

# The Degrees of Freedom of Partial Least Squares Regression

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In my talk, I discuss statistical properties of Partial Least Squares (PLS) Regression. PLS combines dimensionality reduction and least-squares estimation. It is commonly defined as an iterative algorithm that computes low-dimensional subspaces with maximal covariance to the response variable. There is an intriguing correspondence of this purely algorithmic definition to conjugate gradient methods from numerical linear algebra.

While popular and successful in various applications, the statistical properties of PLS are not yet fully understood. In my talk, I argue that the correspondence to conjugate gradients is instrumental, as it opens up the possibility to analyze PLS in a concise way. Moreover, it connects PLS to the theory on statistical inverse problems.

In this talk, I focus on the estimation of the intrinsic complexity of PLS in terms of its Degrees of Freedom. The presented results are important as we can (a) compare different regression methods in terms of their complexity (b) perform fast model-selection based on information criteria and (c) in more general terms, provide a sound statistical model for PLS in terms of inverse problems.