmentation_std.max())
```

```
District code               1.179951
State name                  0.992915
District name               1.721771
Population                  5.202932
Male                        5.278704
Female                      5.107227
Literate                    5.424253
Households_with_Internet    7.381445
Households_with_Computer    7.382053
Rural_Households            3.433510
Urban_Households            6.289856
Households                  5.833210
Age_Group_0_29              4.936360
Age_Group_30_49             5.685461
Age_Group_50                4.571477
Age not stated              4.137599
dtype: float64
```

```
X1 = segmentation_std.loc[:, ["Population","Literate"]].values

from sklearn.cluster import KMeans
wcss = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, init='k-means++')
    kmeans.fit(X1)
    wcss.append(kmeans.inertia_)
plt.figure(figsize=(15,7))
plt.grid()
plt.plot(range(1,11),wcss, linewidth=2, color='red', marker="8")
plt.xlabel('k Value')
plt.ylabel('WCSS')

plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning

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```
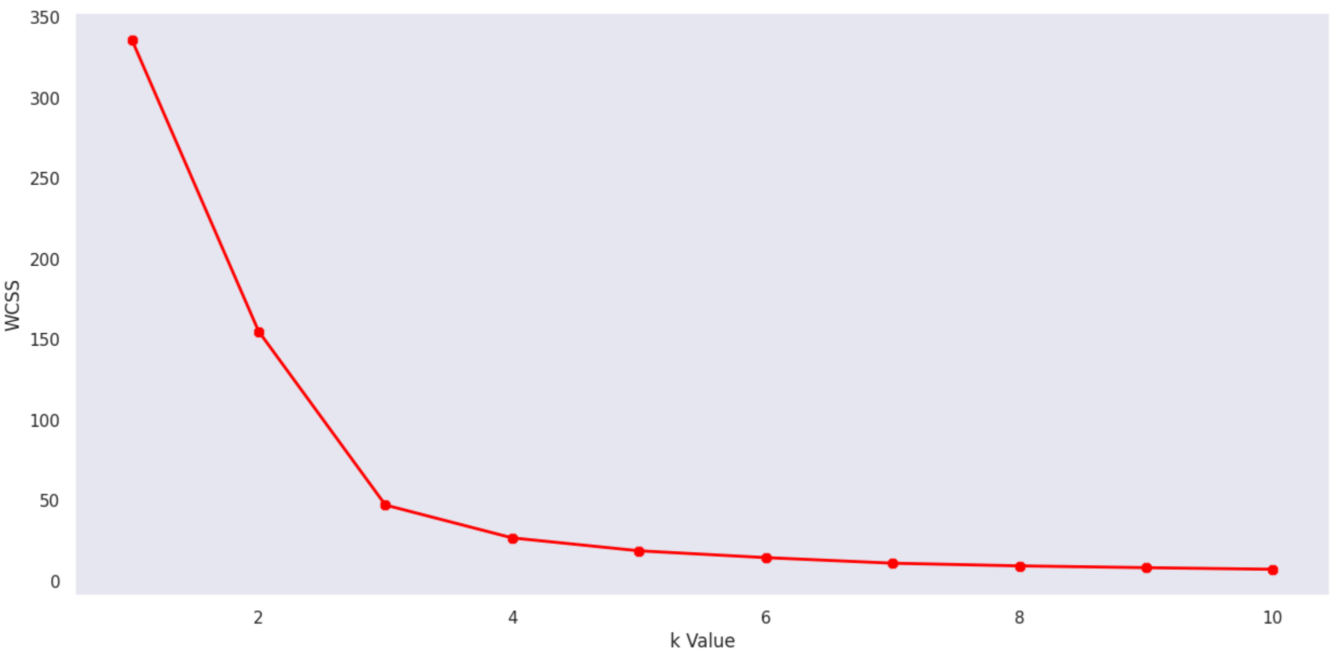



