University of California, Irvine
Statistics Seminar

Error-controlled Variable Selections in Imaging and Genomics Studies

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4 p.m., Thursday, February 9, 2023
6011 Donald Bren Hall

Deep neural networks (DNNs) have been successfully utilized in many scientific problems for their high prediction accuracy, but their application to imaging and genetic studies remain challenging due to the sheer number of variants, the low signal to noise ratio, and strong correlations among variants. Poor interpretability of DNNs may also rise to misleading results with a degree of uncertainty in its final solutions. To address this problem, we evaluate the applications of several attribution methods via gradient information to decipher DNNs. The uncertainty of feature importance scores was also stabilized with an ensembling approach. The aim is to improve statistical power while FDR is under control. This error-controlled variable selection in DNNs helped to get a reliable set of variables with a predetermined error rate.