Abstract: Survival time is defined as the time duration until a certain event occurs. It is of interest for researchers to estimate the distribution of survival time, and to determine what factors and how these factors may be associated with survival time. Unlike other statistical data, survival data has its own features, which leads to many statistical methods not applicable. In addition to non-normality, censoring and truncation are two typical features. For left-truncated and interval-censored (LTIC) data, Shen (2015) derived a class of two-sample rank-based tests from weighted log-rank tests with weight parameters $(\rho, \gamma)$. However, it may be challenging to choose the weight parameters. In this thesis, a new model-based linear rank-type test is proposed to compare survival distributions for LTIC data, which is derived from a proportional reversed hazard (PRH) model. Extensive simulation studies are conducted to examine the performance of the proposed test including the test size and power, and normality of the test statistic. Two scenarios are considered to investigate the robustness of the proposed test: when assumed model is true or false. The proposed test is also compared with an existing method. For illustration, the proposed test is applied to the AIDS Blood Transfusion Data collected by the Centers for Disease Control (CDC) (Kalbfleisch and Lawless, 1989).

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