

# Artificial Intelligence and Machine Learning

## LAB 5

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5. For a dataset, implement K-means clustering algorithm and visualize the clusters.

Program:

```
import numpy as np
import matplotlib.pyplot as plt
from sklearn.cluster import KMeans

# Sample data points
data = np.array([
    [1, 2], [2, 1], [3, 4], [5, 7], [3, 5], [8, 7], [6, 9], [7, 5], [8, 6],
    [15, 18], [16, 20], [14, 17], [13, 16], [18, 22], [19, 21],
    [25, 5], [24, 6], [23, 5], [26, 7], [22, 4],
])

# Create and fit the KMeans model with 2 clusters
kmeans = KMeans(n_clusters=3, random_state=42)
kmeans.fit(data)

# Get cluster assignments for each point
clusters = kmeans.labels_

# Get centroid locations
centroids = kmeans.cluster_centers_

# Plot the clusters and centroids
colors = ['red', 'blue', 'violet']
for i in range(3):
    points = data[clusters == i]
    plt.scatter(points[:, 0], points[:, 1], c=colors[i], label=f'Cluster {i+1}')
plt.scatter(centroids[:, 0], centroids[:, 1], c='green', marker='X', s=100, label='Centroids')
plt.legend()
plt.show()
```

OUTPUT:

