GLOBAL MOBILE SALES PREDICTION

```
import numpy as np
import pandas as pd
import statistics  as st
import seaborn as sns
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings("ignore")
from sklearn.cluster import KMeans
from sklearn import tree
from sklearn.metrics import
confusion_matrix,classification_report,accuracy_score
from sklearn.model_selection import train_test_split

df=pd.read_csv("D:\\GlobalMobile Prices.csv")

df

df.shape

df.info()

df.describe()

df.head(500)

print(len(df.columns))
print(df.columns)

df.columns =['Mobile_brand', 'Mobile_model', 'Cost', 'ram_gb',
'Mobile_storage', 'camera_pxl',
       'battery_mah', 'display_size_inch', 'charging_watt',
'Network_support', 'os',
       'Mobile_processor', 'Mobile_rating', 'release_month', 'year']

df.columns

df

df_numeric=df.select_dtypes(include='number')

corelation_matrix=df_numeric.corr()

print(corelation_matrix)
```

VISUALIZATIONS

1. Distribution of Kmeans

```
X = df[['ram_gb', 'Mobile_storage', 'camera_pxl',
       'battery_mah', 'display_size_inch', 'charging_watt']].values

kmeans = KMeans(n_clusters=4, random_state=40)
kmeans.fit(X)

centers=kmeans.cluster_centers_
labels = kmeans.labels_

print("Cluster centers:\n", centers)

plt.scatter(X[:, 0], X[:, 1], c= labels, cmap='viridis', marker='o')
plt.scatter(centers[:, 0], centers[:, 1], c='red', marker='x', s=200,
label='Centers')

plt.title('K-means Clustering on GlobalMobile Prices')
plt.xlabel('Mobile_brand')
plt.ylabel('Mobile_model')
plt.legend()
```

2. Matplotlib

```
df.head(10)

x=np.array(["Oppo","Realme","Xiaomi","Vivo","Apple","OnePlus","Infinix",
"Apple","Infinix","Realme"])
y=np.array([3.8,4.4,4.1,4.1,3.5,3.7,4.1,4.7,4.0,4.4])
plt.bar(x,y)
plt.show
```

3. Actual vs Predicted Prices

```
plt.figure(figsize=(5,7))
sns.heatmap(df_numeric.corr())

sns.pairplot(df,hue='Mobile_brand')

plt.figure(figsize=(10,5))
sns.barplot(x='Mobile_brand',y='Mobile_rating',data=df,hue='year')
plt.bar(x,y)
plt.show()

plt.figure(figsize=(10,5))
sns.histplot(x='Mobile_brand',data=df,hue='Network_support',kde=True)
plt.show()
```

OUTPUT:

```
brand                  model  price_usd  ram_gb  storage_gb  camera_mp  \
0       Oppo                A98 111        855      16         128        108
1     Realme            11 Pro+ 843        618       6         128         64
2     Xiaomi  Redmi Note 14 Pro 461        258      16          64         64
3       Vivo              V29e 744        837       6         512         48
4      Apple  iPhone 16 Pro Max 927        335      12         128        200
..       ...                   ...        ...     ...         ...        ...
995   Google             Pixel 7a 2        961       8         256         12
996  OnePlus        OnePlus 13R 423        158      16          64         64
997   Xiaomi        Poco X6 Pro 796       1164       6         128        200
998   Realme           Narzo 70 809        895       8          64         48
999   Xiaomi        Mi 13 Ultra 429        458      16         512         64

     battery_mah  display_size_inch  charging_watt 5g_support       os  \
0           6000                6.6             33        Yes  Android
1           4500                6.9            100        Yes  Android
2           4000                6.8             44        Yes  Android
3           4500                6.0             65        Yes  Android
4           5000                6.9            100        Yes      iOS
..           ...                ...            ...        ...      ...
995         4000                5.9             44        Yes  Android
996         5500                5.6             65        Yes  Android
997         4500                5.7            120         No  Android
998         5000                7.0             65         No  Android
999         4500                5.8             18         No  Android

          processor  rating release_month  year
0         Helio G99     3.8      February  2025
1         Tensor G4     4.4        August  2025
2           A18 Pro     4.1         March  2025
3       Exynos 2400     4.1        August  2025
4    Dimensity 9300     3.5      February  2025
..              ...     ...           ...   ...
995       Helio G99     4.0      November  2025
996  Dimensity 9300     3.5      November  2025
997       Helio G99     4.8       January  2025
998         A18 Pro     4.6        August  2025
999         A18 Pro     3.9          July  2025


<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 15 columns):



 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   brand              1000 non-null   object
 1   model              1000 non-null   object
 2   price_usd          1000 non-null   int64
 3   ram_gb             1000 non-null   int64
 4   storage_gb         1000 non-null   int64
 5   camera_mp          1000 non-null   int64
 6   battery_mah        1000 non-null   int64
 7   display_size_inch  1000 non-null   float64
 8   charging_watt      1000 non-null   int64
 9   5g_support         1000 non-null   object
 10  os                 1000 non-null   object
 11  processor          1000 non-null   object
 12  rating             1000 non-null   float64
 13  release_month      1000 non-null   object
 14  year               1000 non-null   int64
```

