The stochastic approximation method for estimation of a multivariate distribution function

Sahar Slama[1] and Yousri Slaoui[2]

[1] Université de Sousse, LAMMDA : Laboratoire de Mathématiques Modélisation Déterministe et Aléatoire, Hammam Sousse, Tunisie
[2] Université de Poitiers, LMA Laboratoire des Mathématiques et Applications, Futuroscope Chasseneuil, France

Abstract :

For this conference, we have the will to present our work already submitted as a paper. Our first purpose in this paper is to propose a multivariate recursive distribution function estimator. Our second aim is to study the asymptotic properties of this estimator and compare them with non-recursive Nadaraya's multivariate distribution estimator. It turns out that, with an adequate choice of the stepsize of the proposed algorithm and an appropriate choice of the bandwidth, using one of two methods of bandwidth selection, the cross-validation procedure as well as the second generation plug-in method, the MSE (Mean Squared Error) of the proposed estimator can be smaller than the one of Nadaraya's estimator. Moreover, we prove that in our context the plug-in method can be more efficient than the cross-validation. We corroborated these theoretical results through applications, first using simulated data and second using some real datasets.