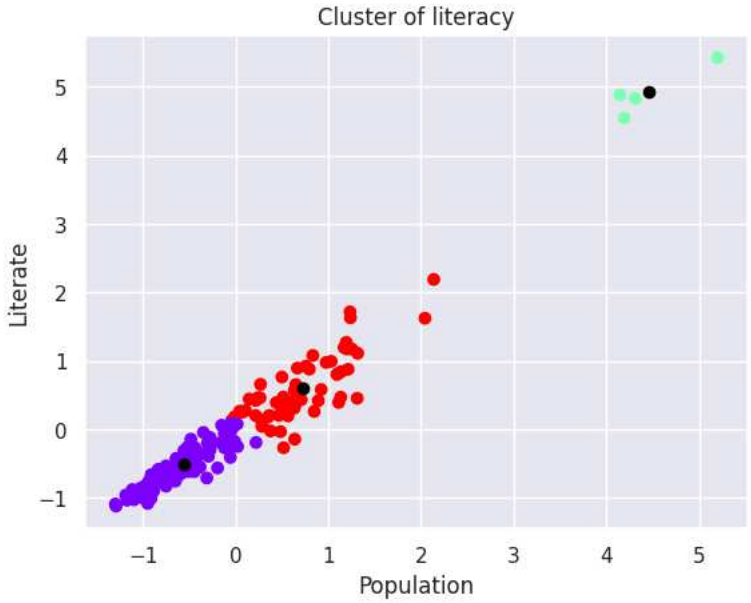

```python
kmeans = KMeans(n_clusters= 3)
label = kmeans.fit_predict(X1)
# print(label)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
```

```python
print(kmeans.cluster_centers_)
```

```
[[-0.56327527 -0.51218995]
 [ 4.46468283  4.91976113]
 [ 0.72152495  0.59677741]]
```

```
plt.scatter(X1[:,0], X1[:,1], c=kmeans.labels_,cmap= 'rainbow')
plt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], color='black')
plt.title('Cluster of literacy')
plt.xlabel('Population')
plt.ylabel('Literate')
plt.show()
```




```
X1 = segmentation_std.loc[:, ["Households_with_Internet","Literate"]].values

from sklearn.cluster import KMeans
wcss = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, init='k-means++')
    kmeans.fit(X1)
    wcss.append(kmeans.inertia_)
plt.figure(figsize=(15,7))
plt.grid()
plt.plot(range(1,11),wcss, linewidth=2, color='red', marker="8")
plt.xlabel('k Value')
plt.ylabel('WCSS')

plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

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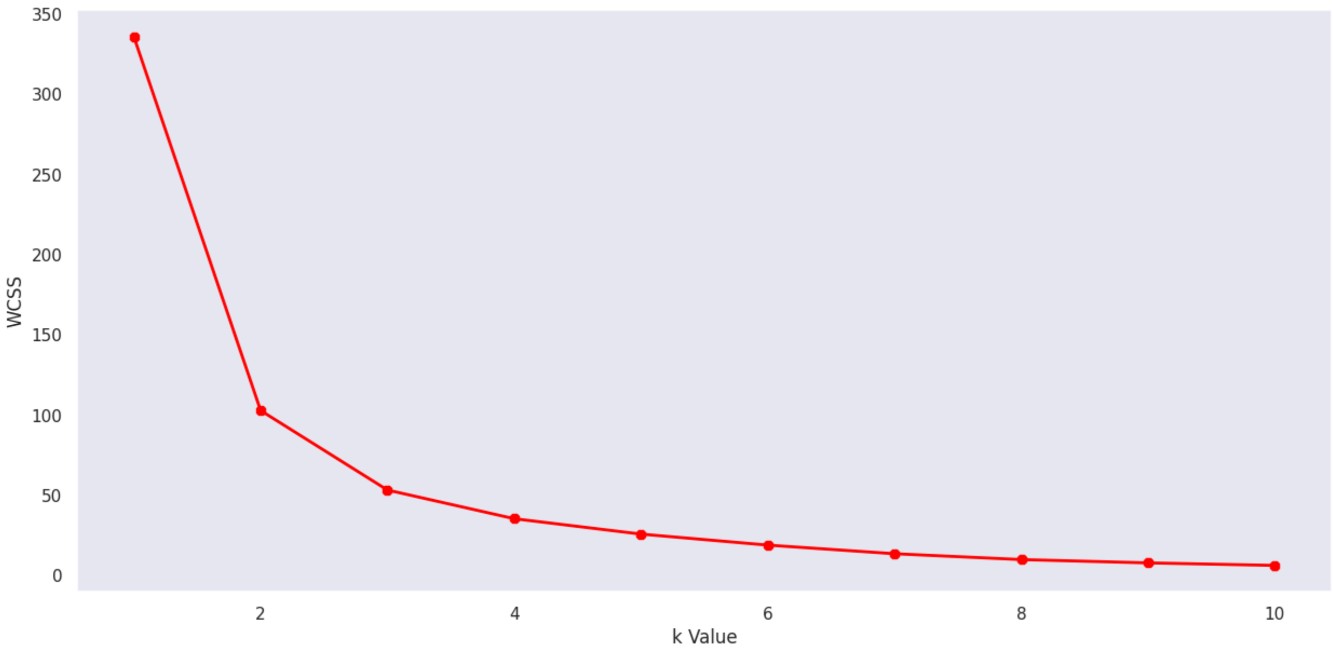

