

Approximate full-conformal multi-task regression with reproducing kernels

Abstract : Multi-task regression aims at jointly solving multiple regression problems, called tasks. Compared to solving each task separately, better performances can be achieved as long as the tasks are sufficiently related. Full-conformal prediction is a framework that formulates a data-dependent prediction-region containing the unknown output-vector at any prescribed confidence level. However, explicit computation of this prediction-region is intractable in general since it requires training infinitely many predictors. The present work focuses on multi-task regression in a Reproducing Kernel Hilbert Space (RKHS) of vector-valued functions. This computational issue is addressed by designing an approximating prediction-region containing the full-conformal one. This construction is carried out in two scenarios : *(i)* when the inter-task covariance-matrix is known, and *(ii)* when this matrix is estimated. In terms of volume, the tightness of this approximation is assessed theoretically by means of an upper-bound in the first scenario. It is also empirically proved to improve upon the split-conformal prediction on synthetic data in both scenarios.