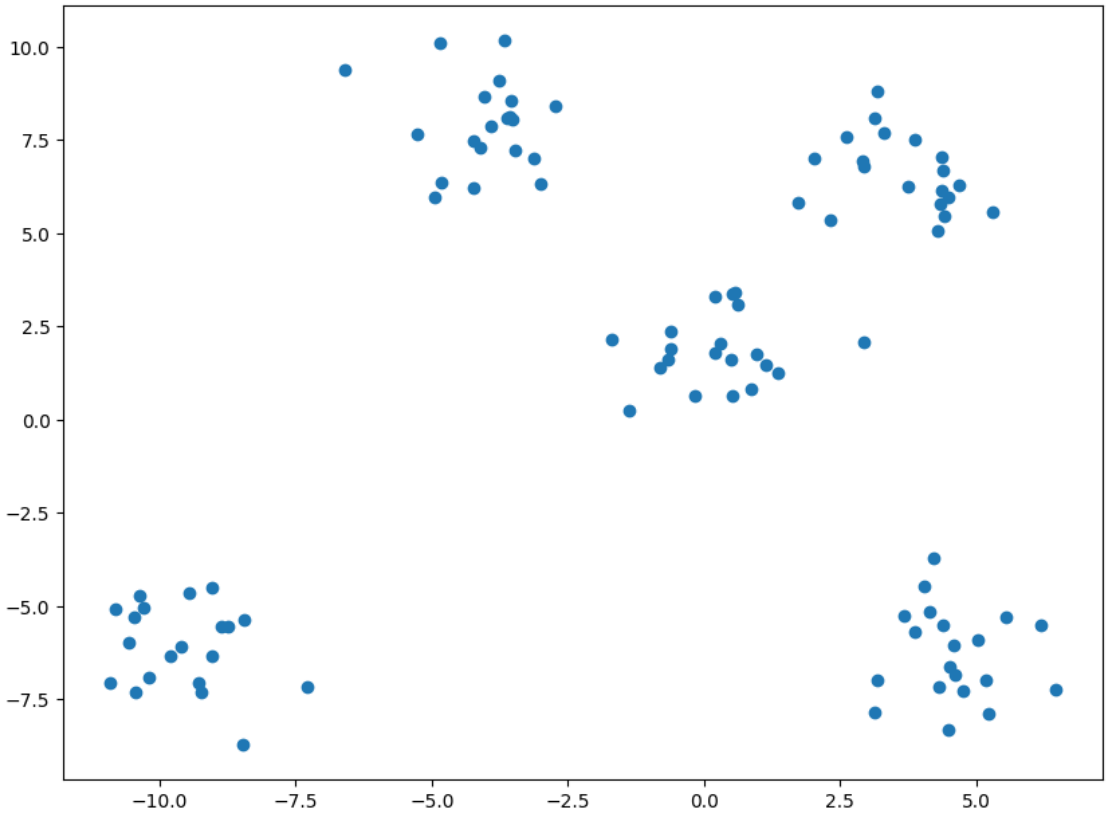
untitled6-2

May 16, 2024

[ ]:
```
# importing the required libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

[ ]:
```
!pip install scikit-learn
import matplotlib.pyplot as plt
from sklearn.datasets import make_blobs

X, y = make_blobs(n_samples=100, centers=5, random_state=101)
plt.rcParams.update({'figure.figsize':(10,7.5), 'figure.dpi':100})
plt.scatter(X[:, 0], X[:, 1])
plt.show()
```