```
X1 = segmentation_std.loc[:, ["Households_with_Internet","Literate"]].values

from sklearn.cluster import KMeans
wcss = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, init='k-means++')
    kmeans.fit(X1)
    wcss.append(kmeans.inertia_)
plt.figure(figsize=(15,7))
plt.grid()
plt.plot(range(1,11),wcss, linewidth=2, color='red', marker="8")
plt.xlabel('k Value')
plt.ylabel('WCSS')

plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

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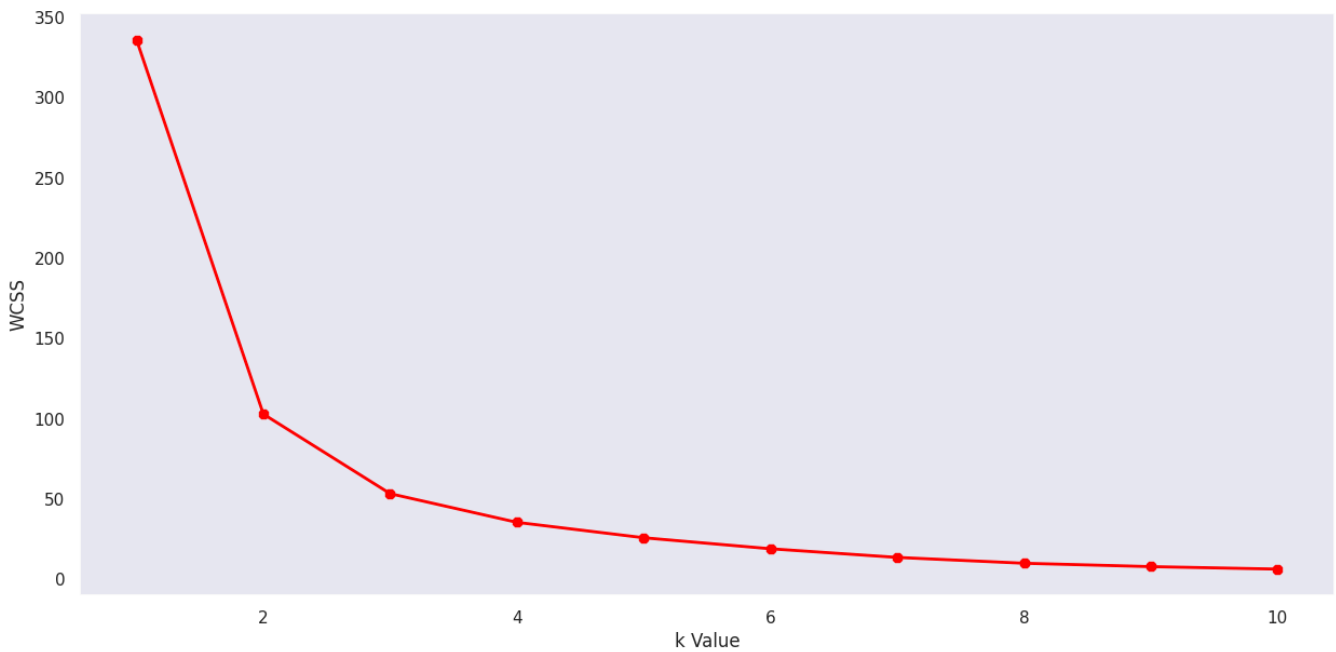


