

Location of Ambulances Considering Temporal Demand Variation Using a Genetic Algorithm Based Approach

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Abstract

Location of ambulances is an important decision in the planning of emergency medical services, which enables responding to patients within short response time, thus, reducing morbidities and saving lives. We consider an ambulance location problem that takes into account the variation in demand across the hours of day and also accounts for server level ambulance availability. The proposed problem considers a combination of performances measures including coverage and survival function for different patient types. A mixed integer programming (MIP) model is presented to model the problem. A solution approach based on the genetic algorithm that uses a mixed chromosome representation is developed. The proposed approach is applied on a realistic dataset generated based on an urban location in India. The effectiveness of the proposed solution approach was validated through comparison with results from commercial optimization software (CPLEX).

Keywords

Emergency Medical Services, Healthcare, Ambulance Planning, Genetic Algorithm and Location Allocation

Biographies

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Prof. Jitesh J. Thakkar is currently Professor at the National Rail and Transportation Institute, Vadodara. He obtained his Ph.D. and M.Tech. from IIT Delhi where he worked in the areas of Industrial Engineering. He has 20 years of teaching, research and industry experience. At present, he is guiding research in the areas of lean manufacturing, sustainable supply chain management, and service operations management. His publications have appeared in the journals - International Journal of Production Economics, Transportation Research (Part E), International Journal of Production Research, Computers and Industrial Engineering, Production Planning and Control and others. He is rendering his services as an editorial board member of OPSEARCH, International Journal of Quality and Reliability Management, International Journal of Productivity and Performance Management. He has trained Corporate Managers in Lean Manufacturing, Process Excellence, Six Sigma, Project Management, Quality Management, Supply Chain Management and Statistical Decision Making.