Abstract

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Thesis title: **Optimal Route Selection and Intermediate Facility Location**

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This thesis focuses on finding routes between multiple starting and ending points (i.e., origin-destination pairs) with minimum total travel time when it is required to place a minimum number of facilities along each used path and when there is a limit on the total number of facilities that can be placed across the network. Such problems often occur in real-life problems like planning of routes for pilgrims, placement of childcare facilities along major commuting routes, routing problems involving electric vehicles, etc., where it is important to have facilities along travel routes. We formulate this problem as an integer linear program. To solve this problem, we proposed a genetic algorithm that selects suitable locations for facilities and routes for different endpoints. The proposed genetic algorithm uses a algorithm as a subroutine to determine paths corresponding to different origin-destination pairs given the facility locations as specified by the strings of the genetic algorithm. The developed algorithms are tested on a standard road network and the obtained results are compared with an existing optimization solver. The results show that the genetic algorithm finds solutions that are close to that obtained by the solver and in much less computational time. The effect of various parameters of the optimization problem were also analyzed.