```
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.10/dist-
packages (1.2.2)
Requirement already satisfied: numpy>=1.17.3 in /usr/local/lib/python3.10/dist-
packages (from scikit-learn) (1.25.2)
Requirement already satisfied: scipy>=1.3.2 in /usr/local/lib/python3.10/dist-
packages (from scikit-learn) (1.11.4)
Requirement already satisfied: joblib>=1.1.1 in /usr/local/lib/python3.10/dist-
packages (from scikit-learn) (1.4.2)
Requirement already satisfied: threadpoolctl>=2.0.0 in
/usr/local/lib/python3.10/dist-packages (from scikit-learn) (3.5.0)
```

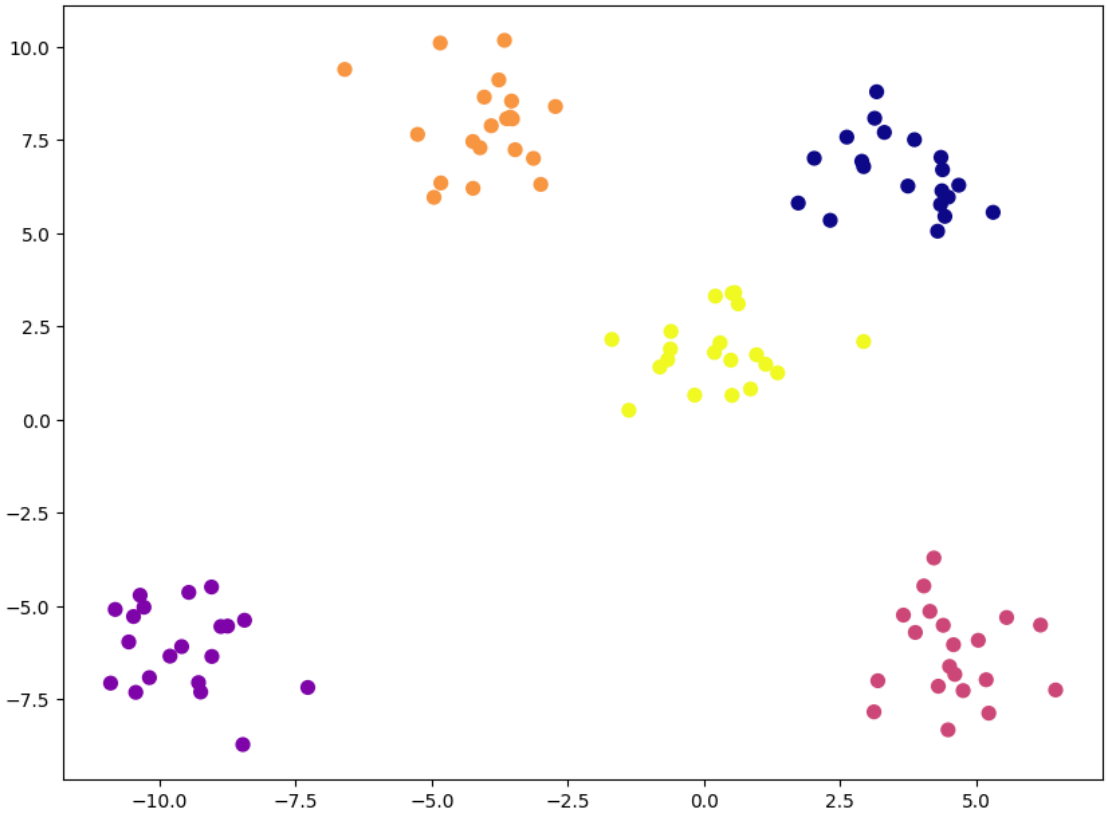


[ ]:
```
from sklearn.cluster import KMeans
```

[ ]:
```
Cluster = KMeans(n_clusters=5)
Cluster.fit(X)
y_pred = Cluster.predict(X)
```

```
/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(
```

[ ]:
```
plt.scatter(X[:, 0], X[:, 1], c=y_pred, s=50, cmap='plasma')
plt.rcParams.update({'figure.figsize':(10,7.5), 'figure.dpi':100})
```



[ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
# using the make_blobs dataset
from sklearn.datasets import make_blobs
X, y = make_blobs(n_samples=100, centers=5, random_state=101)
# setting the number of training examples
m=X.shape[0]
n=X.shape[1]
n_iter=50
```

[ ]:
```
# computing the initial centroids randomly
K=5
import random

# creating an empty centroid array
centroids=np.array([]).reshape(n,0)

# creating 5 random centroids
for k in range(K):
```

```
    centroids=np.c_[centroids,X[random.randint(0,m-1)]]
```