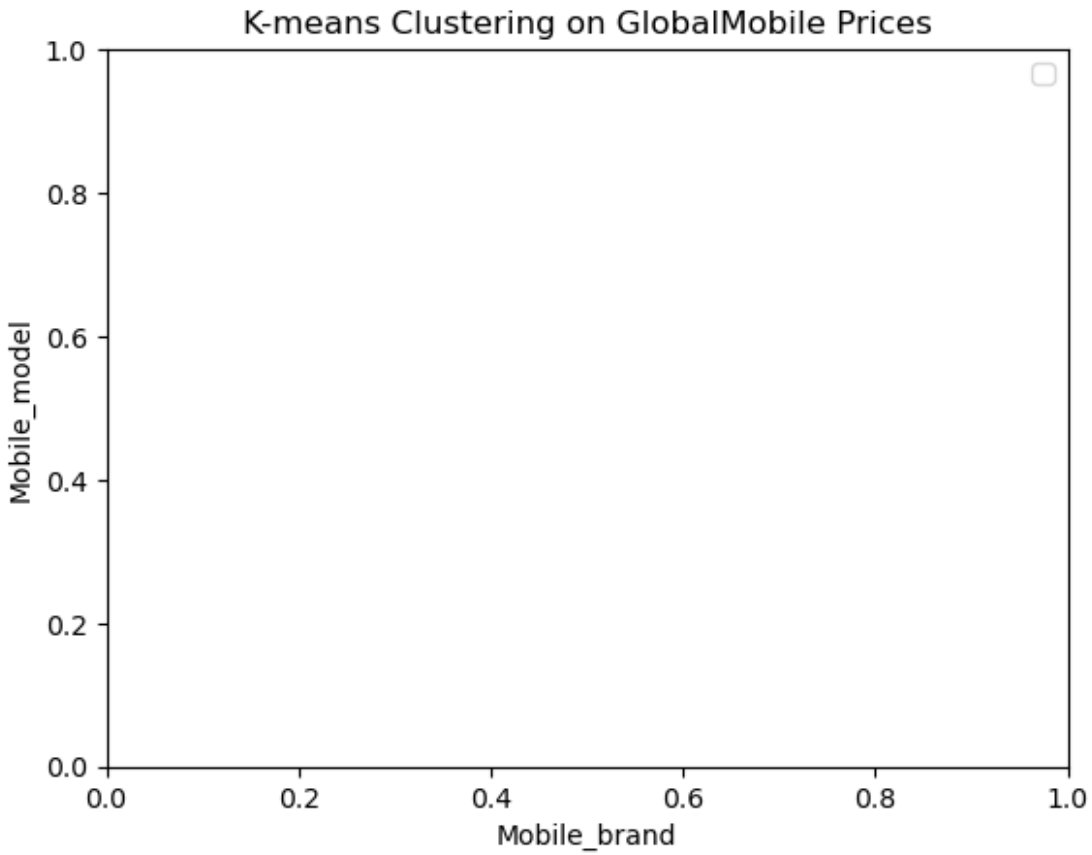
```
price_usd      ram_gb   storage_gb    camera_mp  battery_mah  \
count  1000.000000  1000.00000  1000.000000  1000.000000  1000.000000
mean    813.478000     9.17200   402.880000    83.534000  5012.000000
std     411.708367     4.32633   349.405893    62.504958   711.591429
min     101.000000     4.00000    64.000000    12.000000  4000.000000
25%     449.250000     6.00000   128.000000    48.000000  4500.000000
50%     822.000000     8.00000   256.000000    64.000000  5000.000000
75%    1166.250000    12.00000   512.000000   108.000000  5500.000000
max    1499.000000    16.00000  1024.000000   200.000000  6000.000000

       display_size_inch  charging_watt       rating    year
count        1000.000000    1000.000000  1000.000000  1000.0
mean            6.380600      63.791000     4.229900  2025.0
std             0.496841      36.333751     0.439965     0.0
min             5.500000      18.000000     3.500000  2025.0
25%             6.000000      33.000000     3.800000  2025.0
50%             6.400000      65.000000     4.200000  2025.0
75%             6.800000     100.000000     4.600000  2025.0
max             7.200000     120.000000     5.000000  2025.0



      brand                  model  price_usd  ram_gb  storage_gb  camera_mp  \
0       Oppo                A98 111        855      16         128        108
1     Realme            11 Pro+ 843        618       6         128         64
2     Xiaomi  Redmi Note 14 Pro 461        258      16          64         64
3       Vivo              V29e 744        837       6         512         48
4      Apple  iPhone 16 Pro Max 927        335      12         128        200
..       ...                   ...        ...     ...         ...        ...
495   Xiaomi        Mi 13 Ultra 967        997      12        1024        200
496   Realme           GT 7 Pro 938       1181      12         512         12
497   Google         Pixel 9 Pro 47        141       8         128        108
498     Oppo                A98 898       1322       8         256         12
499  Samsung         Galaxy M55 821        400      12        1024        108

     battery_mah  display_size_inch  charging_watt 5g_support       os  \
0           6000                6.6             33        Yes  Android
1           4500                6.9            100        Yes  Android
2           4000                6.8             44        Yes  Android
3           4500                6.0             65        Yes  Android
4           5000                6.9            100        Yes      iOS
..           ...                ...            ...        ...      ...
495         5000                5.5             18         No  Android
496         6000                5.8             33         No  Android
497         4500                7.0            120        Yes  Android
498         6000                5.8             18        Yes  Android
499         6000                7.2            100        Yes  Android

               processor  rating release_month  year
0              Helio G99     3.8      February  2025
1              Tensor G4     4.4        August  2025
2                A18 Pro     4.1         March  2025
3           Exynos 2400      4.1        August  2025
4         Dimensity 9300     3.5      February  2025
..                   ...     ...           ...   ...
495  Snapdragon 7+ Gen 2     4.4          June  2025
496   Snapdragon 6 Gen 1     4.9           May  2025
497       Dimensity 9300     4.5         March  2025
498  Snapdragon 7+ Gen 2     3.8          June  2025
499          Exynos 2400     3.8      December  2025
```

