Semiparametric distribution function estimation using polynomial functions

Jongho Im, Kosuke Morikawa, and Hyung-Tae Ha

Abstract

The density function can be approximated using the polynomial functions. The coefficients of the polynomial functions are determined either from a moment-matching method or by a minimizing the integrated squared error with respect to a given weighting function. From the primary density approximation results, we can implement density estimation using the moment-matching technique by replacing the true moments with the sample moments. However, this moment-matching estimator often requires existence of higher moments and does not use other available information except for the sample moments. To avoid those disadvantages, we propose a semi-parametric distribution function estimation with percentile-matching technique employing a bench marking distribution function estimator such as the empirical distribution function. The proposed estimator expresses the target density function as the product of initial density guess referred to *base density* and an *adjustment component* consisting a linear combination of polynomial functions. Some numerical examples are considered to compare the classical moment-matching method and the proposed estimator. The results show that the proposed estimator performs well in both simulated and real data sets.