Stochastic optimization is an optimization method that solve stochastic problems for minimizing or maximizing an objective function when there is randomness in the optimization process. In this dissertation, various stochastic optimization problems from the area of Manufacturing, Healthcare, and Information Cascade will be respectively investigated in networks systems. These stochastic optimization problems aims to make the plan for using the existed resources to improve production efficiency, custom satisfaction and information influence within limitation. Since the strategies are made for the future planning, there are uncertainties of environment in the networks systems. Sometimes, environment may be changed due to the action of the decision maker. To handle this decision dependent situation, the discrete choice model is applied to estimate the dynamic environment in the stochastic programming model. In the manufacturing project, production planning of lot allocation is made to maximize the expected output within limited time horizon. In the healthcare project, physician is allocated to different local clinic to maximize the patient utilization. In the information cascade project, seed selection of source user helps the information holder to diffuse the message to target user through independent cascade model to reach the influence maximization. The computation complexities of these three projects are exponentially growth by the network. To solve the stochastic optimization problems of large-scale network within a reasonable time, several problem-specific algorithms is designed for each project. In the manufacturing project, the sampling average approximation method is applied to reduce the scenario size. In the healthcare project, both the guided local search with gradient ascent and large neighborhood search with Tabu search is developed to approach the optimal solution. In the information cascade project, the myopic policy is used to separate stochastic programming by discrete time, and the Markov decision process is implemented in policy evaluation and updating.

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The public is welcome to attend.