Los Alamos Environmental Restoration

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(1965), 52, 1 and 2, p. 203 (Vol. 52, Nos. 1+2) Gehan, 1965, 1296
Great Britain

A generalized Wilcoxon test for comparing arbitrarily singly-censored samples*

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1. SUMMARY

distribution-free two-sample test is proposed that is an extension of the Wilcoxon test ples with arbitrary censoring on the right. The test is conditional on the pattern ervations. The null hypothesis is

$$H_0: F_1(t) = F_2(t) \quad (t \leqslant T) \text{ against either}$$
$$H_1: F_1(t) < F_2(t) \quad (t \leqslant T) \text{ or}$$
$$H_2: F_1(t) < F_2(t) \quad \text{or} \quad F_1(t) > F_2(t) \quad (t \leqslant T),$$

where F_1, F_2 are cumulative distributions (discrete or continuous) of the observations and T is their upper limit. The test is shown to be asymptotically normal and consistent against one-sided alternatives $F_1(t) < F_2(t)$ $(t \leqslant T)$ and against two-sided alternatives where either $F_1(t) < F_2(t)$ or $F_1(t) > F_2(t)$ $(t \leqslant T)$. The asymptotic efficiency of the test relative to the efficient parametric test when the distributions are exponential is at least 0·75 and increases h degree of censoring. When H_0 is true, the test is not seriously affected by real differences e percentage censored in the two groups. Some comparisons are made for five cases of ng degrees of censoring and tying between probabilities from the exact test and those the proposed test and these suggest the test is appropriate under certain conditions the sample size is five in each group. A worked example is presented and some sion is given to further problems.

2. INTRODUCTION

The statistical problem considered in this paper arises in clinical trials comparing two treatments, where the observation for each patient is often time to failure or censoring (sometimes referred to as loss). In fact, the results are relevant for distributions other than failure times and in fields of application outside medicine. However, the discussion is in terms of failure times since most applications are of this type and it is convenient to use medical terminology.

A common problem in a clinical trial is to compare two treatments for their ability to prolong life or maintain a patient in a well state. Patients enter study serially in time and are randomly allocated to one of two treatments. At a time T after the start of the study, an observation is recorded of time to failure (death or relapse) or censoring from observation (patient still alive or in remission at T). In general, $n_i - r_i$ individuals have failed and r_i are censored at time T $(i = 1, 2)$, but because patients have entered at different times, the times to censoring will differ among patients.

A special case has been considered by Halperin (1960) in an industrial life-testing context.

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(Received this from Randy Rytti - He might have complete copy.) MB