

Using Hyper Clustering Algorithms in Mobile Network Planning

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Abstract: Problem statement: As a large amount of data stored in spatial databases, people may like to find groups of data which share similar features. Thus cluster analysis becomes an important area of research in data mining. Applications of clustering analysis have been utilized in many fields, such as when we search to construct a cluster served by base station in mobile network. Deciding upon the optimum placement for the base stations to achieve best services while reducing the cost is a complex task requiring vast computational resource. **Approach:** This study addresses antenna placement problem or the cell planning problem, involves locating and configuring infrastructure for mobile networks by modified the original density-based Spatial Clustering of Applications with Noise algorithm. The Cluster Partitioning around Medoids original algorithm has been modified and a new algorithm has been proposed by the authors in a recent work. In this study, the density-based Spatial Clustering of Applications with Noise original algorithm has been modified and combined with old algorithm to produce the hybrid algorithm Clustering Density Base and Clustering with Weighted Node-Partitioning around Medoids algorithm to solve the problems in Mobile Network Planning. **Results:** Implementation of this algorithm to a real case study is presented. Results demonstrate that the proposed algorithm has minimum run time minimum cost and high grade of service. **Conclusion:** The proposed hyper algorithm has the advantage of quick divide the area into clusters where the density base algorithm has a limit iteration and the advantage of accuracy (no sampling method is used) and highly grade of service due to the moving of the location of the base stations (medoid) toward the heavy loaded (weighted) nodes.

Key words: Clustering techniques, network planning, cell planning mobile network, Mobile Switching Center (MSC), Artificial Intelligence (AI), research area, spatial data, Base Station (BS), Genetic Algorithm (GA)

INTRODUCTION

Clustering is one of the most important research areas in the field of data mining (Velmurugan and Santhanam, 2011; Suguna and Thanushkodi, 2011); it specializes in techniques for grouping similar objects into a cluster in which objects inside a cluster exhibit certain degree of similarities. It separates dissimilar objects into different clusters. In geometry aspect, clustering is a process to identify dense regions, which are separated by the sparse regions, in the data space to be clusters from the whole data space. Applications of clustering analysis have been utilized in many fields, especially in spatial data

analyzing. As large amounts of data are obtained from satellite increasingly, finding clusters in spatial data becomes an active research area.

In mobile network, each cellular service area is divided into regions called cells. Each cell contains an antenna and is controlled by a solar or AC power network station, called the Base Station (BS). Each base station, in turn, is controlled by a switching office, called a Mobile Switching Center (MSC). The MSC coordinates communication between all the base stations and telephone central office. Cell planning is challenging due to inherent complexity, which stems from requirements concerning radio modeling and

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