A Novel Density Peaks Clustering Algorithm Based on K Nearest Neighbors With Adaptive Merging Strategy

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Research

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Abstract

Recently the density peaks clustering algorithm (dubbed as DPC) attracts lots of attention. The DPC is able to quickly find cluster centers and complete clustering tasks. And the DPC is suitable for many clustering tasks. However, the cutoff distance d_{dc} is depends on human experience which will greatly affect the clustering results. In addition, the selection of cluster centers requires manual participation which will affect the clustering efficiency. In order to solve these problem, we propose a density peaks clustering algorithm based on K nearest neighbors with adaptive merging strategy (dubbed as KNN-ADPC). We propose a clusters merging strategy to automatically aggregate the over-segmented clusters. Additionally, the K nearest neighbors is adopted to divide points more reasonably. The KNN-ADPC only has one parameter and the clustering task can be conducted automatically without human involvement. The experiment results on artificial and real-world datasets prove the higher accuracy of KNN-ADPC compared with DBSCAN, K-means++, DPC and DPC-KNN.

Full Text

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Figures

Figure 1

Misallocation diagram.

Figure 1

Misallocation diagram.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 2

The performance of each algorithm on Flame.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 2

The performance of each algorithm on Flame.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 3

The performance of each algorithm on Jain.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 3

The performance of each algorithm on Jain.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 4

The performance of each algorithm on Aggregation.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 4

The performance of each algorithm on Aggregation.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 5

The performance of each algorithm on Spiral.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 5

The performance of each algorithm on Spiral.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 6

The performance of each algorithm on R15.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 6

The performance of each algorithm on R15.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 7

The performance of each algorithm on D4.

DBSCAN

k-means++

DPC

DPC-KNN

KNN-ADPC

Figure 7

The performance of each algorithm on D4.

Figure 8

The performance of each algorithm on D9.

Figure 8

The performance of each algorithm on D9.