```
import numpy as np
import pandas as pd
```

import the dataset

```
dataset=pd.read_csv('/content/drive/MyDrive/Mall_Customers.csv')
dataset.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

```
X = dataset.iloc[:, [3, 4]].values
```

To find the optimal number of clusters

Apply DBSCAN algorithm

```
from sklearn.cluster import DBSCAN
dbscan=DBSCAN(eps=3,min_samples=4)
```

fitting the model

```
model=dbscan.fit(X)
labels=model.labels_
labels
```

```
array([-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,  0,  0,  0,  0, -1, -1,  0, -1,  0, -1,  0,  0,
       -1,  0, -1, -1,  0, -1,  1,  1,  1,  1,  1,  1,  1,  1,  1,  1,  1,
        1,  1,  1, -1,  2,  1,  2,  2,  2,  2,  2,  2,  2,  2,  2,  2,  2,
        2,  2,  2,  2,  2,  2,  2,  2,  2,  2,  2,  2,  2,  2,  2,  3,  2,

        3,  3, -1,  3, -1, -1,  4, -1, -1, -1,  4,  5,  4, -1,  4,  5, -1,
        5,  4, -1,  4,  5, -1, -1,  6, -1, -1, -1,  7, -1,  6, -1,  6, -1,
        7, -1,  6, -1,  7, -1,  7, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
        8, -1,  8, -1,  8, -1,  8, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1,
       -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1, -1])
```

-1 is noise

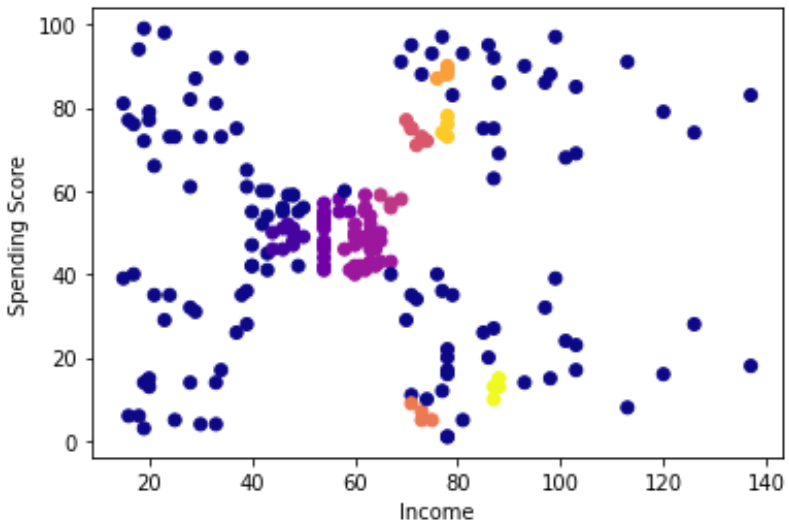
0-8 are clusters

Calculating the number of clusters

```
n_clusters=len(set(labels))- (1 if -1 in labels else 0)
n_clusters
```

```
9
```

```
plt.scatter(X[:, 0], X[:,1], c = labels, cmap= "plasma") # plotting the clusters
plt.xlabel("Income") # X-axis label
plt.ylabel("Spending Score") # Y-axis label
plt.show()
```



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