ABSTRACT

In the statistical literature for testing differences of two or more populations in an ordinal table, we normally use Pearson's chi-squared test(1900), Wilcoxon test(1945), Mantel's test(1963) and Nair's test(1986). In those tests, Pearson's chi-squared test does not have good power against ordered alternatives and the Wilcoxon test or Mantel's test has high powers for detecting linear responses, but poorly behaves for detecting non-linear responses which we are interested in this thesis. Nair's test is, specially designed to detect dispersion alternatives.

Jayasekara and Yanagawa(Bulletin of informatics and Cybernetics, 31(1999), 180-190) have proposed a statistical test called Q_t test which has higher powers for non-linear responses in $2 \times k$ ordered categorical tables. The purpose of this research work is to extend the Q_t test for testing ordered categorical data in $r \times k$ tables.

The proposed Statistic is expressed as functions of the Wilcoxon test and a test whose score is orthonormal to the Wilcoxon score.

The asymptotic distributions of the proposed test are obtained both under the null and alternative hypothesis.

Considering the linear and non-linear response patterns, the asymptotic powers of the proposed test are computed.

Also using the simulation, the proposed test was compared with Mantel's test and Pearson's Chi-squared test. It is shown that the test is superior to Pearson's chi-squared test and Mantel's test in many cases.