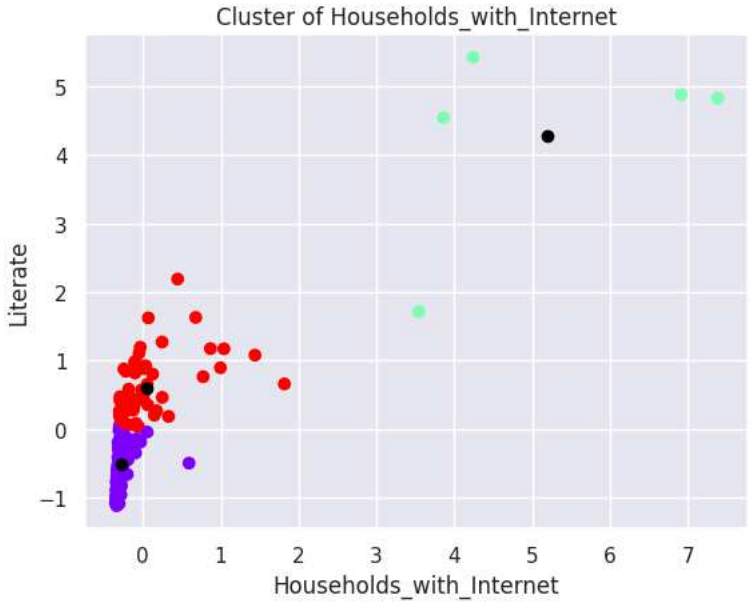

```
kmeans = KMeans(n_clusters= 3)
label = kmeans.fit_predict(X1)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
```

```
print(kmeans.cluster_centers_)
plt.scatter(X1[:,0], X1[:,1], c=kmeans.labels_,cmap= 'rainbow')
plt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], color='black')
plt.title('Cluster of Households_with_Internet')
plt.xlabel('Households_with_Internet')
plt.ylabel('Literate')
plt.show()
```

```
[[-0.27097743 -0.51980044]
 [ 5.18770938  4.27897896]
 [ 0.04886071  0.5912974 ]]
```




```
X1 = segmentation_std.loc[:, ["Urban_Households","Households_with_Computer"]].values

from sklearn.cluster import KMeans
wcss = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, init='k-means++')
    kmeans.fit(X1)
    wcss.append(kmeans.inertia_)
plt.figure(figsize=(15,7))
plt.grid()
plt.plot(range(1,11),wcss, linewidth=2, color='red', marker="8")
plt.xlabel('k Value')
plt.ylabel('WCSS')

plt.show()
```

```
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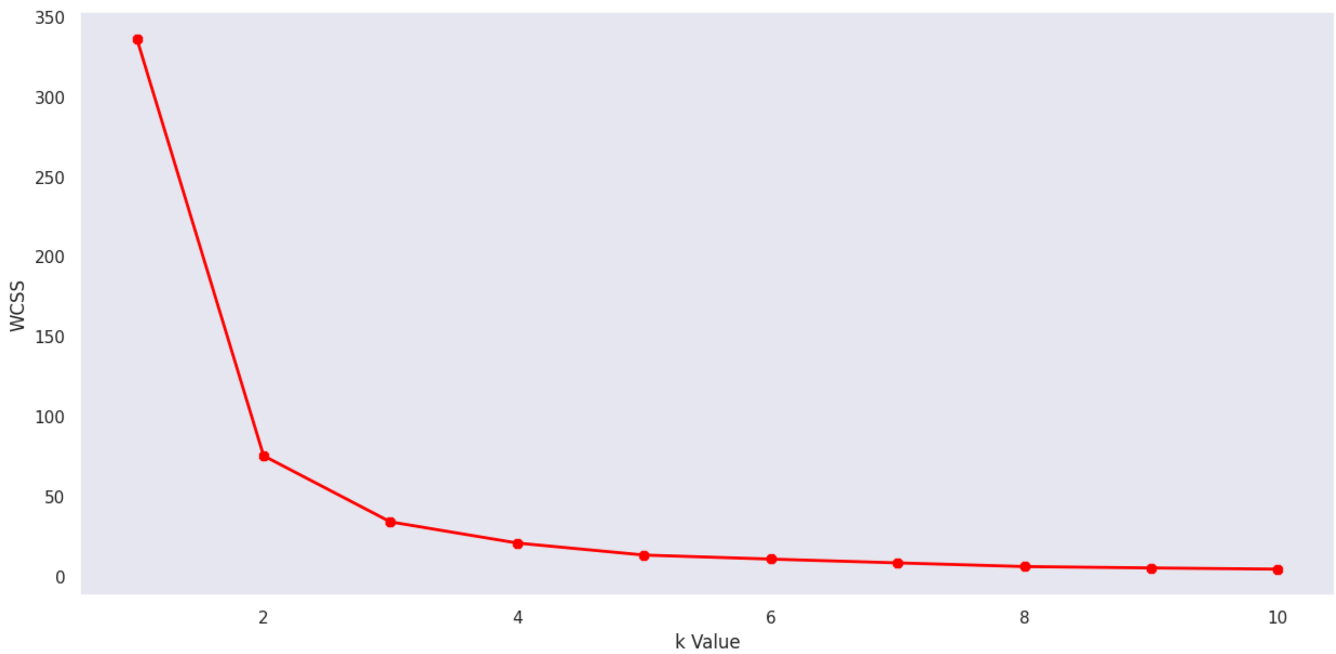
```

