HSC: A SPECTRAL CLUSTERING ALGORITHM COMBINED WITH HIERARCHICAL METHOD

Li Liu[*], Xiwei Chen[*], Dashi Luo[*], Yonggang Lu[*], Guandong Xu[†], Ming Liu[‡]

Abstract: Most of the traditional clustering algorithms are poor for clustering more complex structures other than the convex spherical sample space. In the past few years, several spectral clustering algorithms were proposed to cluster arbitrarily shaped data in various real applications. However, spectral clustering relies on the dataset where each cluster is approximately well separated to a certain extent. In the case that the cluster has an obvious inflection point within a non-convex space, the spectral clustering algorithm would mistakenly recognize one cluster to be different clusters. In this paper, we propose a novel spectral clustering algorithm called HSC combined with hierarchical method, which obviates the disadvantage of the spectral clustering by not using the misleading information of the noisy neighboring data points. The simple clustering procedure is applied to eliminate the misleading information, and thus the HSC algorithm could cluster both convex shaped data and arbitrarily shaped data more efficiently and accurately. The experiments on both synthetic data sets and real data sets show that HSC outperforms other popular clustering algorithms. Furthermore, we observed that HSC can also be used for the estimation of the number of clusters.

Key words: *Data mining, clustering, spectral clustering, hierarchical clustering*

Received: May 9, 2013
Revised and accepted: October 24, 2013

1. Introduction

Clustering is a powerful tool to analysis data by assigning a set of observations into clusters so that the points in a cluster have high similarity and points in

[*]Li Liu, Xiwei Chen, Dashi Luo, Yonggang Lu
School of Information Science and Engineering, Lanzhou University, Gansu 730000, P.R.China
{liliu,chenxw2011,luodsh12,ylu}@lzu.edu.cn
[†]Guandong Xu
Advanced Analytics Institute, University of Technology Sydney, NSW 2008, Australia
Guandong.Xu@uts.edu.au
[‡]Ming Liu
School of Electrical and Information Engineering, The University of Sydney, NSW 2006, Australia
ming.liu@sydney.edu.au

