國立臺北大學統計學系

教師升等著作發表

講　題：Nonparametric identification of a Wiener system using a stochastic excitation of arbitrarily unknown spectrum

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時　間：105 年 9 月 14 日(星期三，下午 1:10 ~ 1:40)

地　點：三峽校區商學大樓商 7F01 教室

Abstract

A Wiener system consists of two sequential sub-systems: (i) a linear, dynamic, time-invariant, asymptotically stable sub-system, followed by (ii) a nonlinear, static, invertible sub-system. Both sub-systems will be identified non-parametrically in this paper, based on observations at only the overall Wiener system's input and output, without any observation of any internal signal inter-connecting the two sub-systems, and without any prior parametric assumption on either sub-system. This proposed estimation allows the input to be temporally correlated, with a mean / variance / spectrum that are a priori unknown.

Moreover, the nonlinear sub-system's input and output may be corrupted additively by Gaussian noises of non-zero means and unknown variances. For the above-described set-up, this paper is first in the open literature (to the best of the present authors' knowledge) to estimate the linear dynamic sub-system non-parametrically. This presently proposed linear system estimator is analytically proved as asymptotically unbiased and consistent. Moreover, the proposed nonlinear sub-system's estimate is assured of invertibility, asymptotic unbiasedness, and point-wise consistence, Furthermore, both sub-systems' estimates' finite-sample convergence is also derived analytically. Monte Carlo simulations verify the efficacy of the proposed estimators and the correctness of the derived convergence rates.

~歡迎蒞臨指導~

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2014.09.08