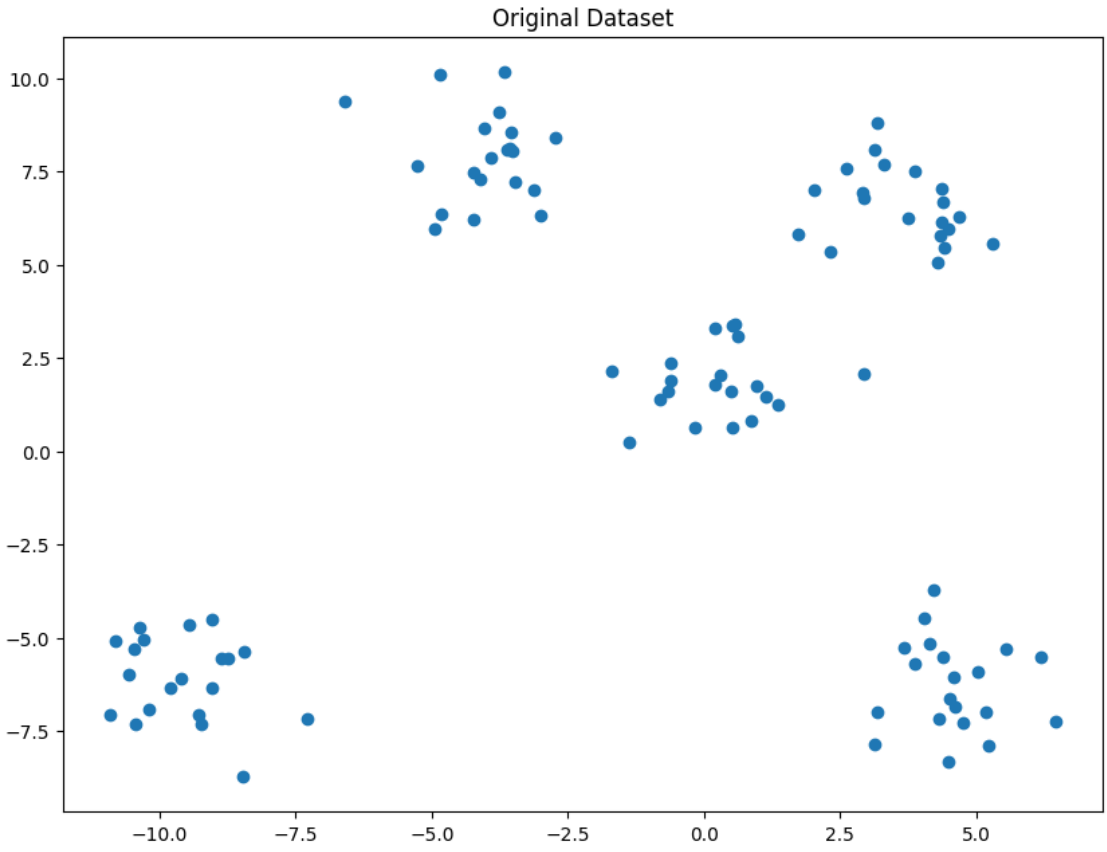
[ ]:
```
output={}

# creating an empty array
euclid=np.array([]).reshape(m,0)

# finding distance between for each centroid
for k in range(K):
       dist=np.sum((X-centroids[:,k])**2,axis=1)
       euclid=np.c_[euclid,dist]

# storing the minimum value we have computed
minimum=np.argmin(euclid,axis=1)+1
```

[ ]:
```
# computing the mean of separated clusters
cent={}
for k in range(K):
    cent[k+1]=np.array([]).reshape(2,0)

# assigning of clusters to points
for k in range(m):
    cent[minimum[k]]=np.c_[cent[minimum[k]],X[k]]
for k in range(K):
    cent[k+1]=cent[k+1].T

# computing mean and updating it
for k in range(K):
     centroids[:,k]=np.mean(cent[k+1],axis=0)
```