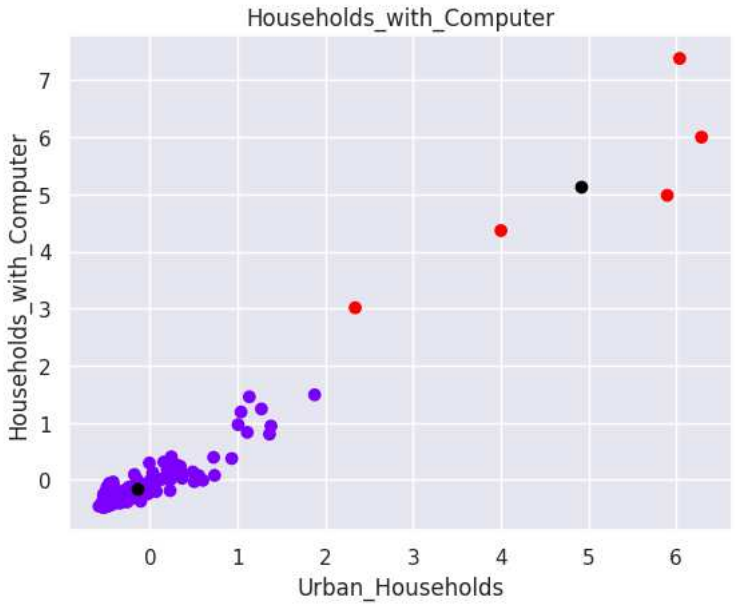



```
kmeans = KMeans(n_clusters= 2)
label = kmeans.fit_predict(X1)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
```

```
plt.scatter(X1[:,0], X1[:,1], c=kmeans.labels_,cmap= 'rainbow')
plt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], color='black')
plt.title('Households_with_Computer')
plt.xlabel('Urban_Households')
plt.ylabel('Households_with_Computer')
plt.show()
```




```
X1 = segmentation_std.loc[:, ["Age_Group_0_29","Literate"]].values

