Statistical simulation as a tool for solving problems and expanding the scope of classical criteria of testing statistical hypotheses

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The present report is devoted to solving the problems that limit the application field of some groups of parametric and nonparametric tests of statistical hypotheses on the basis of statistical simulation. In particular, the application of nonparametric goodness-of-fit tests (Kolmogorov, Kuiper, Cramer-von Mises-Smirnov, Watson, Anderson-Darling and Zhang tests) for composite hypotheses (Lemeshko(2014)) is discussed. Problems associated with the usage of special tests for normality are discussed, in particular, it has been shown that some tests can be biased against some competing hypotheses (Lemeshko(2015)). Similar disadvantages associated with the application of of some nonparametric goodness-of-fit tests (especially Zhang test) for testing normality have been noted.

Similar problems, limiting the application of special tests for uniformity, have been considered. In particular, it has been shown, that some uniformity tests turns out to be biased against close competing hypotheses, corresponding to the distributions which distribution function intersects the distribution function of a uniform law (Lemeshko(2016)). It has been noted that, unfortunately, a large part of nonparametric goodness-of-fit tests have the same disadvantage (Kolmogorov, Cramer-von Mises-Smirnov, Anderson-Darling tests and, to a smaller extent, Zhang test).

Another topic for discussion is the experience of using statistical simulations as a research tool that allows making correct statistical conclusions in the case of violation of standard assumptions for the application of various statistical tests, in particular, tests for randomness and lack of a trend, tests of homogeneity of variances, etc.

References

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