國 立 中 央 大 學

統 計 研 究 所

學 術 演 講

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講　　題：**Solving Fused Group Lasso Problems via Block Splitting Algorithms**

時　　間：**104 年 11 月 24 日（星期二）上午 11：00 ～ 12：00**

地　　點：中央大學鴻經館 **M605** 室

茶　　會：<u>上午 10：30 ～11：00</u>　　地　點：鴻經館　**510**　室

ABSTRACT

Abstract: In this paper we propose a distributed optimization-based method for solving the fused group lasso problem, in which the penalty function is a sum of Euclidean distances between pairs of parameter vectors. As a result of that, the penalty function is not separable in terms of these parameter vectors. To make the penalty function separable, one common way is to introduce a set of auxiliary variables that represent the differences between pairs of parameter vectors. This representation can be seen as a linear operator on the joint vector of the parameter vectors, and the resulting augmented Lagrangian will have a coupling quadratic term involving the linear representation. Even though the linear representation is separable in terms of the parameter vectors, the coupling quadratic term is not. To make the coupling quadratic term separable, we further introduce a set of equality constraints that connect each parameter vector to a group of paired auxiliary variables. With these newly introduced equality constraints, we are able to derive a modified augmented Lagrangian that is separable either in terms of the parameter vectors or in terms of the paired auxiliary variables. This separable property further facilitates us to solve the fused group lasso problem by developing an iterative algorithm with that most tasks can be carried out independently in parallel. We evaluate performance of the parallel algorithm by carrying out fused group lasso estimation for regression models using simulated data sets. Our results show that the parallel algorithm has a massive advantage over its non-parallel counterpart in terms of computational time and memory usage. In addition, with additional steps in each iteration, the parallel algorithm can obtain parameter values almost identical to those obtained by the non-parallel algorithm.

Keywords: Fused lasso; Group lasso; Scalability; Alternating direction method of multipliers; Block splitting algorithms.

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