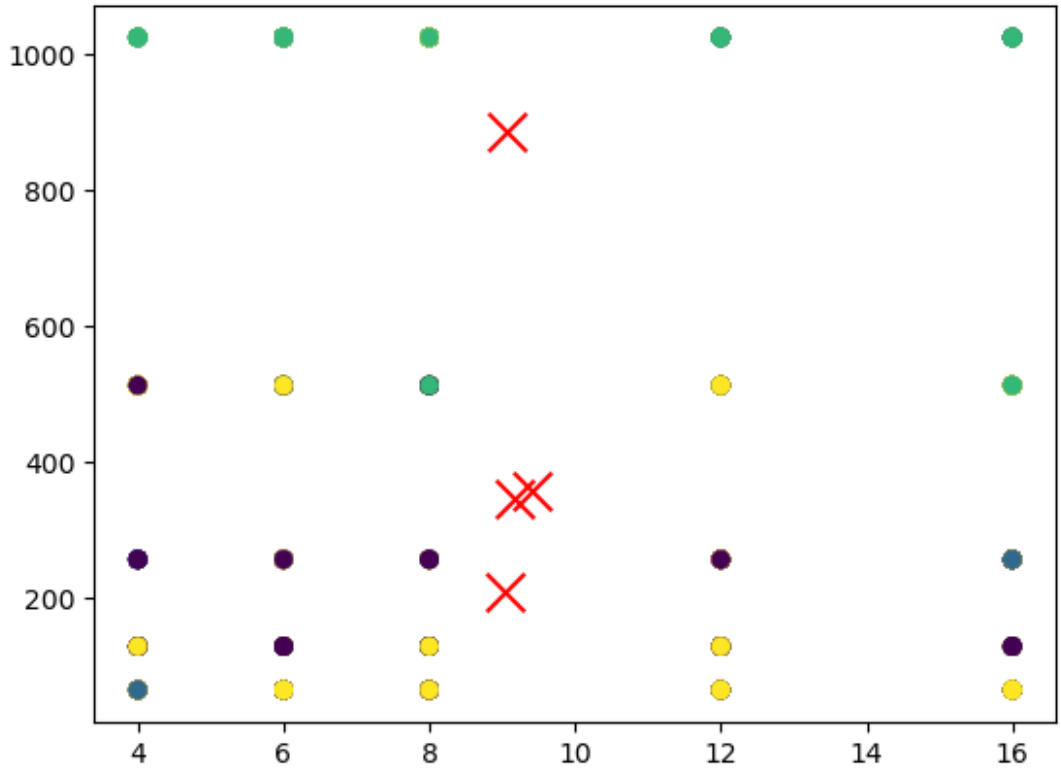
```
Index(['brand', 'model', 'price_usd', 'ram_gb', 'storage_gb', 'camera_mp',
       'battery_mah', 'display_size_inch', 'charging_watt', '5g_support', 'os',
     'processor', 'rating', 'release_month', 'year'],
      dtype='object')

Index(['Mobile_brand', 'Mobile_model', 'Cost', 'ram_gb', 'Mobile_storage',
       'camera_pxl', 'battery_mah', 'display_size_inch', 'charging_watt',
       'Network_support', 'os', 'Mobile_processor', 'Mobile_rating',
       'release_month', 'year'],
      dtype='object')

    Mobile_brand           Mobile_model  Cost  ram_gb  Mobile_storage  \
0           Oppo                A98 111   855      16             128
1         Realme            11 Pro+ 843   618       6             128
2         Xiaomi  Redmi Note 14 Pro 461   258      16              64
3           Vivo              V29e 744   837       6             512
4          Apple  iPhone 16 Pro Max 927   335      12             128
..           ...                   ...   ...     ...             ...
995       Google             Pixel 7a 2   961       8             256
996      OnePlus        OnePlus 13R 423   158      16              64
997       Xiaomi        Poco X6 Pro 796  1164       6             128
998       Realme           Narzo 70 809   895       8              64
999       Xiaomi        Mi 13 Ultra 429   458      16             512

     camera_pxl  battery_mah  display_size_inch  charging_watt  \
0           108         6000                6.6             33
1            64         4500                6.9            100
2            64         4000                6.8             44
3            48         4500                6.0             65
4           200         5000                6.9            100
..          ...          ...                ...            ...
995          12         4000                5.9             44
996          64         5500                5.6             65
997         200         4500                5.7            120
998          48         5000                7.0             65
999          64         4500                5.8             18

    Network_support       os Mobile_processor  Mobile_rating release_month  \
0               Yes  Android        Helio G99            3.8      February
1               Yes  Android        Tensor G4            4.4        August
2               Yes  Android          A18 Pro            4.1         March
3               Yes  Android      Exynos 2400            4.1        August
4               Yes      iOS   Dimensity 9300            3.5      February
..              ...      ...              ...            ...           ...
995             Yes  Android        Helio G99            4.0      November
996             Yes  Android   Dimensity 9300            3.5      November
997              No  Android        Helio G99            4.8       January
