

SPARSE ESTIMATION WITH STRONGLY CORRELATED VARIABLES

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This talk considers ordered weighted L1 (OWL) norm regularization for sparse estimation problems with strongly correlated variables. We show that OWL norm regularization automatically clusters strongly correlated variables, in the sense that the coefficients associated with such variables have equal estimated values. Furthermore, we characterize the statistical performance of OWL norm regularization for generative models in which certain clusters of regression variables are strongly (even perfectly) correlated, but variables in different clusters are uncorrelated. We show that if the true p -dimensional signal generating the data involves only s of the clusters, then $O(s \log p)$ samples suffice to accurately estimate the signal, regardless of the number of coefficients within the clusters. The estimation of s -sparse signals with completely independent variables requires just as many measurements. In other words, using the OWL we pay no price (in terms of the number of measurements) for the presence of strongly correlated variables.