Production Problems

SCFXM1
: SCFXM1 is real-world production scheduling problem of unknown origin. The problem is two stage, but can be extended to a multistage problem. The problem originated in Ho and Loute , and has been extended by Birge, Gassman, and Birge, et. al.

CEP1
: CEP1 is a two-stage machine capacity planning problem provided by Survajeet Sen (see, e.g. Higle and Sen).

STORM
: STORM is a two period freight scheduling problem described in Mulvey and Ruszczynski. (The problem was provided to the University of Michigan courtesy of Adam Berger). In this model, routes are scheduled to satisfy a set of demands at stage 1, demands occur, and unmet demands are delivered at higher costs in stage 2 to account for shortcomings.

Expansion and Planning Problems

SCAGR
: SCAGR is a multiperiod dairy farm expansion model. The problem first appeared in deterministic form in a chapter by Swart, Smith, and Holderby. The model was subsequently collected in electronic form by Ho and Loute and modified by Birge and Gassman.

SSN
: SSN is a telephone switching network expansion planning problem, discussed in Sen, Doverspike, and Cosares The model seeks to add capacity (lines) to a network of existing point-to-point connections so as to minimize the number of unfilled requests for service. Demand is defined as the number of requests for connections at a given instance of time, and is stochastic.

SC205
: SC205 is a dynamic multisector planning problem adapted by Ho and Loute from Manne's ETA model. The history of the model is unclear, but SC205 appears to be model whose goal is to determine a free market's ability to supply energy to an economy. Since the model appears to be a feasibility problem, it probably was formulated to find equilibrium points where shadow prices of energy sources are equal to their marginal costs of supply.

SCRS
: SCRS8, collected by Ho and first modified to include stochasticity by Birge, is a technological assessment model for the transition from nonrenewable to renewable energy sources. The model is a linearized version of the ETA model (Manne) which seeks to find the minimal cost strategy to meet future energy demands.

PLTEXP
: PLTEXP (Sims) is a stochastic capacity expansion model inspired by manufacturing flexibility research in Graves and Jordan. The model is similar to SSN in that it tries to allocate new production capacity across a set of plants so as to maximize profit subject to uncertain demand. However, instead of enumerating a set of possible expansions, PLTEXP explicitly models the expansion options with binary variables. The test version is the linearized relaxation.

PGP2
: PGP2 is an electrical capacity expansion problem developed by Louveaux and Smeers. (The problem was donated in digital format by Survajeet Sen, University of Arizona, and by H. I. Gassman) The two-stage stochastic program finds the minimal cost strategy for investing in various types of power plants.

STOCHFOR
: STOCHFOR is a multistage model developed by Gassman to determine logging levels to maximize output. The problem considers the risk of fire and of other environmental hazards. (The electronic form was donated by H. Gassman).

Finance Problems

Network Models of Mulvey and Vladimirou
: Mulvey and Vladimirou have created several two-stage network programs for finding the optimal investment strategy to meet cash flow needs in the face of uncertain investment returns. Although the formulations are two-stage in the formal sense, the second stage groups together multiple time periods. The goal of the model is to allocate funds to asset categories in each of four periods. Flows of funds between assets in a period have fixed marginal costs. Asset returns from one period to the next are modeled using stochastic multipliers on ``arcs'' from between periods. A scenario in this case is a realization of all future asset returns.

OPTN - An option selection model
: OPT is a multistage stochastic programming model for selecting a minimal (expected) cost option portfolio. The portfolio must guarantee that an acceptable level of dollar revenue will be obtained given that a known quantity of a foreign currency must be exchanged in the future. The model was first developed by Klaassen, et. al. and was digitized and slightly modified by Derek Holmes.

ALM: Asset Liability Management
: Kusy and Ziemba developed a multistage stochastic formulation called ALM to try to balance a bank's income stream from a set of assets against a set of liabilities. The assets are loans and investments with uncertain returns and varying levels of risk, and the liabilities are depositor's withdrawals from demand accounts.

Other Models

SCTAP1: Traffic Assignment

SCTAP1 is a stochastic version of a two stage traffic assignment problem given in Ho. The objective of the problem is to find a set of traffic flows over a network with multiple sources and one sink that minimizes some cost function. The cost function is a utility function associated with traffic congestion. The flow of traffic is governed by an ``exit function" for each arc which relates the amount of traffic entering and leaving an arc in a given period. This function is (in general) a nondecreasing, continuous concave function, which is linearized to form a problem in standard LP form.

SCSD: Design of a multistage truss

SCSD is a multistage model due to Ho which seeks to find the lowest weight truss design given a set of admissible joints in the plane and a load which the truss must bear. The structure is formed by placing bars between pairs of joints, and must satisfy constraints on maximum stress in each bar.

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