Maximax 机会约束规划

随机环境下， 为了根据某机会约束 在给定的置信水平下极大化乐观收益, 刘宝碇 (1999) 提出了以下机会约束规划 CCP:

$$\begin{cases} \max\ \overline{f} \\ \text{subject to:} \\ \qquad \Pr\left\{f(\mathbf{x},\boldsymbol{\xi}) \geq \overline{f}\right\} \geq \beta \\ \qquad \Pr\left\{g_j(\mathbf{x},\boldsymbol{\xi}) \leq 0, j=1,2,\cdots,p\right\} \geq \alpha \end{cases}$$

机会约束多目标规划 (CCMOP):

$$\begin{cases} \max\ \left[\overline{f}_1, \overline{f}_2, \cdots, \overline{f}_m\right] \\ \text{subject to:} \\ \qquad \Pr\left\{f_i(\mathbf{x}, \xi) \geq \overline{f}_i\right\} \geq \beta_i, \quad i = 1, 2, \cdots, m \\ \qquad \Pr\left\{g_j(\mathbf{x}, \xi) \leq 0\right\} \geq \alpha_j, \quad j = 1, 2, \cdots, p \end{cases}$$

机会约束目标规划 (CCGP):

$$\begin{cases} \min\limits_{\mathbf{x}} \sum\limits_{j=1}^{l} P_j \sum\limits_{i=1}^{m} (u_{ij} d_i^+ \vee 0 + v_{ij} d_i^- \vee 0) \\ \text{subject to:} \\ \qquad \Pr\left\{ f_i(\mathbf{x}, \boldsymbol{\xi}) - b_i \le d_i^+ \right\} \ge \beta_i^+, \quad i = 1, 2, \cdots, m \\ \qquad \Pr\left\{ b_i - f_i(\mathbf{x}, \boldsymbol{\xi}) \le d_i^- \right\} \ge \beta_i^-, \quad i = 1, 2, \cdots, m \\ \qquad \Pr\left\{ g_j(\mathbf{x}, \boldsymbol{\xi}) \le 0 \right\} \ge \alpha_j, \qquad\qquad j = 1, 2, \cdots, p \end{cases}$$

Minimax 机会约束规划

随机环境下， 为了根据某机会约束 在给定的置信水平下极大化悲观收益, 刘宝碇 (2002) 提出了以下 minimax CCP 模型:

$$\begin{cases} \max\limits_{\mathbf{x}} \min\limits_{\bar{f}} \bar{f} \\ \text{subject to:} \\ \qquad \Pr\left\{f(\mathbf{x},\boldsymbol{\xi}) \le \bar{f}\right\} \ge \beta \\ \qquad \Pr\{g_j(\mathbf{x},\boldsymbol{\xi}) \le 0, j = 1,2,\cdots,p\} \ge \alpha \end{cases}$$

minimax CCMOP 模型：

$$
\begin{cases}
\max\limits_{\mathbf{x}} \left[\min\limits_{\overline{f}_1} \overline{f}_1,\ \min\limits_{\overline{f}_2} \overline{f}_2, \cdots, \min\limits_{\overline{f}_m} \overline{f}_m \right] \\
\text{subject to:} \\
\qquad \Pr\left\{ f_i(\mathbf{x}, \boldsymbol{\xi}) \le \overline{f}_i \right\} \ge \beta_i, \quad i = 1, 2, \cdots, m \\
\qquad \Pr\{ g_j(\mathbf{x}, \boldsymbol{\xi}) \le 0 \} \ge \alpha_j, \quad j = 1, 2, \cdots, p
\end{cases}
$$

minimax CCGP 模型:

$$\left\{\begin{array}{l}\min\limits_{\mathbf{x}} \sum\limits_{j=1}^{l} P_j \sum\limits_{i=1}^{m} \left[u_{ij}\left(\max\limits_{d_i^+} d_i^+ \vee 0\right) + v_{ij}\left(\max\limits_{d_i^-} d_i^- \vee 0\right)\right] \\ \textbf{subject to:} \\ \qquad \Pr\left\{f_i(\mathbf{x},\xi) - b_i \geq d_i^+\right\} \geq \beta_i^+, \quad i = 1, 2, \cdots, m \\ \qquad \Pr\left\{b_i - f_i(\mathbf{x},\xi) \geq d_i^-\right\} \geq \beta_i^-, \quad i = 1, 2, \cdots, m \\ \qquad \Pr\left\{g_j(\mathbf{x},\xi) \leq 0\right\} \geq \alpha_j, \qquad\qquad j = 1, 2, \cdots, p\end{array}\right.$$