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Inference Procedures about Population Correlations Under Order Restrictions

Abstract

The testing of equality of several Pearson correlations can be found in a number of scientific fields. We surmise in many such cases that the alternatives of interest in practice are, in deed, order restricted, and therefore the researcher is best served by use of testing procedures developed for those specific alternatives. In this note we introduce a collection of tests for use in testing equality of k correlation coefficients against order alternatives, with an emphasis on simple order. Specifically, we propose likelihood ratio tests and contrast tests based on the well known Fisher Z transformation as well as tests which make use of generalized variable methodologies. The proposed procedures are empirically compared with regards to type I and II error rates via Monte Carlo simulations studies, and the use of the approaches are illustrated using an example. These tests are found to be vastly superior to tests for the general alternative, and the contrasts tests based on the Fisher Z transformation are recommended for practice based on the observed test properties and simplicity.

Key words: Order restricted inference, correlation, Fisher's Z transformation.

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