

Title: An Information Ratio based Goodness-of-fit Test for Copula Models on Censored Data

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Abstract

Copula is popular for modeling the dependence between marginal distributions in multivariate censored data, such as interval-, right- censored, and recurrent events. Given that there is a vast diversity of copula models, one critical question is whether the fitted copula model is a good fit for the data. However, no formal goodness-of-fit (GOF) test exists for copula specification in interval censoring or recurrent events. To address this critical issue, we develop a novel information ratio (IR)-based goodness-of-fit test for diagnosing copula-based survival models. It is the first method that handles interval-, right-censored and recurrent events. It applies to any copula family with a parametric form, including Archimedean and Gaussian families. It also works for copula models with more than one dependence parameter. The test statistic is simple to calculate, and the test procedure is straightforward to implement. We prove its asymptotic consistency and normality. We propose a parametric bootstrap procedure to carry out our test procedure and achieve high computational efficiency through parallel computing. The simulation results show that our method can control type-I errors well and achieve satisfactory power performance when the dependence strength (in terms of Kendall's τ) is moderate to high. Finally, we employ our method to test a list of copula models in multiple real datasets and our method exhibits strong differentiating power.

Key words: copula, goodness-of-fit, information ratio, interval censoring, recurrent events