

Regression models with functional predictors

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Abstract: Regression of a scalar response on functional predictors (or signals), such as spectra or images, presents a major challenge when, as is typically the case, the dimension of the signals far exceeds the number of signals in the dataset. Fitting such a model meaningfully requires some form of dimension reduction. A proposed approach to this problem extends common multivariate methods (principal component regression (PCR) and partial least squares (PLS)) to handle functional data by also incorporating a roughness penalty. A number of alternative estimation strategies are available and these will be discussed briefly, as well as sufficient conditions for consistency. These methods are illustrated using data from near infrared (NIR) spectra from chemical samples and data from a brain imaging study.