Maximax 机会约束规划

模糊 CCP,

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

其中 α 和 β 是置信水平.

模糊机会约束多目标规划 (CCMOP),

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

其中 $\alpha_1, \alpha_2, \cdots, \alpha_p, \beta_1, \beta_2, \cdots, \beta_m$ 是置信水平.

minimin 机会约束目标规划 (CCGP):

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

Minimax 机会约束规划

minimax CCP,

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

其中 $\min \overline{f}$ 是 β-悲观收益.

minimax CCMOP,

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

其中 α_j 和 β_i 是置信水平, 而 $\min \overline{f}_i$ 是收益函数 $f_i(\mathbf{x}, \boldsymbol{\xi})$ 的 β_i-悲观值, $i = 1, 2, \cdots, m$.

minimax CCGP:

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