Presný test rozptylu
Exact Test of Dispersion

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The presented article proposes a non-parametric alternative for testing for equal variance between two samples. The test is applicable under the assumptions, that both samples are random samples from their respective populations, the measurement scale is continuous and there is independence assumed between and within the samples.

In the first part of the article the test statistic and its distribution under the null hypothesis are derived.

The second part consists of results of a series of simulations that we conducted in order to examine the behavior of the test and compare and contrast it to F-test, a parametric test of equal variance. Firstly, we conducted three sets of experiments (for normal, heavy-tailed and skewed data) to compare the power of our test and that of the F-test as proportion of correctly rejected null hypotheses while alternating both level of significance and the effect size. Secondly, we varied the sample sizes to see, how the test would behave with increasing number of data. In this case we only worked with normal distribution.
Thirdly, we simulated non-equal sample sizes. In these circumstances we worked with normal and skewed distribution.

In the final part the conclusions drawn from the results of preliminary simulations are summarized:

a) With small samples of equal size the F-test has better performance as for the higher statistical power at every significance level and effect size
b) Our test is more conservative as the false rejection rate is always lower than the significance level and always less than that of the F-test
c) The power of our test increases with greater sample sizes, however it's power at sample size 300 roughly equals to that of the F-test at sample size 30
d) Our test is more sensitive than the F-test to unequal sample size effect
e) Our test is less sensitive to non-normality in situations with the null hypothesis being in fact true, where the F-test fails, and is therefore more robust. However, this breaks down as the samples become more unequal as for their size
f) Because of the exact nature of our test it can be used with small samples
g) Where the normal approximation applies, our test is computationally less intensive than the F-test, as it does not calculate variances

Key words: statistics, test, dispersion, variance, F-test, binomial distribution

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