998              No  Android          A18 Pro            4.6        August
999              No  Android          A18 Pro            3.9          July

     year
0    2025
1    2025
2    2025
3    2025
4    2025
..    ...
995  2025
996  2025
997  2025
998  2025
999  2025
```

```
                       Cost    ram_gb  Mobile_storage  camera_pxl  \
Cost                1.000000 -0.023628        0.000730    0.015682
ram_gb             -0.023628  1.000000        0.013488    0.011987
Mobile_storage      0.000730  0.013488        1.000000    0.030576
camera_pxl          0.015682  0.011987        0.030576    1.000000
battery_mah        -0.006909  0.024691       -0.026807    0.004402
display_size_inch  -0.023611  0.003696        0.012260   -0.057576
charging_watt       0.014869  0.001560        0.050683    0.008465
Mobile_rating      -0.001010 -0.060605        0.028872    0.032554
year                     NaN       NaN             NaN         NaN

                   battery_mah  display_size_inch  charging_watt  \
Cost                 -0.006909          -0.023611       0.014869
ram_gb                0.024691           0.003696       0.001560
Mobile_storage       -0.026807           0.012260       0.050683
camera_pxl            0.004402          -0.057576       0.008465
battery_mah           1.000000           0.013966      -0.003426
display_size_inch     0.013966           1.000000       0.053701
charging_watt        -0.003426           0.053701       1.000000
Mobile_rating         0.011322           0.011403       0.032803
year                       NaN                NaN            NaN

                   Mobile_rating  year
Cost                   -0.001010   NaN
ram_gb                 -0.060605   NaN
Mobile_storage          0.028872   NaN
camera_pxl              0.032554   NaN
battery_mah             0.011322   NaN
display_size_inch       0.011403   NaN
charging_watt           0.032803   NaN
Mobile_rating           1.000000   NaN
year                         NaN   NaN
```

```
array([[1.60e+01, 1.28e+02, 1.08e+02, 6.00e+03, 6.60e+00, 3.30e+01],
       [6.00e+00, 1.28e+02, 6.40e+01, 4.50e+03, 6.90e+00, 1.00e+02],
       [1.60e+01, 6.40e+01, 6.40e+01, 4.00e+03, 6.80e+00, 4.40e+01],
       ...,
       [6.00e+00, 1.28e+02, 2.00e+02, 4.50e+03, 5.70e+00, 1.20e+02],
       [8.00e+00, 6.40e+01, 4.80e+01, 5.00e+03, 7.00e+00, 6.50e+01],
       [1.60e+01, 5.12e+02, 6.40e+01, 4.50e+03, 5.80e+00, 1.80e+01]])

KMeans(n_clusters=4, random_state=40)
```

```
Cluster centers:
 [[   9.0418251   207.81749049   78.97338403 4182.5095057     6.36501901
    62.49429658]
 [   9.41747573  357.59223301   85.41747573 6000.            6.41019417
    61.20873786]
 [   9.06508876  884.63905325   85.90532544 4523.66863905    6.39112426
    67.18343195]
 [   9.17679558  345.45856354   84.66850829 5280.38674033    6.37016575
    64.61878453]]
```

