THE SOLVER MODULE FOR LINEAR STOCHASTIC PROBLEMS[1]

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The work is devoted to creation of software for the solution of linear stochastic problem of the type:

$$M\left(\sum_{j=1}^{n} c_j x_j\right) \to max,$$
$$P\left\{\sum_{j=1}^{n} a_{ij} x_j \le b_i\right\} \ge \alpha_i, i = 1, ..., m, \quad (1)$$
$$x_j \ge 0, j = 1, ..., n.$$

There are implemented two approaches for resolve problem (1).

The first approach – move to deterministic task.

It is known [1], if the elements of the matrix A and components of the vector b are mutually independent normally distributed random variable $a_{ij} \in N(\overline{a}_{ij},\ \sigma_{ij}^2)$, $b_i \in N(\overline{b}_i, \theta_i^2)$ and the condition $\alpha_i \ge 0.5,\ i = 1, ..., m$, then the problem (1) is reduced to deterministic problem of convex programming in the following form:

$$\sum_{j=1}^{n} \overline{c}_j x_j \to max,$$
$$\Phi^{-1}(\alpha_i)\left\{\sum_{j=1}^{n} \sigma_{ij}^2 x_j^2 + \theta_i^2\right\}^{\frac{1}{2}} + \sum_{j=1}^{n} \overline{a}_{ij} x_j \le \overline{b}_i, i = 1, ..., m, \quad (2)$$
$$x_j \ge 0, j = 1, ..., n.$$

For the solution of problem (2), provided that $x \in X$, where X – convex set, in the software package implements a method possible directions. In addition, there was conducted study based on statistical methods and simulation [2], the result of which are the conditions, in witch possible to use problem (2) to find the solution of problem (1) if the elements of the matrix A and vector b are mutually independent uniformly distributed random variable $a_{ij} \in R(\ \underline{a}_{ij},\ \overline{a}_{ij})$, $b_i \in R(\underline{b}_i,\ \overline{b}_i)$.

The second approach – a direct method for solving stochastic problems.

In developed software implemented design method of stochastic quasigradient [3] for solving problem (1), provided that $x \in X$, where X – convex set.

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