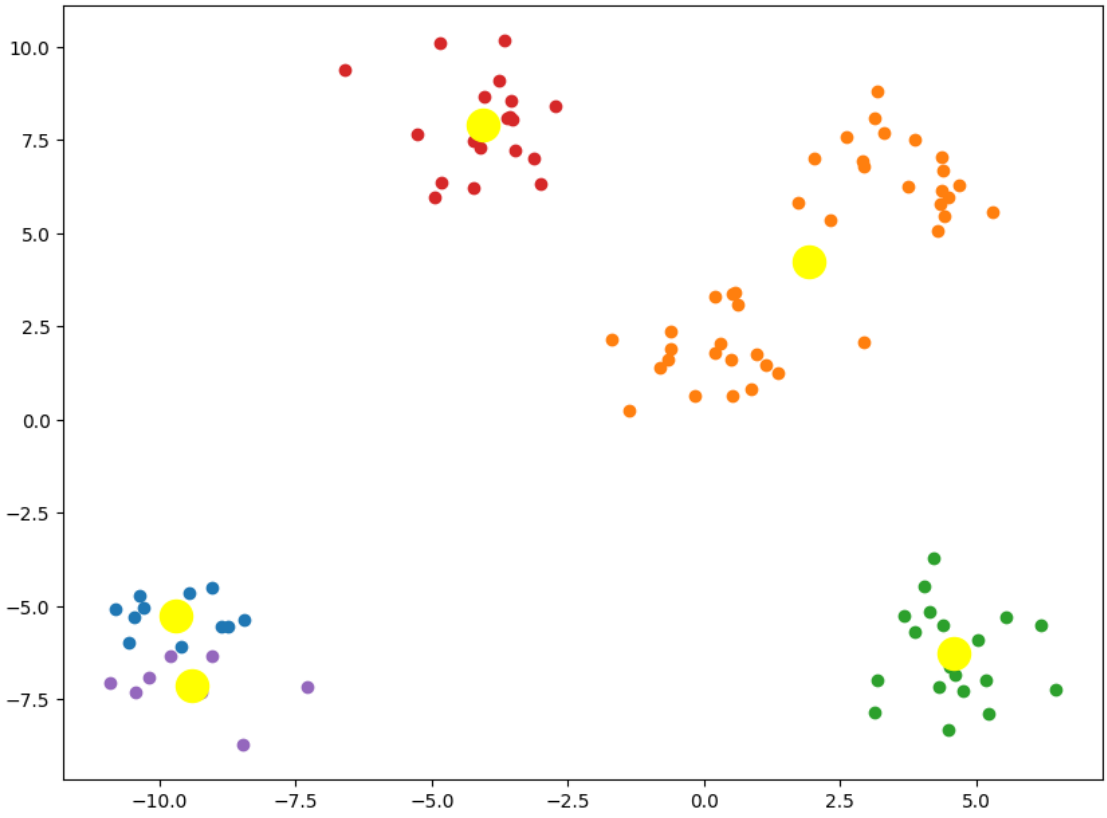
[ ]:
```
# repeating the above steps again and again
for i in range(n_iter):
      euclid=np.array([]).reshape(m,0)
      for k in range(K):
          dist=np.sum((X-centroids[:,k])**2,axis=1)
          euclid=np.c_[euclid,dist]
      C=np.argmin(euclid,axis=1)+1
      cent={}
      for k in range(K):
           cent[k+1]=np.array([]).reshape(2,0)
      for k in range(m):
           cent[C[k]]=np.c_[cent[C[k]],X[k]]
      for k in range(K):
           cent[k+1]=cent[k+1].T
      for k in range(K):
           centroids[:,k]=np.mean(cent[k+1],axis=0)
      final=cent
```

[ ]:
```
plt.scatter(X[:,0],X[:,1])
plt.rcParams.update({'figure.figsize':(10,7.5), 'figure.dpi':100})
plt.title('Original Dataset')
```