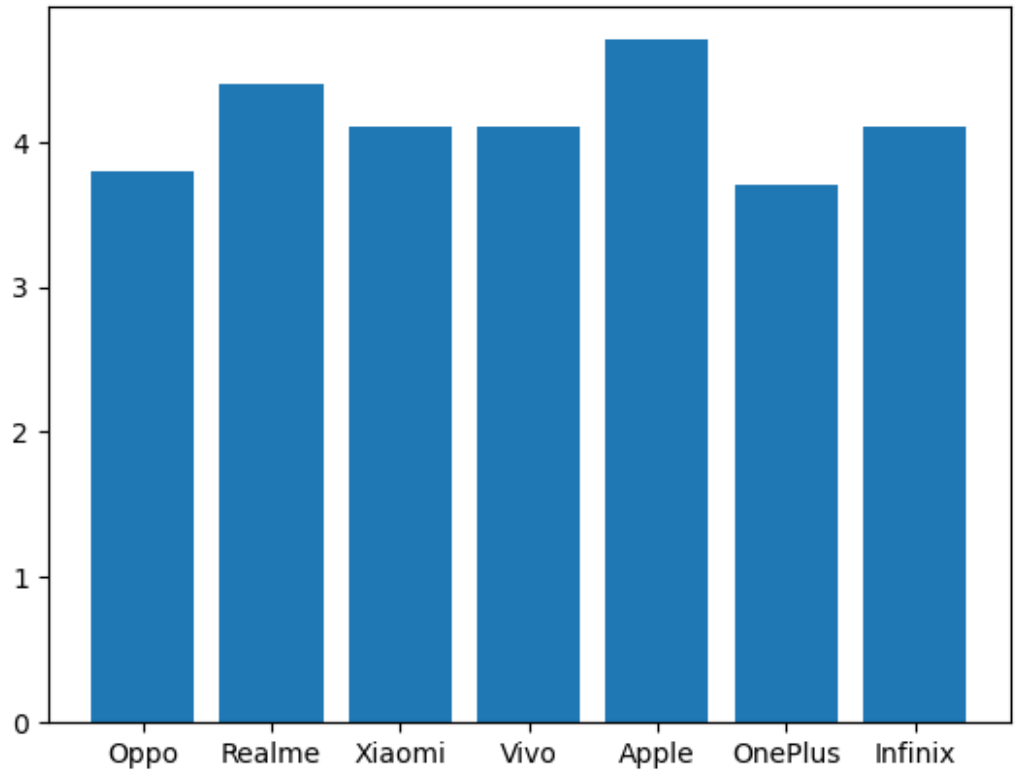

K-means Clustering on GlobalMobile Prices
Mobile_model
Mobile_brand
0.0
0.2
0.4
0.6
0.8
1.0

