Model Structure Determination

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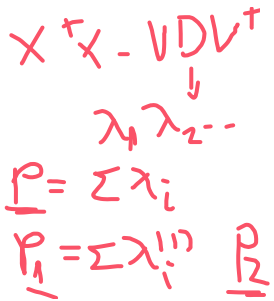
Approaches for Variables Reduction

- Unsupervised Approach
  - Example: Principal Component Analysis
    - B1 Backward, B1 Forward, B2, B4...



- Supervised Approach
  - Example: Regression models
    - LASSO, RIDGE regression, etc.
    - Forward, Backward, Stepwise Regression
    - Nonlinear Stepwise Regression

Regression / Model Structure Determination

- All Combinations of Factors

  Let p_{max} – max. number of potential factors

  Number of models to be examined: $n = 2^{Pmax} - 1$

  Examples:

  $p_{max} = 3$

  $n = 2^3 - 1 = 7$

  $\{x_1\}, \quad \{x_2\}, \quad \{x_3\}, \quad \{x_1, x_2\}, \quad \{x_1, x_3\}, \quad \{x_2, x_3\}, \quad \{x_1, x_2, x_3\}$

  $p_{max} = 20$

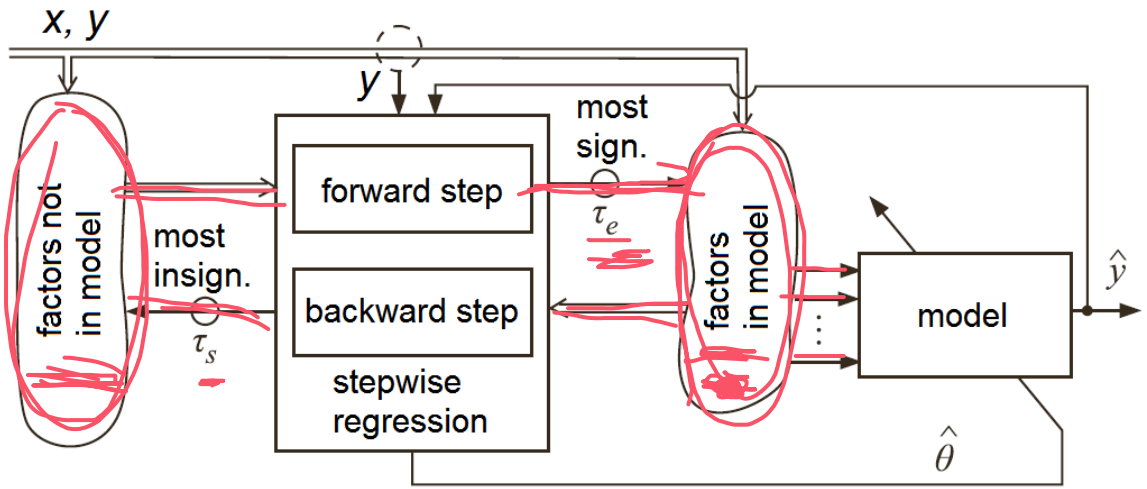
  $n \approx 1.0485 \times 10^6$

  $p_{max} = 50$

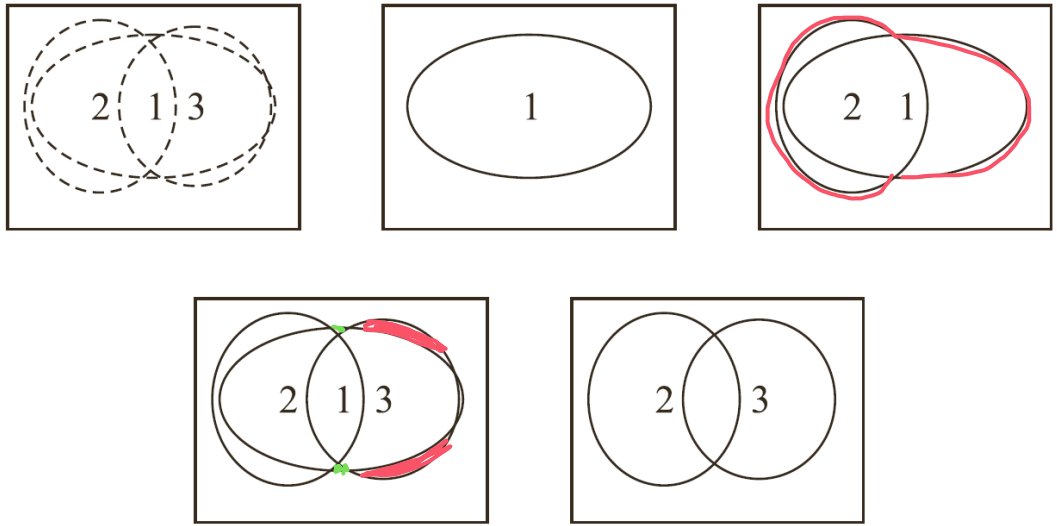
  $n \approx 1.1259 \times 10^{15}$

Regression / Model Structure Determination

- Iterative Approach
  - Forward regression
  - Backward regression
  - Stepwise regression
  - Groupwise approach
    /e.g. for dummies/
  - Linear & Non-linear models



- Factors Selection and Multicollinearity



THANKS

Summer School

Literature

Efremov, A. Multivariable System Identification. Monograph, second edition, ISBN 978-954-9489- 42-2, DAR-RH, VT

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