linear_bilevel

For decision variables $x \in \mathbb{R}^{n_x}$ and $y \in \mathbb{R}^{n_y}$ fully linear bilevel program has the form

$$\begin{aligned}
\underset{x\in\mathbb{R}^{n_x},y^*\in\mathbb{R}^{n_y}}{\text{minimise}} \quad & {c_{\text{up}}}^\top x + {d_{\text{up}}}^\top y^* \\
\text{subject to} \quad & A_{\text{up}} x + B_{\text{up}} y^* \geq r_{\text{up}} \\
& \bar{x} \leq x \leq \underline{x} \\
& y^* \in \underset{y\in\mathbb{R}^{n_y}}{\arg\min} \begin{cases} {c_{\text{lo}}}^\top x + {d_{\text{lo}}}^\top y : \\ A_{\text{lo}} x + B_{\text{lo}} y \geq r_{\text{lo}} \\ \bar{y} \leq y \leq \underline{y} \end{cases}
\end{aligned}$$

where the program is parametrised by

Parameter	variable name	dimension
A_{up}	`A_upper`	$\in \mathbb{R}^{n_G \times n_x}$
B_{up}	`B_upper`	$\in \mathbb{R}^{n_G \times n_y}$
c_{up}	`c_upper`	$\in \mathbb{R}^{n_x}$
d_{up}	`d_upper`	$\in \mathbb{R}^{n_y}$
r_{up}	`rhs_upper`	$\in \mathbb{R}^{n_G}$
A_{lo}	`A_lower`	$\in \mathbb{R}^{n_g \times n_x}$
B_{lo}	`B_lower`	$\in \mathbb{R}^{n_g \times n_y}$
c_{lo}	`c_lower`	$\in \mathbb{R}^{n_x}$
d_{lo}	`d_lower`	$\in \mathbb{R}^{n_y}$
r_{lo}	`rhs_lower`	$\in \mathbb{R}^{n_g}$
$\bar{x}, \underline{x}$	`x_bounds`	$\in \mathbb{R}^{n_x}$
$\bar{y}, \underline{y}$	`y_bounds`	$\in \mathbb{R}^{n_y}$

We provide 20 data files to parametrise this problem. They are listed here with citations to the paper of origin.

- anandalingham_white_1990 [1, page 1172]
- ben_ayed_blair_1990a [2, page 557]
- bialas_karwan_1984a [3, page 1009]
- bialas_karwan_1984b [3, page 1016]
- candler_townsley_1982 [4, page 91]
- clark_westerberg_1988 [5]
- clark_westerberg_1990b [6, page 89]
- glackin_et_al_2009 [7, page 206]
- haurie_savard_white_1990 [8]
- hu_huang_zhang_2009 [9]
- lan_wen_shih_lee_2007 [10]

- liu_hart_1994 [11]
- mersha_dempe_2006_ex1 [12, page 5]
- mersha_dempe_2006_ex2 [12, page 7]
- tuy_et_al_1993 [14]
- tuy_et_al_1994 [15]
- tuy_et_al_2007_ex3 [13, page 551]
- visweswaran_et_al_1996 [16]
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