$r = (r_1, r_2, \dots, r_n)$

$\operatorname{sgn}(r_i) = \begin{cases} 0 & \text{si } r_i = 0 \\ 1 & \text{si } r_i > 0 \\ -1 & \text{si } r_i < 0 \end{cases}$

$d^k = \left(\frac{r_1}{|r_1|}, \frac{r_2}{|r_2|}, \dots, \frac{r_n}{|r_n|} \right)$

$d^k = \sum e^i \operatorname{sgn}(r_i)$

$\alpha_k = \frac{(r^k)^t d^k}{(d^k)^t A d^k} = \frac{\boxed{\sum |r_i|}}{\boxed{(d^k)^t \boxed{A d}^k}}$ $\quad \|r\|_1 \quad \sum_{i=1}^{n}$

$A \begin{pmatrix} 1 \\ \vdots \\ 1 \end{pmatrix}$

$d^t A d \leq \|A\|_2 n$

$r^t A^{-1} r \leq \|A^{-1}\|_2 \|r\|_2^2$

$\|r\|_2 \leq \|r\|_1$

$x^{k+1} = x^k + \alpha_k d^k = x^k + \frac{(r^k)^t d^k}{(d^k)^t A d^k} \qquad d^k = -$

$\|x^{k+1} - x^*\|_A^2 = \left(1 - \frac{(r^k)^t d^k \, (r^k)^t d^k}{(d^k)^t A d^k \, (r^k)^t A^{-1} r^k} \right) \|x^k - x^*\|_A^2 \leq \left(1 - \frac{\cancel{\|r^k\|_1^2}}{\|A\|_2 n \, \|A^{-1}\| \cancel{\|r^k\|_2^2}} \right)$