استخدام تقنيات الجموعة في تخطيط شبكة الجوال

M-PAM (Modified-Partitioning Around Medoids).

CWN-PAM (Clustering with Weighted Node-Partitioning Around Medoids).

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Employing Clustering Techniques in Mobile Network Planning

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Abstract

With the rapid development in mobile network, we need effective network planning tool to satisfy the need of customers. However, deciding upon the optimum placement for the base stations (BS's) to achieve best services while reducing the cost is a complex task requiring vast computational resource. This thesis addresses antenna placement problem or the cell planning problem, which involves locating and configuring infrastructure for mobile networks by modifying the original Partitioning Around Medoids PAM algorithm. M-PAM (Modified-Partitioning Around Medoids) and CWN-PAM (Clustering with Weighted Node-Partitioning Around Medoids) have been proposed to satisfy the requirements and constraints.

PAM needs to specify number of clusters (k) before starting to search for the best locations of base stations. The M-PAM algorithm uses the radio network planning to determine k. Radio network planning is divided into coverage planning phase and capacity planning phase, the number of base stations that the planned area needs to run a mobile network are determined in each phase. The maximum number of base stations got in two planning phases will be chosen as the initial value of number of clusters (k) since each cluster is served by one base stations. CWN-PAM is based mainly on the idea of the M-PAM algorithm by modifying the cost function. In CWN-PAM algorithm, the weights are associated with intersection nodes and represent the subscribers loads, therefore the location of the base stations will move toward the heavy weighted nodes, while in M-PAM algorithm, clustering distance represents a direct distance without weight.

Boundary of each cluster is determined by proposed algorithms. For each cluster, we calculate for each cluster its coverage and capacity and determine if they satisfy the mobile requirements, if not we will increase (k) and reapply algorithms depending on two methods for clustering: the first method will cluster the whole covered area by increasing (k) until specify mobile requirements, the second method will cluster each cluster that had a problem in its coverage or capacity or both individually by increasing it's (k) until specify mobile requirements. Finally, We got four algorithms, we compared between them in terms of total number of base stations which effect the total planning cost and in terms of run time.

Experimental results and analysis indicate that the CWN-PAM algorithm is effective in case of non-homogeneous heavy load distribution, and leads to minimum number of base stations, which positively affect onto the cost of planning the network.