

Evaluation of the power of Goodness-of-Fit tests for the comparison of data distributions

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Many Goodness-of-Fit tests have been collected in a new open-source Statistical Toolkit: Chi-squared, Kolmogorov-Smirnov, Goodman, Kuiper, Cramer-von Mises, Anderson-Darling, Tiku, Watson, as well as novel weighted formulations of some tests. None of the Goodness-of-Fit tests included in the toolkit is optimal for any analysis case. Statistics does not provide a universal recipe to identify the most appropriate test to compare two distributions; the limited available guidelines derive from relative power comparisons of samples drawn from smooth theoretical distributions. A comprehensive study has been performed to provide general guidelines for the practical choice of the most suitable Goodness-of-Fit test under general non-parametric conditions. Quantitative comparisons among the two-sample Goodness-of-Fit tests contained in the Goodness-of-Fit Statistical Toolkit are presented.

This study is the most complete and general approach so far available to characterize the power of goodness-of-fit tests for the comparison of two data distributions; it provides guidance to the user to identify the most appropriate test for his/her analysis on an objective basis.

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