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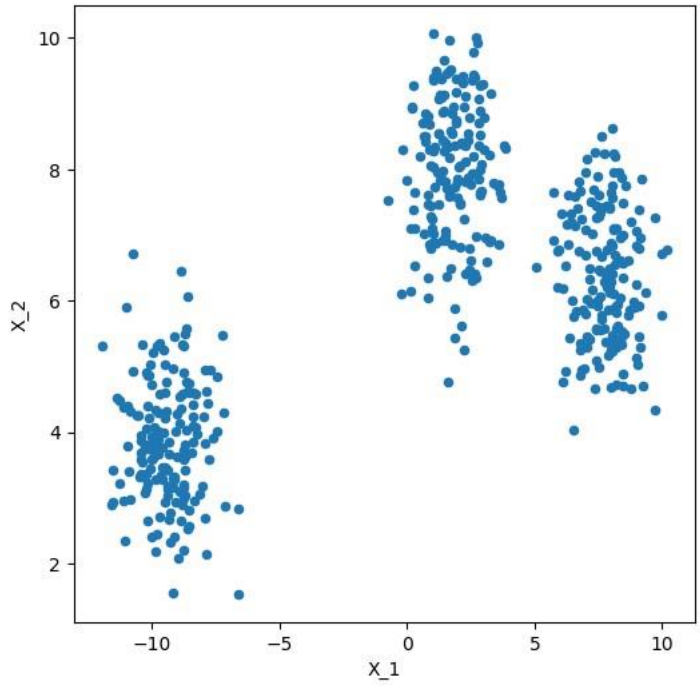
Roll No: ***15***
Moodle ID: ***20102152***
Machine Learning Experiment No: ***9***

```
import numpy as np from
sklearn.datasets import make_blobs
from—matplotlib—import—pyplot—as—plt
from—matplotlib.pyplot—import—figure
from—pandas—import—DataFrame
```

```
X, _ = make_blobs(     n_samples=500,      # Generate 500 data
points     centers=3,          # Create 3 clusters
n_features=2,       # Each data point has 2 features
random_state=20     # Set a random seed for reproducibility
)
```

```
df=DataFrame(dict(x=X[:,0],y=X[:,1])) fig,
ax=plt.subplots(figsize=(6,6)) #specifies the size of the figure
df.plot(ax=ax,kind='scatter',x='x',y='y') plt.xlabel('X_1')
plt.ylabel('X_2') plt.show()
```




```
from sklearn.cluster import DBSCAN

# Create a DBSCAN clustering object with specified parameters
clustering = DBSCAN(eps=1, min_samples=5).fit(X)

# Obtain cluster labels for each data point
cluster = clustering.labels_

# Calculate the number of unique clusters found
unique_clusters = len(set(cluster))
unique_clusters
```

```
4
```

```
clustering.labels_
array([ 0,  1,  0,  0,  1,  1,  2,  2,  0,  0,  0,  1,  2,  2,  2,  0,  1,
        0,  2,  2,  0,  0,  1,  2,  1,  1,  0,  1,  0,  2,  2,  2,  1,  2,
        0,  1,  0,  2,  1,  1,  2,  1,  2,  2,  2,  2,  0,  0,  0,  2,  2,
        2,  1,  1,  1,  0,  2,  1,  2,  2,  0,  2,  2,  1,  2,  0,  0,  2,
        0,  2,  2,  1,  2,  2,  1,  0,  0,  0,  2,  0,  1,  1,  0,  0,  0,
        2,  2,  2,  0,  2,  0,  2,  2,  0,  0,  2,  1,  0,  2,  0,  1,  2,
        1,  0,  2,  2,  2,  1,  1,  0,  0, -1,  0,  0,  0,  1,  1,  0,  1,
        2,  1,  2,  2,  0,  0,  2,  1,  2,  1,  2,  0,  2,  1,  0,  1,  1,
```

```
2,  0,  2,  1,  1,  2,  2,  1,  1,  1,  2,  0,  2,  1,  0,  0,  0,
0,  0,  1,  2,  0,  1,  0,  2,  0,  0,  2,  0,  0,  0,  0,  0,  0,
2,  0,  1,  1,  2,  2,  2,  0,  1,  1,  1,  1,  2,  0,  2,  1,
2,  1,  2,  1,  1,  0,  1,  1,  1,  2,  2,  1,  1,  0,  2,  2,  1,
0,  2,  2,  1,  2,  1,  0,  0,  1,  1,  0,  2,  1,  1,  0,  2,  0,
2,  0,  2,  0,  2,  1,  0,  1,  0,  1,  0,  2,  0,  0,  0,  2,  1,
0,  1,  1,  2,  2,  1,  2,  2,  2,  0,  1,  2,  2,  1,  0,  0,  2,
2,  2,  1,  1,  0,  2,  1,  2,  2,  2,  0,  0,  2,  1,  0,  1,  1,
2,  1,  0,  1,  0,  0,  1,  1,  1,  2,  1,  0,  2,  2,  2,  0,  2,
0,  2,  0,  1,  1,  0,  2,  2,  0,  1,  2,  1,  0,  1,  0,  0,  0,
1,  1,  0,  0,  0,  1,  1,  1,  2,  1,  1,  2,  2,  1,  2,  1,  1,
2,  0,  1,  2,  2,  1,  2,  1,  2,  1,  1,  0,  0,  0,  2,  1,  1,
0,  0,  2,  0,  0,  1,  2,  1, -1,  1,  0,  2,  1,  1,  0,  1,  0,
1,  1,  0,  1,  2,  1,  1,  0,  0,  0,  2,  0,  2,  1,  1,  1,  0,
0,  2,  2,  0,  2,  2,  1,  1,  2,  1,  1,  1,  1,  1,  2,  1,  2,
2,  0,  1,  2,  0,  1,  0,  0,  2,  0,  1,  1,  2,  1,  2,  0,  1,
2,  2,  0,  0,  0,  1,  2,  0,  0,  1,  1,  2,  1,  2,  1,  2,  2,
2,  2,  0,  0,  0,  1,  1,  0,  0,  1,  1,  0,  2,  1,  2,  1,  1,
1,  1,  2,  0,  1,  2,  1,  1,  1,  0,  0,  2,  0,  2,  0,  1,  1,
0,  0,  0,  0,  0,  2,  2,  1,  2,  0,  2,  0,  1,  1,  0,  1,  0,
0,  2,  2,  1,  2,  2,  0,  2,  0,  2,  2,  0,  0,  0,  0,  1,  1,
2,  1,  0,  2,  2,  2,  1])
```

```
def show_clusters(X, cluster):
    # Create a DataFrame containing data points and their cluster labels
df = DataFrame(dict(x=X[:, 0], y=X[:, 1], label=cluster))

    # Define colors for each cluster label     colors = {-1: 'red', 0:
'blue', 1: 'orange', 2: 'green', 3: 'pink'}

    # Create a Matplotlib figure and axis for the plot
fig, ax = plt.subplots(figsize=(8, 8))

    # Group data points by their cluster labels
grouped = df.groupby('label')

    # Plot each cluster with a different color     for key, group in grouped:
group.plot(ax=ax, kind='scatter', x='x', y='y', label=key, color=colors[key])

    # Set labels for the x-axis and y-axis
plt.xlabel('X_1')     plt.ylabel('X_2')

    # Show the plot
plt.show()
```

```
show_clusters(X, cluster)
```