

Appendix 1

G-computation mapping and DR-IPTW mapping of the full data loss function

The G-computation loss function is defined as:

$$\begin{aligned} L_{Gcomp}(O) &= \sum_{a \in A} E\{(Y - \psi(A, V))^2 g(A|V) | A = a, W\} \\ &= \sum_{a \in A} E\{[Q_{02}(a, W) - 2Q_{01}(a, W)\psi(a, V) + \psi(a, V)^2]g(a|V) | A = a, W\}, \end{aligned}$$

where $Q_{01}(A, W) = E(Y|A, W)$ and $Q_{02}(A, W) = E(Y^2|A, W)$.

The DR-IPTW loss function is defined as

$$\begin{aligned} L_{DR}(O) &= (Y - \psi(A, V))^2 \frac{g(A|V)}{g(A|W)} - \frac{g(A|V)}{g(A|W)} E[(Y - \psi(A, V))^2 | A, W] \\ &\quad + \sum_{a \in A} E[(Y(a) - \psi(a, V))^2 | A = a, W]g(a|V), \end{aligned}$$

where $E[(Y - \psi(A, V))^2 | A, W] = Q_{02}(A, W) - 2Q_{01}(A, W)\psi(A, V) + \psi(A, V)^2$,

$E[(Y(a) - \psi(a, V))^2 | A = a, W] = Q_{02}(a, W) - 2Q_{01}(a, W)\psi(a, V) + \psi(a, V)^2$.