from sklearn.cluster import KMeans
wcss = []
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, init='k-means++')
    kmeans.fit(X1)
    wcss.append(kmeans.inertia_)
plt.figure(figsize=(15,7))
plt.grid()
plt.plot(range(1,11),wcss, linewidth=2, color='red', marker="8")
plt.xlabel('k Value')
plt.ylabel('WCSS')

plt.show()
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

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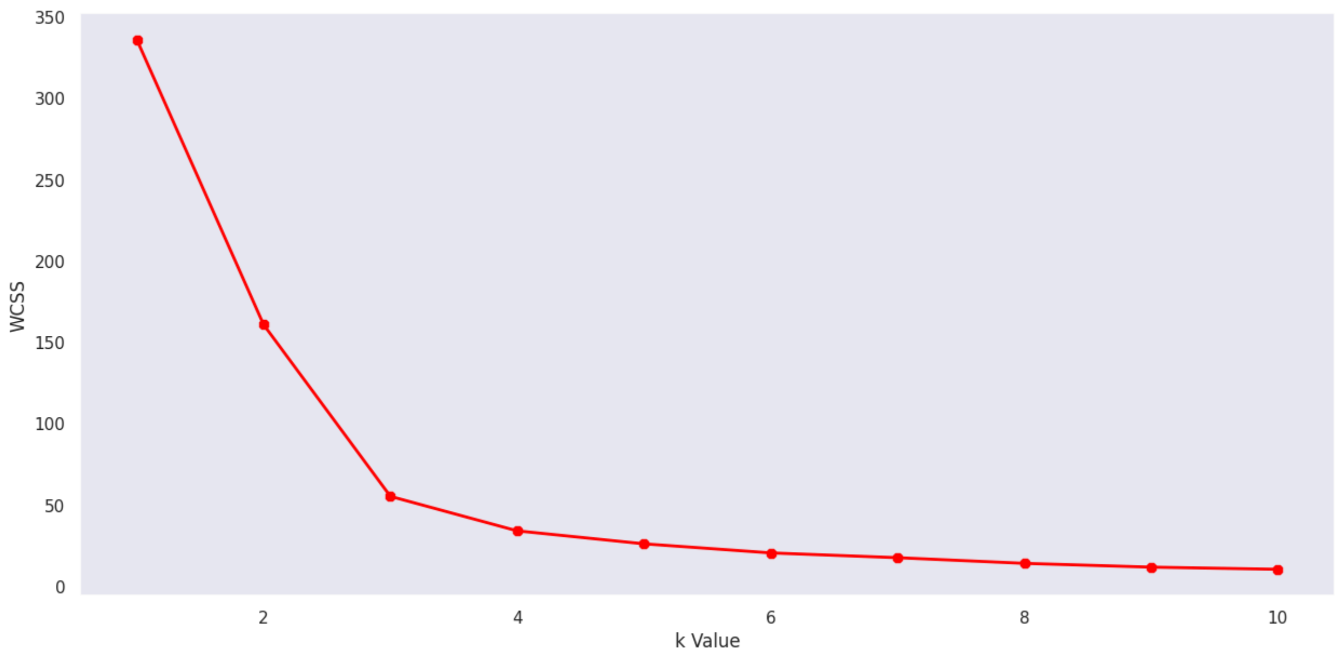
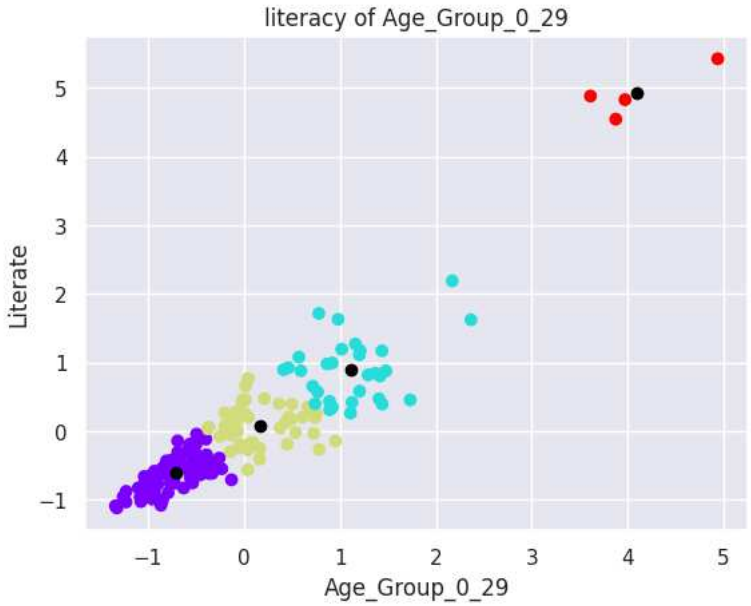



