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Market Basket Magic: Extracting Insights for Retail Success

```
# import required libraries

import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Understanding the Data

```
df = pd.read_csv('/content/Mall_Customers.csv')
df.head()
```

	CustomerID	Gender	Age	Annual Income (k$)	Spending Score (1-100)
0	1	Male	19	15	39
1	2	Male	21	15	81
2	3	Female	20	16	6
3	4	Female	23	16	77
4	5	Female	31	17	40

```
df.shape
(200, 5)
df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 5 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
0   CustomerID              200 non-null    int64  1
Gender                      200 non-null    object  2
Age                         200 non-null    int64  3
Annual Income (k$)          200 non-null    int64  4
Spending Score (1-100)  200 non-null   int64 dtypes:
int64(4),   object(1)   memory   usage:   7.9+   KB
df.isnull().sum()
CustomerID                  0
Gender                      0
Age                         0
Annual Income (k$)          0
```

```
Spending Score (1-100)    0
dtype: int64 df.describe()

       CustomerID         Age  Annual Income (k$)  Spending Score (1-
100)
count  200.000000  200.000000          200.000000
200.000000
mean   100.500000   38.850000           60.560000
50.200000
std     57.879185   13.969007           26.264721
25.823522
min      1.000000   18.000000           15.000000
1.000000
25%     50.750000   28.750000           41.500000
34.750000
50%    100.500000   36.000000           61.500000
50.000000
75%    150.250000   49.000000           78.000000
73.000000
max    200.000000   70.000000          137.000000
99.000000
```

Data Preprocessing

```
from sklearn import cluster

new_df = df.iloc[:,-2:]
new_df.head()
   Annual Income (k$)  Spending Score (1-100)
0                  15                      39
1                  15                      81
2                  16                       6
3                  16                      77
4                  17                      40
error=[] for i in range(1,11):   kmeans =
cluster.KMeans(n_clusters=i,init = 'k-means+
+',random_state=4)
kmeans.fit(new_df)
  error.append(kmeans.inertia_)

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

```
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'auto' in 1.4. Set the value of `n_init` explicitly to suppress the
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: 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   warnings.warn(
```
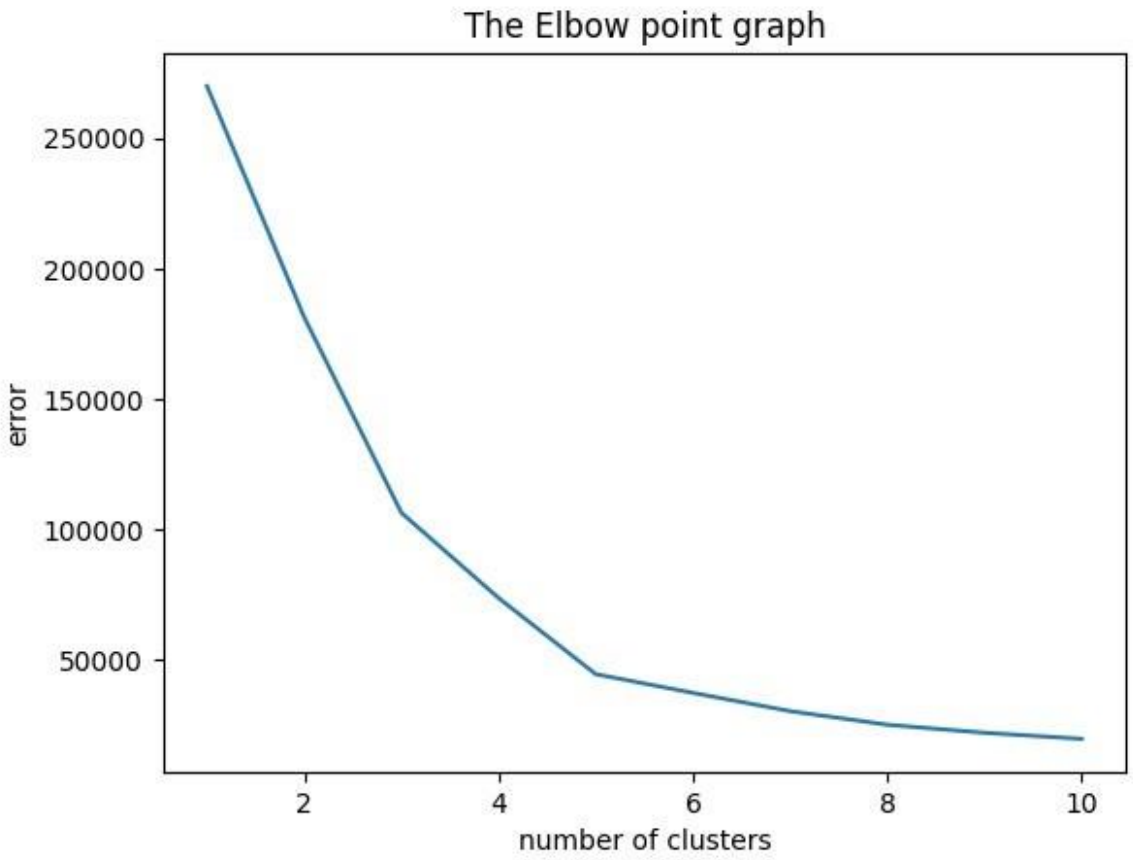

```
plt.plot(range(1,11),error)
plt.title('The Elbow point graph')
plt.xlabel('number of clusters')
plt.ylabel('error') plt.show()
```



Machine Learning approach with K-Means Clustering Algorithm

```
km_model = cluster.KMeans(n_clusters=5,init = 'k-means+
+',random_state=0)
km_model.fit(new_df)
```

```
/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   warnings.warn(
KMeans(n_clusters=5, random_state=0)
pred = km_model.predict(new_df)
pred
array([4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4,
3,
       4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4, 3, 4,
1,
       4, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
```

```
1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,
1,
       1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 0, 2, 1, 2, 0, 2, 0,
2,
       1, 2, 0, 2, 0, 2, 0, 2, 0, 2, 1, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0,
2,
       0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0,
2,
       0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0, 2, 0,
2,
       0, 2], dtype=int32)
```

```
# Testing the model with random observation
```

```
km_model.predict([[60,50]])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439:
UserWarning: X does not have valid feature names, but KMeans was
fitted with feature names   warnings.warn( array([1],
dtype=int32) km_model.predict([[15,1]])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439:
UserWarning: X does not have valid feature names, but KMeans was
fitted with feature names   warnings.warn( array([4],
dtype=int32) km_model.predict([[41,34]])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439:
UserWarning: X does not have valid feature names, but KMeans was
fitted with feature names   warnings.warn( array([4],
dtype=int32) km_model.predict([[137,99]])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439:
UserWarning: X does not have valid feature names, but KMeans was
fitted with feature names   warnings.warn( array([2],
dtype=int32) km_model.predict([[78,73]])
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/base.py:439:
UserWarning: X does not have valid feature names, but KMeans was
fitted with feature names   warnings.warn( array([2],
dtype=int32)
```

The End!!!