

3. Aggregation of marker similarities using an exact binomial test

Firstly, the weighted number of success x and the weighted number of trials w are calculated using these two formulas:

$$x = \underset{i=1}{\overset{n}{trail_i} \times weigth_i} \quad w = \underset{i=1}{\overset{n}{weigth_i}}$$

where

trial_i is equal to **0** *iff* the trial fail for marker_i or else is equal to **1** *iff* the trial success for marker_i. Those marker trials will then correspond to success or fail in a Bernoulli experiment.

Secondly, using x and w, an exact right-tailed binomial test is performed between the null hypothesis defined by the probability of success P (provided by the user) and the observed number of success x in the w number of trials. A low p-value can then be interpreted as a high proportion of marker successes corresponding to similar cell clusters.

Moreover, an aggregated similarity measure is computed using the following formula:

$$D = \sum_{i=1}^{n} D_i \times weigth_i$$

where

 D_i correspond to the similarity measure for marker_i.