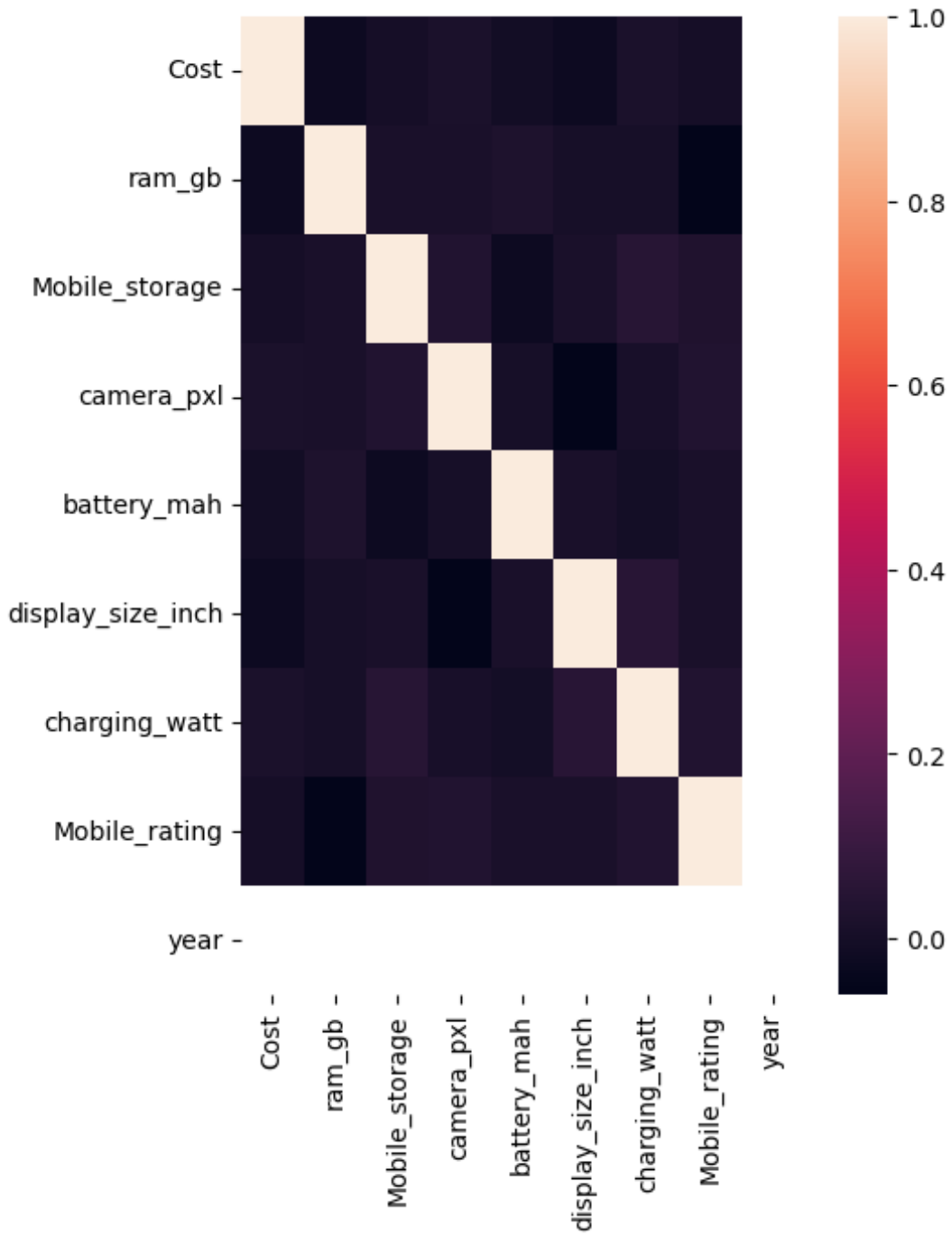

1000
800
600
400
200
4
6
8
10
12
14
16

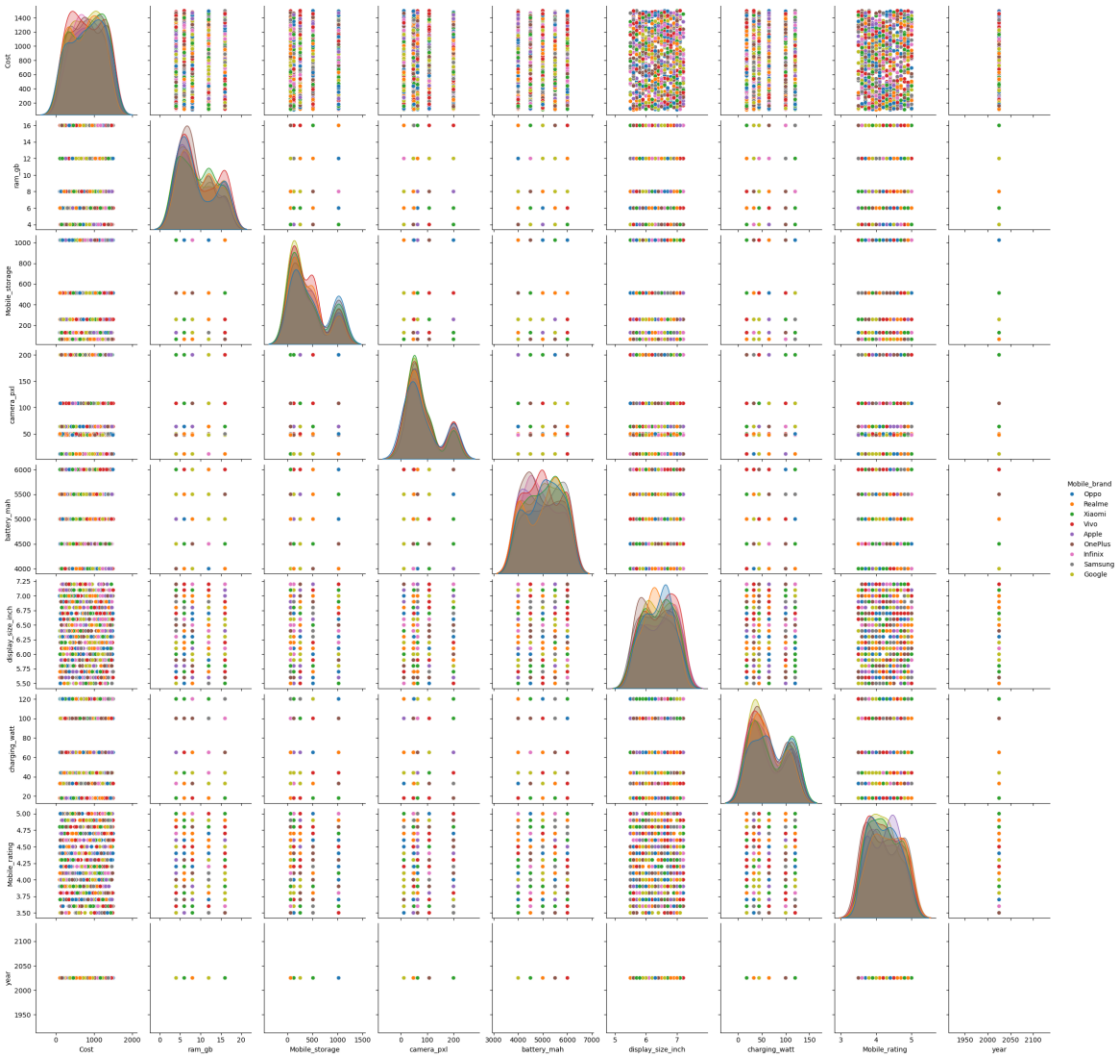
	Mobile_brand	Mobile_model	Cost	ram_gb	Mobile_storage	\
0	Oppo	A98 111	855	16	128	
1	Realme	11 Pro+ 843	618	6	128	
2	Xiaomi	Redmi Note 14 Pro 461	258	16	64	
3	Vivo	V29e 744	837	6	512	
4	Apple	iPhone 16 Pro Max 927	335	12	128	
5	OnePlus	Nord 4 295	938	16	512	
6	Infinix	GT 20 Pro 112	418	12	256	
