中央研究院統計科學研究所

學 術 演 講

講 題：A Generalized Ridge Regression Method for Sparse and High-Dimensional Linear Models

演 講 人：Prof. Takeshi Emura
School of Informatics and Data Science, Hiroshima University, Japan

時 間：2025-05-28 (Wed.) 10:30-12:00

地 點：Auditorium, B1F, Institute of Statistical Science；The tea reception will be held at 10:10.

備 註：Online live streaming through Google Meet will be available.

Abstract

Ridge regression is one of the most popular shrinkage estimation methods for linear models. Ridge regression effectively estimates regression coefficients in the presence of high-dimensional regressors. Recently, a generalized ridge estimator was suggested that involved generalizing the uniform shrinkage of ridge regression to non-uniform shrinkage; this was shown to perform well in sparse and high-dimensional linear models. In this paper, we introduce our newly developed R package “g.ridge” (first version published on 7 December 2023) that implements both the ridge estimator and generalized ridge estimator. The package is equipped with generalized cross-validation for the automatic estimation of shrinkage parameters. The package also includes a convenient tool for generating a design matrix. By simulations, we test the performance of the R package under sparse and high-dimensional settings with normal and skew-normal error distributions. From the simulation results, we conclude that the generalized ridge estimator is superior to the benchmark ridge estimator based on the R package “glmnet”. Hence the generalized ridge estimator may be the most recommended

estimator for sparse and high-dimensional models. We demonstrate the package using intracerebral hemorrhage data.

Keywords: cross-validation; high-dimensional data; intracerebral hemorrhage; least squares estimator; mean square error; penalized regression; R package; shrinkage estimator; sparse model

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