```python
kmeans = KMeans(n_clusters= 4)
label = kmeans.fit_predict(X1)
```

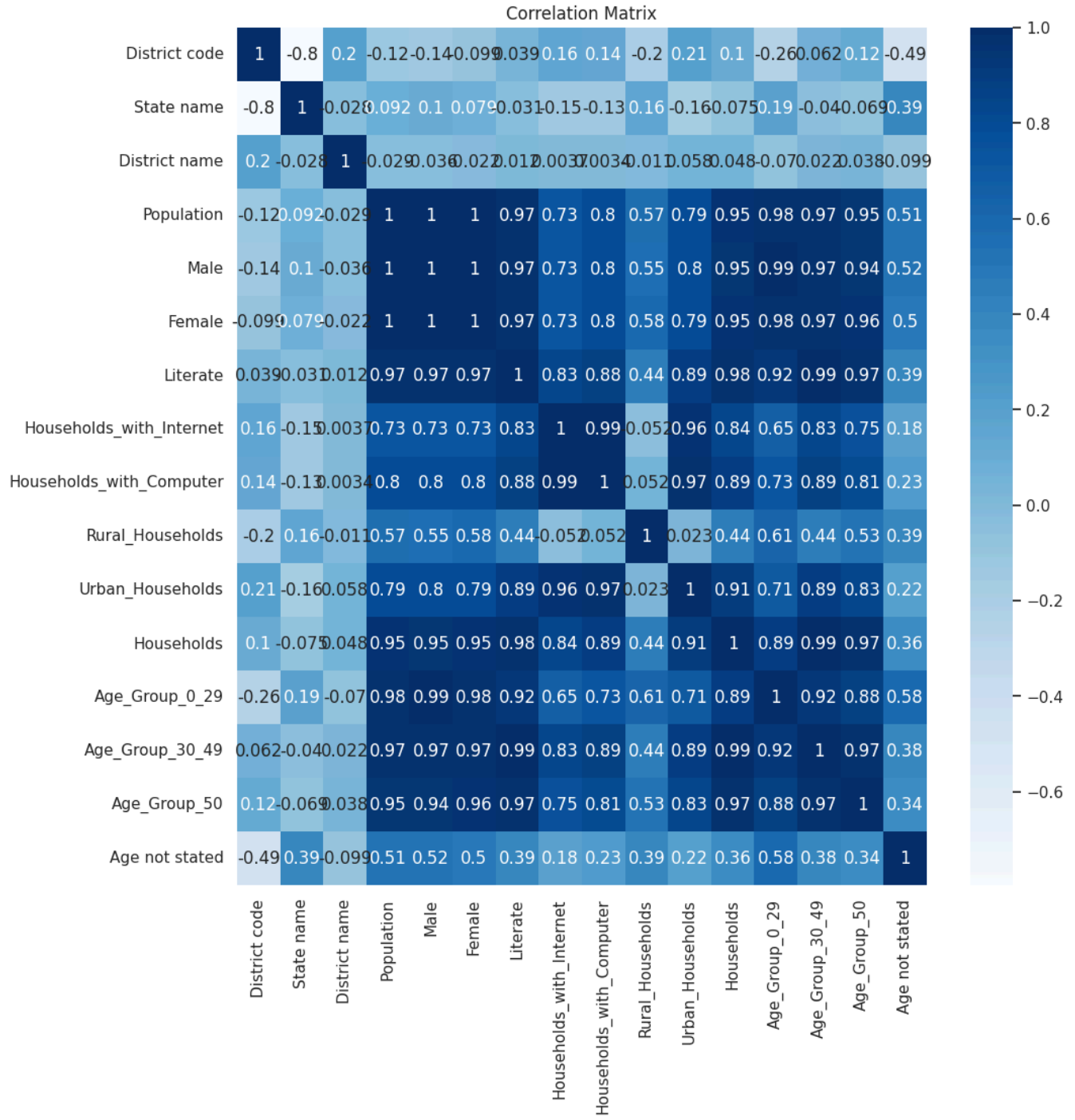
```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning:

