Algebraic properties of some contingency tables

Oskar Maria Baksalary, <u>Jan Hauke</u>

Adam Mickiewicz University, Poznań, Poland

Abstract

A chi-squared test as one of the most popular nonparametric independence tests can be performed using contingency tables, which summarize the relationship between several categorical variables. From the algebraic point of view, a contingency table as a two-way table is a matrix of non-negative integers showing cross-classification.

The idea of using such tables for the test was proposed by [1] and is based on comparing the "distance" of the empirical array of contingencies with its theoretical counterpart - expressing the full invariance. The properties of the contingency tables are still in the interest of researchers (see [2]). The aim of the paper is to analyse some algebraic properties of a square and symmetric contingency tables as matrices and their theoretically equalized counterparts.

Keywords

Contingency table, chi squared test.

References

[1] Pearson, K.(1904). *On the Theory of Contingency and its Relation to Association and Normal Correlation*, Dulau and Co., London, UK.

[2] Dobra A., et al. (2009). *Algebraic statistics and contingency table problems: Log-linear models, likelihood estimation, and disclosure limitation. Emerging applications of algebraic geometry, 63–88*. Springer New York.