Statistics Assessment

ENSAE ParisTech

December 2015

Let $(X_1, ..., X_n)$ $\mathcal{B}e(\alpha, \beta)$ iid, $(\alpha, \beta) \in \mathbb{R}_+^{*2}$ unknown. The goal is to numerically estimate α and β.

1. Suggest an estimator, using the method of moments.
2. Explain why the maximum likelihood estimator can only obtained numerically. How one should utilize the Newton-Raphson algorithm to get this estimator? Implement it in R on simulated data.
3. Graphically, compare the two estimators, for different values of n.
4. Explain how to adapt the previous algorithm to perform a Wald test on the hypothesis $H_0 : \alpha = \beta$. Implement it for a given asymptotic level (for instance 5%) on simulated data (under H_0, and for an arbitrary value of $\alpha = \beta$). For different values of n, compute the non-asymptotic threshold of the test.