7	Apple	iPhone 16 Pro Max 232	1447	16	64	
8	Infinix	Hot 40 111	1354	6	1024	
9	Realme	GT 7 Pro 668	311	8	1024	

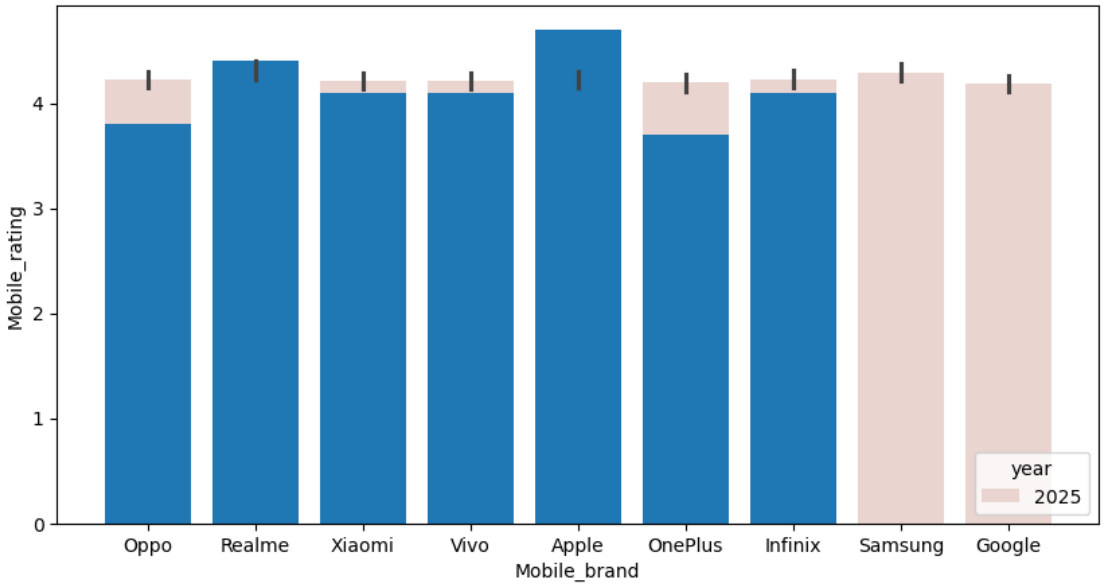
	camera_pxl	battery_mah	display_size_inch	charging_watt	Network_support	\
0	108	6000	6.6	33	Yes	
1	64	4500	6.9	100	Yes	
2	64	4000	6.8	44	Yes	
3	48	4500	6.0	65	Yes	
4	200	5000	6.9	100	Yes	
5	200	5000	6.2	120	No	
6	64	6000	6.9	44	No	
7	64	4500	6.7	33	Yes	
8	12	5500	5.7	18	Yes	
9	50	5500	6.9	44	Yes	

