

## Synopsis

Optimal allocation of patients after major accident is important because there are several constraints such as limited capacities of hospitals, traffic congestion on the roads connecting the accident location to hospitals, etc. It becomes imperative to timely provide treatment to patients after such accidents in order to minimize the loss of lives. In this thesis, we propose a formulation to optimally allocate patients in order to minimize the total system travel time and the total waiting and treatment times of the patients while considering travel congestion and limited capacities of hospitals. The developed optimization formulation is non-linear and therefore we develop a genetic algorithm (GA) to solve it. We test the developed algorithm on a standard transportation network and find that the algorithm gives solution close to the optimal in reasonable time. We also perform the sensitivity analysis with various parameters such as the number of hospitals, hospital capacities, treatment times, etc. We also argue that the special case of the proposed optimization formulation when the travel times are fixed, is convex. Finally, for the special case of the problem where the travel times are fixed and there are no capacity constraints, we analytically derive the optimal solution.