The default value of `n_init` will change from 10 to 'auto' in 1.4. Set the value of `n_init` explicitly to suppress the warning
```

```
plt.scatter(X1[:,0], X1[:,1], c=kmeans.labels_,cmap= 'rainbow')
plt.scatter(kmeans.cluster_centers_[:,0], kmeans.cluster_centers_[:,1], color='black')
plt.title('literacy of Age_Group_0_29')
plt.xlabel('Age_Group_0_29')
plt.ylabel('Literate')
plt.show()
```

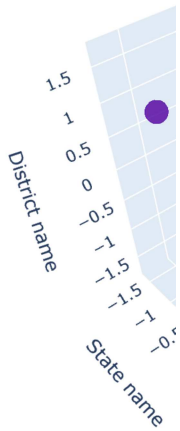



```
plt.figure(figsize=(11,11))
sns.heatmap(advance_data.corr(), cmap='Blues', annot=True)
plt.title('Correlation Matrix')
```

```
Text(0.5, 1.0, 'Correlation Matrix')
```



```
x = Selected_States[['District code',   'State name', 'District name', 'Population', 'Male', 'Female', 'Literate',
          'Households_with_Internet', 'Households_with_Computer', 'Rural_Households', 'Urban_Households',
          'Households', 'Age_Group_0_29', 'Age_Group_30_49',    'Age_Group_50']].values
km = KMeans(n_clusters = 15, init = 'k-means++', max_iter = 300, n_init = 10, random_state = 0)
km.fit(x)
labels = km.labels_
centroids = km.cluster_centers_
segmentation_std['labels'] =  labels
trace1 = go.Scatter3d(
    x= segmentation_std['Population'],
    y= segmentation_std['State name'],
    z= segmentation_std['District name'],
    mode='markers',
     marker=dict(
        color = segmentation_std['labels'],
        size= 10,
        line=dict(
            color= segmentation_std['labels'],
            width= 12
        ),
        opacity=0.8
     )
)
df = [trace1]

layout = go.Layout(
    title = 'population in States as well as District',
    margin=dict(
        l=0,
        r=0,
        b=0,
        t=0
    ),
    scene = dict(
            xaxis = dict(title  = 'Population'),
            yaxis = dict(title  = 'State name'),
            zaxis = dict(title  = 'District name')
        )
)

fig = go.Figure(data = df, layout = layout)
iplot(fig)
```



```
segmentation_std['labels'] =  labels
trace1 = go.Scatter3d(
    x= segmentation_std['Households'],
    y= segmentation_std['Rural_Households'],
    z= segmentation_std['Urban_Households'],
    mode='markers',
     marker=dict(
        color = segmentation_std['labels'],
        size= 10,
        line=dict(
            color= segmentation_std['labels'],
            width= 12
        ),
        opacity=0.8
     )
)
df = [trace1]

layout = go.Layout(
    title = 'Households in rural and urban',
    margin=dict(
        l=0,
        r=0,
        b=0,
        t=0
    ),
```