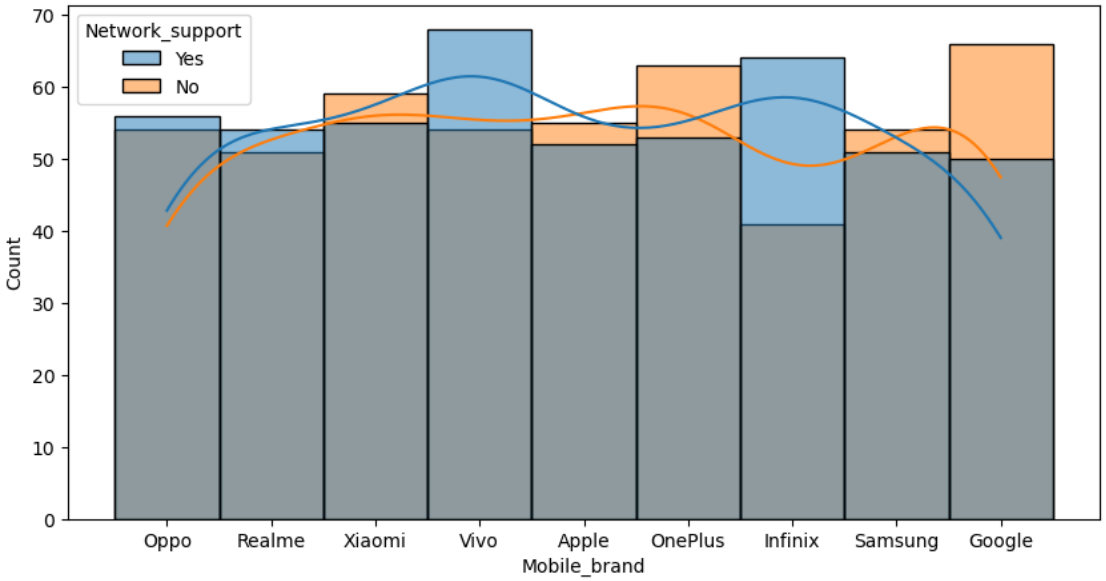
	os	Mobile_processor	Mobile_rating	release_month	year
0	Android	Helio G99	3.8	February	2025
1	Android	Tensor G4	4.4	August	2025
2	Android	A18 Pro	4.1	March	2025
3	Android	Exynos 2400	4.1	August	2025
4	iOS	Dimensity 9300	3.5	February	2025
5	Android	Exynos 2400	3.7	May	2025
6	Android	Exynos 2400	4.1	April	2025
7	iOS	Exynos 2400	4.7	November	2025
8	Android	Tensor G4	4.0	July	2025
9	Android	Snapdragon 6 Gen 1	4.4		




Cost
ram_gb
Mobile_storage
camera_pxl
battery_mah
display_size_inch
charging_watt
Mobile_rating
year
1.0
0.8
0.6
0.4
0.2
0.0


Cost
ram_gb
Mobile_storage
camera_pxl
battery_mah
display_size_inch
charging_watt
Mobile_rating
year
Mobile_brand
Oppo
Realme
Xiaomi
Vivo
Apple
OnePlus
Infinix
Samsung
Google


Mobile_rating
Mobile_brand
Oppo
Realme
Xiaomi
Vivo
Apple
OnePlus
Infinix
Samsung
Google
year
2025


Network_support
Yes
No
Count
70
60
50
40
30
20
10
0
Oppo
Realme
Xiaomi
Vivo
Apple
OnePlus
Infinix
Samsung
Google
Mobile_brand