ENHANCING CLUSTERING NETWORK PLANNING ALGORITHM IN THE PRESENCE OF OBSTACLES

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Abstract: Clustering in spatial data mining is to group similar objects based on their distance, connectivity, or their relative density in space. In real word, there exist many physical obstacles such as rivers, lakes, highways and mountains, and their presence may affect the result of clustering substantially. Today existing telephone networks nearing saturation and demand for wire and wireless services continuing to grow, telecommunication engineers are looking at technologies that will deliver sites and can satisfy the required demand and grade of service constraints while achieving minimum possible costs. In this paper, we study the problem of clustering in the presence of obstacles to solve network planning problem. In this paper, COD-DBSCAN algorithm (Clustering with Obstructed Distance - Density-Based Spatial Clustering of Applications with Noise) is developed in the spirit of DBSCAN clustering algorithms. We studied also the problem determine the place of Multi Service Access Node (MSAN) due to the presence of obstacles in area complained of the existence of many mountains such as in Saudi Arabia. This algorithm is Density-based clustering algorithm using BSP-tree and Visibility Graph to calculate obstructed distance. Experimental results and analysis indicate that the COD-DBSCAN algorithm is both efficient and effective.

1 INTRODUCTION

In network planning process, one of the difficult task which are facing Telecommunication Company is determining the best place and numbers of Multi Service Access Node (MSAN).

The process of network planning is divided into two sub problems: determining the location of the switches or MSAN and determining the layout of the subscribers' network lines paths from the switch to the subscribers while satisfying both cost optimization criteria and design constraints. Due to the complexity of this process artificial intelligence (AI) (Fahmy and Douligeris, 1997); (El-Dessouki et al., 1999) partitioning clustering techniques (Fattouh, et al., 2003); (Fattouh and Al Harbi, 2008a); (Al Harbi and Fattouh, 2008); (Fattouh and Al Harbi, 2008b); (Fattouh, 2006); (Fattouh, 2005); (Fattouh et al., 2005) has been successfully deployed in a number of areas.

Clustering technique will be used for helping engineers to improve the network planning by determining the place of MSAN. Clustering is one of the most useful tasks in data mining process. There are many algorithms that deal with the problem of clustering large number of objects. The different algorithms can be classified regarding different aspects. These methods can be categorized into partitioning methods (Kaufman and Rousseeuw, 1990); (Han et al., 2001); (Bradly et al., 1998); hierarchical methods (Kaufman and Rousseeuw, 1990); (Zhang et al., 1996); (Guha et al., 1998); density based methods (Ester et al., 1996); (Ankerst et al., 1999); (Hinneburg and Keim, 1998), grid based (Wang et al., 1997); (Sheikholeslami et al., 1998), (Agrawal et al., 1998) methods, and model based methods (Shavlik and Dietterich, 1990); (Kohonen, 1982). The clustering task consists of separating a set of objects into different groups according to some measures of goodness that differ according to application. The application of clustering in spatial databases presents important characteristics. Spatial databases usually contain very large numbers of points. Thus, algorithms for

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