

Course Outline: Generalized Linear Models /
Machine learning (21 hours)

September 6, 2024

1 Introductory Examples

- 1.1 Simple linear regression
- 1.2 Multiple linear regression
- 1.3 Parametric non-linear regression
- 1.4 Polynomial regression
- 1.5 Non-parametric regression
- 1.6 Piecewise linear regression
- 1.7 Logistic regression (Generalized Linear Model)

2 Multiple Linear Regression

- 2.1 Homoscedastic models
- 2.2 Heteroscedastic models

3 Overparameterization in Regression

- 3.1 Context
- 3.2 Ridge regression
- 3.3 LASSO method
- 3.4 Dimensionality reduction by creating new regressors

4 Generalized Linear Models

4.1 Why generalized linear models?

4.2 Scalar exponential families

4.3 Exponential families with a nuisance parameter

4.4 Classic examples

4.5 Definition of generalized linear models

5 Logistic Model

5.1 Definition and examples

5.2 Parameter estimation and precisions

5.3 Model quality

6 Random Forests

6.1 Background

6.2 Trees

6.3 Bagging predictors

6.4 Random Forests algorithm

Bibliographie

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Hastie, Tibshirani et Friedman (2009) **The Elements of Statistical Learning Data Mining, Inference, and Prediction**, Springer
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