

Scalar on Function Regression

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Presentation Day

Introduction

Jona

Introductory Example → Octane/NIR-spectrum

Theory

Jona

Motivation from multivariate regression (multivariate dgp).

Theory

Jonghun

- Random Functions (name square integrable functions)
- Motivate continuous stochastic processes (growth curves/electricity consumption/yield curves/stonks)
- Use curves to predict a scalar response (show typical dgp)

Theory

Jonghun

- Basis expansions (b-splines and fourier)
- Talk about purposes
- Plots and show bias variance tradeoff

Theory

Jakob

- Random function represented as linear combination of basis functions
- Just transform to multiple linear regression setting
- You already know that from the beginning

Theory - FPCA

Jakob

- Let's assume you know the theory of PCA (pc from varcov matrix)
- Introduce mean and covariance functions of random functions
- There is another cool basis \rightarrow Eigenbasis (Karhunen-Loeve Expansion)
- Sample Analog! (create a basis from observations and use for basis regression)
- Plot fpcs and approximation of function realization

Simulation Setup & Application

Jona

- Compare b-spline / fourier regression chosen via criterion (cv/aic/...)
- Similar for fpca
- generate new curves from observed curves motivated by Karhunen-Loeve expansion
- Compare optimal variants with test and training sets
- Connect to Application

Summary

Jona

Just summarize what we have done...

further reading

Put footnotes here!