Session: Location

Discrete Location Models for Internet Content Distribution

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Abstract

Content Distribution Networks (CDN) have emerged as a new technology to overcome the problems due to the fast growth of the web-related traffic on the Internet, such as slow response times and heavy server loads. These networks maintain a number of proxy servers throughout the Internet, which totally or partially replicate the content of the main server and serve a set of clients. Thus, latency perceived by the clients and the total traffic flowing on the Internet is reduced. In a CDN, one has to decide on where to place the proxies among a given set of potential sites, which clients should be assigned to the installed proxies and which content should each proxy hold.

In this research, we first review the existing models used for content distribution, such as the classical p-median and facility location models. We then argue why these models are not always adequate for a CDN and propose a novel binary integer programming model that takes into account all the decisions simultaneously. Two types of heuristics, namely a greedy and a Lagrangean type, to solve the model are described. Computational results of the heuristics on randomly generated Internet topologies are also presented.

Keywords: Content distribution network, Integer programming, Lagrangean relaxation.