NONLINEAR FUNCTIONAL REGRESSION

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Functional Regression (FR) revolves around datasets composed of functions sampled from a population. Most FR research is rooted in a modified version of the functional linear model initially introduced by Ramsay and Dalzell in 1991. Recently, Yao and Müller (2010) discussed a more expansive form of polynomial functional regression, highlighting quadratic functional regression as a prominent case. Constructing FR models entails addressing a pivotal challenge: the combination of information both across and within observed functions, denoted as replication and regularization by Ramsay and Silverman (1997).

In this presentation, we will unveil a comprehensive approach for analyzing regularized polynomial functional regression of arbitrary order, by formulating it as an inverse problem. We will explore the potential utilization of a technique developed recently in the realm of supervised learning. Additionally, we will delve into the application of multiple penalty regularization within the FR framework, showcasing its advantages, and we also present a theoretically grounded strategy for dealing with the associated parameters. Finally, we will touch upon the application of FR in stenosis detection. This is based on joint work with Sergei Pereverzyev (RICAM, Linz).