

An Approximate Score Confidence Interval for The Difference of Proportions in Two Independent Populations

Assumptions

1. The data are Y_1 from a $b(n_1, p_1)$ population and Y_2 from a $b(n_2, p_2)$ population.
2. Y_1 and Y_2 are independent.

Formulas

A level L confidence interval for $p_1 - p_2$ is $\left(\tilde{p}_1 - \tilde{p}_2 - \hat{\sigma}(\tilde{p}_1 - \tilde{p}_2)z_{\frac{1+L}{2}}, \tilde{p}_1 - \tilde{p}_2 + \hat{\sigma}(\tilde{p}_1 - \tilde{p}_2)z_{\frac{1+L}{2}} \right)$, where $\tilde{p}_1 = \frac{y_1 + 0.25z_{(1+L)/2}^2}{n_1 + 0.5z_{(1+L)/2}^2}$, and $\tilde{p}_2 = \frac{y_2 + 0.25z_{(1+L)/2}^2}{n_2 + 0.5z_{(1+L)/2}^2}$, $\hat{\sigma}(\tilde{p}_1 - \tilde{p}_2) = \sqrt{\frac{\tilde{p}_1(1-\tilde{p}_1)}{n_1} + \frac{\tilde{p}_2(1-\tilde{p}_2)}{n_2}}$ is the estimated standard error of $\tilde{p}_1 - \tilde{p}_2$, and $z_{\frac{1+L}{2}}$ may be obtained from a table of normal quantiles ([click here](#)).

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