A STUDY ON EXACT DISTRIBUTIONS OF
THE KAO AND CHAKRABORTI'S
STATISTICS FOR COMPARING
TREATMENTS WITH A CONTROL IN A
RANDOMIZED COMPLETE BLOCK DESIGN

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Abstract

In this study, the exact distributions of the Kao and Chakraborti’s Statistics for comparing treatments with a control in a randomized complete block design are obtained. Some exact critical values found from this distribution are also given. A great many differences for this statistics have been found between the cumulative probability values by the usual approach proposed by Kao and Chakraborti and those of the exact distributions, even when the sample size is inadequate.

Keywords: Two-way classification, Joint rank test, Simulation.

1. Introduction

In many fields such as industry, agriculture, and health care, it is more important to know whether carrying out a task with a newly-suggested method, in place of a commonly used method taken as a standard or control, causes improvements than it is to know whether it merely brings about change. For example, it is highly important for those involved in implementation in a given area of study to know whether patients treated with a newly-developed drug recover more quickly than those treated with a standard drug, or whether a newly-produced fertilizer is more productive than the standard one. Suppose that an experiment has been designed to identify, in various kinds of soil, whether a newly-developed fertilizer is better than the standard one. Such a problem may be formulated as a one-tailed hypothesis test, called a randomized complete block design, in which soil types are blocks, newly-developed fertilizers are treatments, and the standard fertilizer is control. For the test, we suppose that a one-tailed comparison of $t$ treatments in $b$ blocks with a control has been designed.

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