[ ]:
```
Text(0.5, 1.0, 'Original Dataset')
```



[ ]:
```
for k in range(K):
    plt.scatter(final[k+1][:,0],final[k+1][:,1])
plt.scatter(centroids[0,:],centroids[1,:],s=300,c='yellow')
plt.rcParams.update({'figure.figsize':(10,7.5), 'figure.dpi':100})
plt.show()
```



[ ]:
```
from sklearn.datasets import make_blobs
X, y = make_blobs(n_samples=100, centers=5, random_state=101)
```

[ ]:
```
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans

elbow = []
for i in range(1, 20):
    kmeans = KMeans(n_clusters=i, init='k-means++', random_state=101)
    kmeans.fit(X)
    elbow.append(kmeans.inertia_)

sns.lineplot(x=range(1, 20), y=elbow, color='blue')
plt.rcParams.update({'figure.figsize':(10, 7.5), 'figure.dpi':100})
plt.title('ELBOW METHOD')
plt.show()
```

```
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```
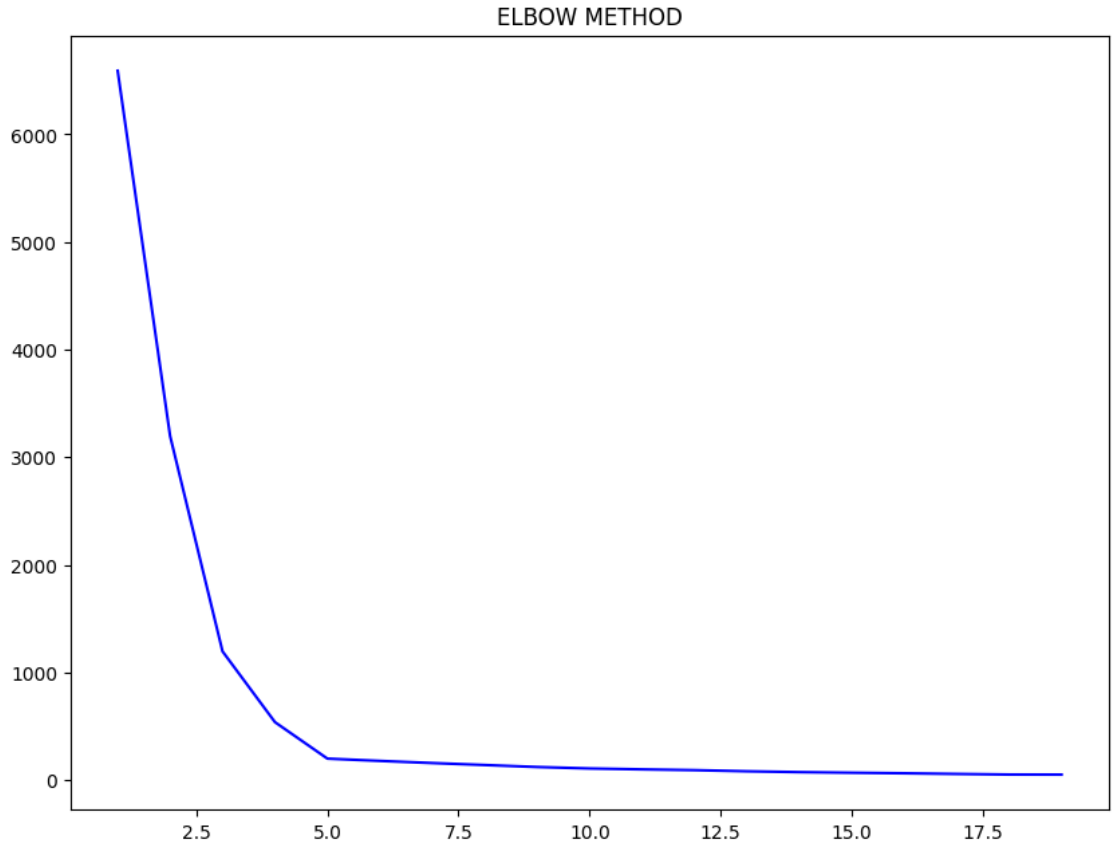
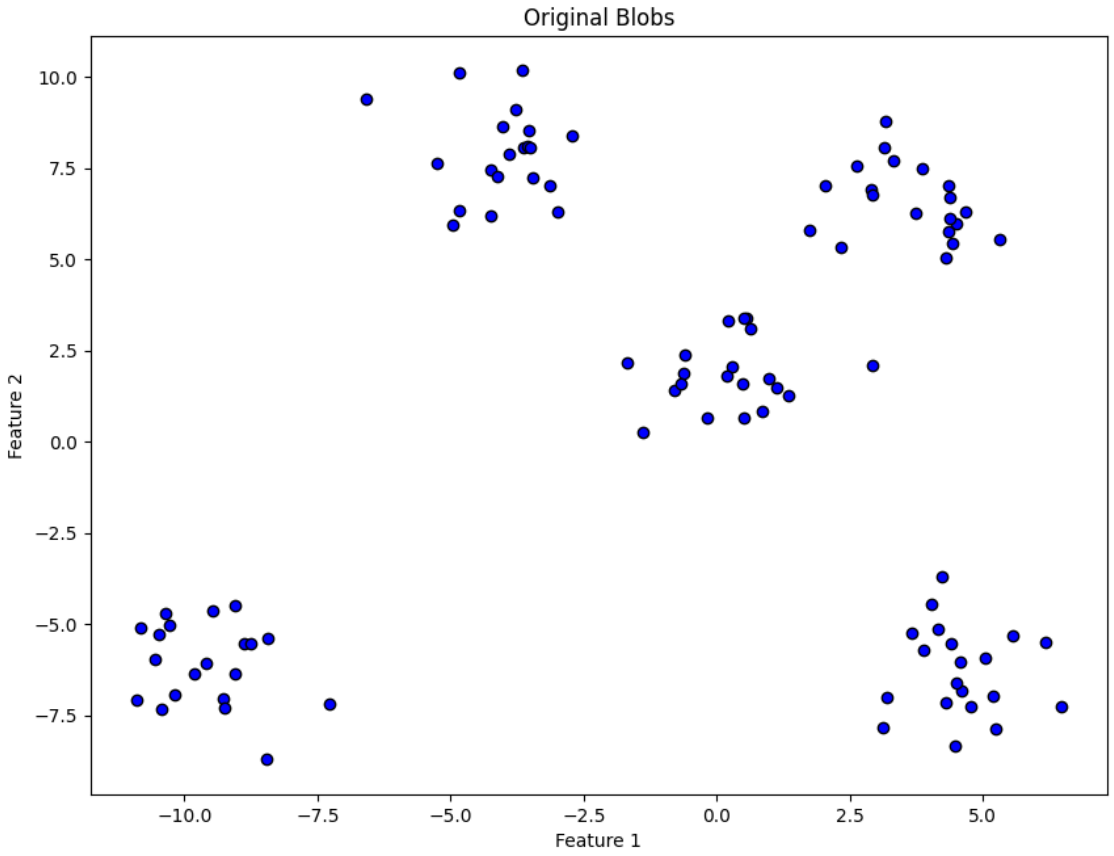
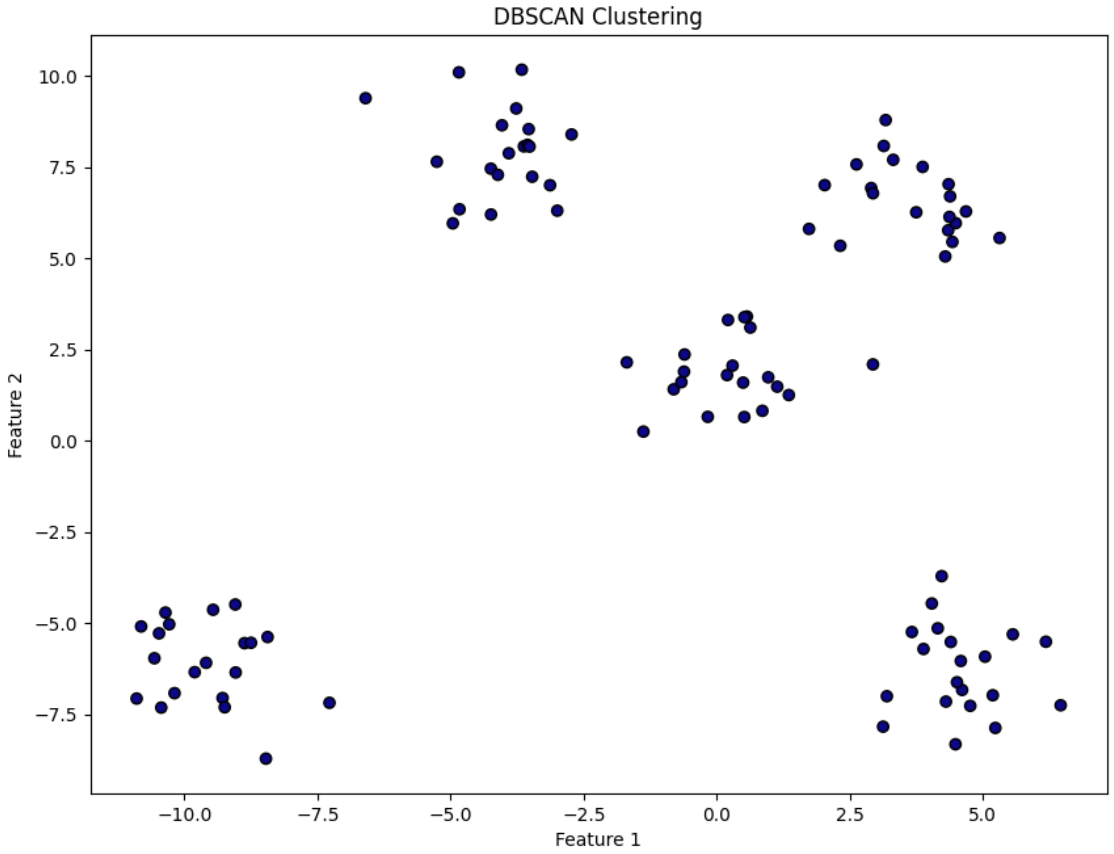



[28]:
```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.datasets import make_blobs
from sklearn.cluster import DBSCAN

