Goodness-of-Fit Tests for Censored and Truncated Data: A Gaussian Process Approach

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Abstract

We aim to test for $\mathcal{H}_0 : F = F_{\theta_0}$ for some $\theta_0 \in \Theta \subset \mathbb{R}^p$, when a target variable $X \sim F$ is censored and/or truncated. Let $W \sim G$ be an auxiliary vector of censoring and truncation random variables, independent of X. We observe $Z = T(X, W)$ only when $B(X, W) = 1$, for known measurable mappings T and B with $\alpha \equiv P(B(X, W) = 1) > 0$. For several relevant censoring and truncation models we characterize the null hypothesis by the equality $E_{F_0,G}[g_\varphi(Z_1, \theta_0, G)] = 0$, with $F_0 \equiv F_{\theta_0}$, along a rich class of φ-functions, where Z_1 denotes a random variate distributed as Z conditionally on $B(X, W) = 1$ and g_φ is a score function depending on φ. An omnibus test for $\mathcal{H}_0$ based on a Maximum Mean Discrepancy principle is proposed and its properties are investigated theoretically and empirically by simulations and a real data application.