Perform a statistical adjustement (reweighting)

Dominique Emmanuel

2016-03-01

Let $X^1, \ldots, X^n$ be some categorical variables, and for each variable X^i let $m^{i1}, \ldots, m^{in_i}$ be its levels, and let $X^{i1}, \ldots, X^{in_i}$ be the associated dummies. Let w be an initial weight. We call **adjustement** a weight w' such that :

- w' is as close as possible to w (L2 norm)
- $\sum_{k=1}^{N} w'_k = \sum_{k=1}^{N} w_k$
- $\forall k \;\; 0 \leq w_{\min} \leq w'_k \leq w_{\max}$
- the weighted values of each level m^{ij} is equal (and/or greater and/or lower) to specifed value v^{ij}.

Consequently

$$w' = \underset{\forall i,j \quad \sum_{k=1}^{N} x_k X_k^{ij} = v^{ij}}{\arg\min} \|x - w\|^2$$

NB: Any equality $\sum_{k=1}^{N} x_k X_k^{ij} = v^{ij}$ can be replaced by an inequality.