# Generate sample data
X, y = make_blobs(n_samples=100, centers=5, random_state=101)

# Visualize the blobs
plt.scatter(X[:, 0], X[:, 1], c='blue', marker='o', edgecolor='black')
plt.title('Original Blobs')
plt.xlabel('Feature 1')
plt.ylabel('Feature 2')
plt.show()

# Create DBSCAN object
dbscan = DBSCAN(eps=0.5, min_samples=10)

# Fit the model to the data
```

```
dbscan.fit(X)

# Predict the cluster labels
y_pred_dbscan = dbscan.labels_

# Visualize the clusters
plt.scatter(X[:, 0], X[:, 1], c=y_pred_dbscan, cmap='plasma', marker='o',␣
 ↪edgecolor='black')
plt.title('DBSCAN Clustering')
plt.xlabel('Feature 1')
plt.ylabel('Feature 2')
plt.show()
```





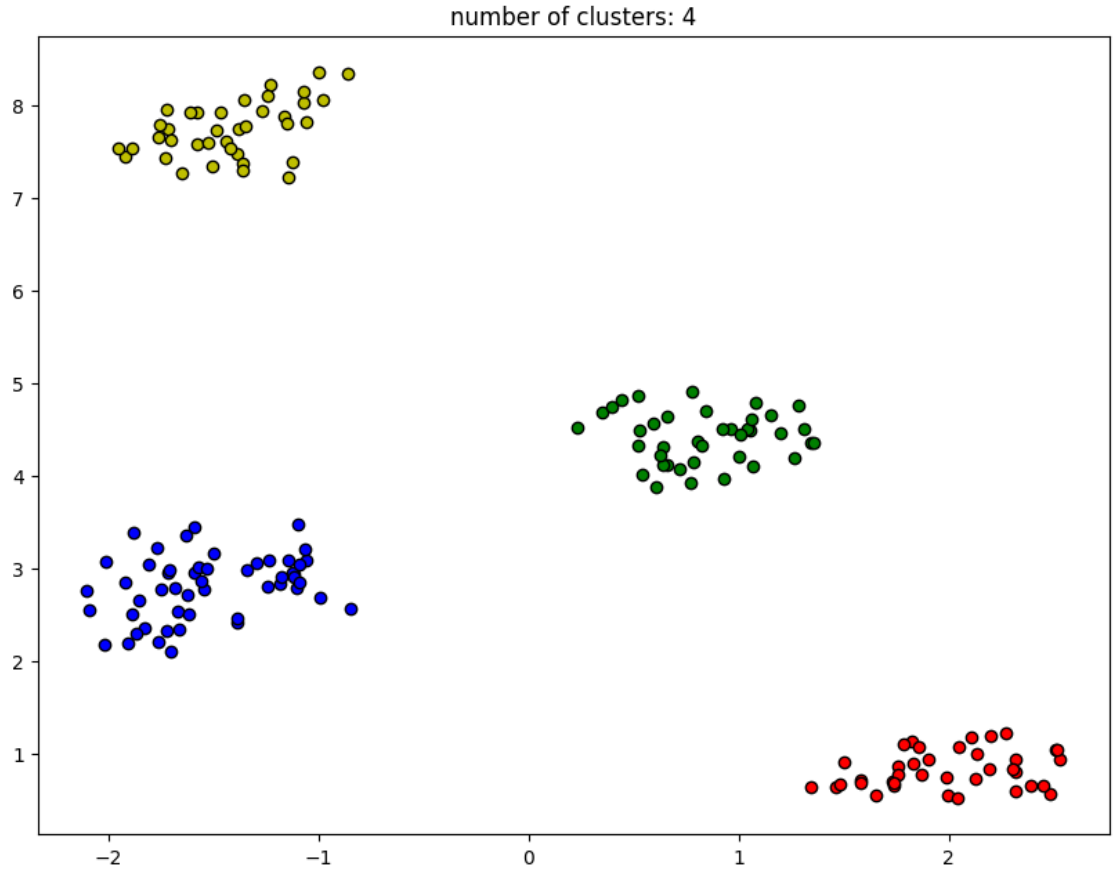
[29]:
```
import matplotlib.pyplot as plt
import numpy as np
from sklearn.cluster import DBSCAN
from sklearn import metrics
from sklearn.datasets import make_blobs
from sklearn.preprocessing import StandardScaler
from sklearn import datasets
```

[30]:
```
# Load data in X
X, y_true = make_blobs(n_samples=300, centers=4,
                                        cluster_std=0.50, random_state=0)
```

[31]:
```
db = DBSCAN(eps=0.3, min_samples=10).fit(X)
core_samples_mask = np.zeros_like(db.labels_, dtype=bool)
core_samples_mask[db.core_sample_indices_] = True
labels = db.labels_

# Number of clusters in labels, ignoring noise if present.
n_clusters_ = len(set(labels)) - (1 if -1 in labels else 0)
```

```
# Plot result

# Black removed and is used for noise instead.
unique_labels = set(labels)
colors = ['y', 'b', 'g', 'r']
print(colors)
for k, col in zip(unique_labels, colors):
        if k == -1:
                # Black used for noise.
                col = 'k'

        class_member_mask = (labels == k)

        xy = X[class_member_mask & core_samples_mask]
        plt.plot(xy[:, 0], xy[:, 1], 'o', markerfacecolor=col,
                        markeredgecolor='k',
                        markersize=6)

        xy = X[class_member_mask & ~core_samples_mask]
        plt.plot(xy[:, 0], xy[:, 1], 'o', markerfacecolor=col,
                        markeredgecolor='k',
                        markersize=6)

plt.title('number of clusters: %d' % n_clusters_)
plt.show()
```

```
['y', 'b', 'g', 'r']
```


number of clusters: 4
8
7
6
5
4
3
2
1
−2
−1
0
1
2

[ ]: