

Mathematical Sciences

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Colloquium Series



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: Friday, February 26 : 3pm : Zoom Meeting :

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Kernel, decision tree and ensemble models

Abstract

As a useful complement to kernel learning, a recursive-partitioning procedure using kernel functions is proposed. We call it KICT- kernel-induced classification trees. Essentially, KICT uses observation-based kernel functions to construct split rules for a CART model. The resulting KICT model could perform significantly better in classification than the CART model in many situations, especially when the pattern of the data is non-linear. KICT, usually small in tree size, also performs very well in comparison to random forests and SVM in these situations. To further improve KICT, we also introduce KIRF- kernel-induced random forests. KIRF is competitive to random forests and SVM in many situations. We use simulated and real-world data to illustrate their performances. We conclude that the proposed methods are useful alternatives and complements to CART, random forest, and SVM by combining a rich class of kernel functions with the recursive-partitioning learning procedure (KICT) and the ensemble random forests procedure (KIRF), which are flexible to a variety of non-traditional data types with properly defined kernels. Particularly, if a convolution kernel is used, the procedure will have a flavor of deep learning in image classification.

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