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AN ITERATIVE EXACT ALGORITHM OVER A TIME-EXPANDED NETWORK FOR THE TRANSPORTATION OF BIOMEDICAL SAMPLES

Speaker:

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ABSTRACT

In this talk I will present an iterative algorithm to address the optimization problem of distributing a set of multiple highly perishable commodities in a healthcare network. In the biomedical sample transportation problem, numerous commodities with short lifespans presume multiple transportation requests at the same facility in a day and restrict the maximum time to reach their destination. These two characteristics create an interdependency between the routing and the pickup decisions in time that is highly complex. To address these timing issues, we model this problem as a service network-design problem over a time-expanded network and propose an iterative exact method based on a dynamic discretization discovery (DDD) algorithm. Our solution method aggregates the network at two levels. First, the commodities are aggregated and artificially consolidated, reducing the symmetry arising when multiple transportation requests are solicited within a short period of time. Second, the space-time nodes in the network are constructed dynamically, thus reducing the size of the mathematical model to be solved at each iteration. Moreover, it creates auxiliary networks to calculate good quality primal bounds to the problem. Our algorithm proves to be efficient to solve a set of real-life instances from the Quebec laboratory network under the management of the Ministère de la santé et des services sociaux (Ministry of Health and Social Services) with a detailed network of up to 2377 periods and 277 transportation requests.

BIOSKETCH

Industrial engineer with a Ph. D. in administration science, Ana María is an associate professor in Operations Management at the Université du Québec à Montréal Business School (ESG-UQAM). She is mainly concerned about the planning, design and optimization of the logistic network and distribution decisions in humanitarian and healthcare logistics. Her latest work focuses in fairness in distribution, network design with time dependencies, as well as efficient modelling and resolution approaches for real-life distribution challenges in healthcare.