國立中山大學應用數學系
學術演講

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講　題：Variable Selection in Deep Neural Networks

時　間：2026/11/06（Friday）15:10pm~16:00pm

地　點：理 SC4011 教室

茶　會：13:30

Abstract

We study variable selection in a semiparametric regression model combining a sparse linear component with a sparse ReLU nonlinear function. Building on the LassoNet hierarchy and proximal framework of Lemhadri et al. (2021), we develop statistical theory for an identified linear–nonlinear decomposition under strong heredity. A hierarchy-feasible approximation construction, an external entropy bound, and a finite-sample oracle inequality yield a constrained sieve prediction bound with compositional approximation, unknown-support search, coefficient-discretization, and penalization/optimization terms. Benchmark lower bounds recover the compositional and sparse search scales on rich submodels; common-class minimax matching additionally requires compatibility of the envelope, hierarchy, and richness conditions. Under a population approximate-orthogonality restriction on the nonlinear sieve, prediction control gives high-probability bounds on thresholded model size, sure screening, and thresholded exact support without irrepresentability. We also derive the KKT system for the hierarchy-constrained joint optimization problem and, when the nonlinear function is fixed, classical Lasso model-size and sign-recovery conclusions under additional score and design assumptions. Simulations including a sparse-interaction competitor and a rolling-origin FOMC application illustrate prediction and screening.

敬 請 公 告！ 歡 迎 參 加！

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