doc-concordance-formulas

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Obtain weighted estimate of the concordance between assigned risks and observed outcomes for one disease and one competing risk.

$T^{(0)}$ is time until censoring

$T^{(1)}$ is the time until disease

$T^{(2)}$ is the time until death from other causes

$S_0(t) = P(T^{(0)} > t)$

$T = \min\left(T^{(0)}, T^{(1)}, T^{(2)}\right)$

e indicates which of $T^{(0)}$, $T^{(1)}$, $T^{(2)}$ is the minimum and equal to T

r is here assigned risk

We observe (e, T, r)

The weighted estimate of concordance proposed by Blanche et al is

$$\hat{C} = \frac{\sum_{n_1=1}^{N} \sum_{n_2=1}^{N} w_{n_1} w_{n_2} A_{n_1} B_{n_2} 1\left(r_{n_1} > r_{n_2}\right)}{\left(\sum_{n_1=1}^{N} w_{n_1} A_{n_1}\right)\left(\sum_{n_2=1}^{N} w_{n_2} B_{n_2}\right)} \tag{1}$$

And the chunks I need to get the ROC picture are

$$\text{selectivity} = \frac{\sum_{n=1}^{N} w_n A_n 1\left(r_n > c\right)}{\sum_{n=1}^{N} w_n A_n} \tag{2}$$

$$\text{specificity} = \frac{\sum_{n=1}^{N} w_n B_n 1\left(r_n \leq c\right)}{\sum_{n=1}^{N} w_n B_n} \tag{3}$$

Use weighted Kaplan-Meier to estimate $S_0(t)$ and

$A_n = 1\left(T_n \leq t^* \text{ and } e_n = 1\right) \Big/ \hat{S}_0\left(T_n\right)$

$B_n = \left\{1\left(T_n > t^*\right) \Big/ \hat{S}_0(t^*)\right\} + \left\{1\left(T_n \leq t^* \text{ and } e_n = 2\right) \Big/ \hat{S}_0\left(T_n\right)\right\}$

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