Regularization Methods for Linear Regression

Introduction

M1 Math et Interactions – UEVE/ENSIIE

Autumn semester 2016

http://julien.cremeriefamily.info/teachings_M1MINT_Reg.html

ensiie
école nationale supérieure d'informatique pour l'industrie et l'entreprise

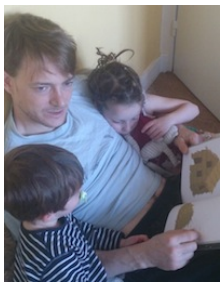
université evry val-d'essonne

Intervenants

Équipe “Statistique & Génome”, AgroParisTech/MIA

`https://www6.inra.fr/mia-paris//`

Julien Chiquet



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Agenda

1. Simple linear regression (15/09 lecture, 22/09 practical)
   - estimation, prediction, analysis of variance, diagnostic
2. Multiple linear regression (29/09 lecture, 06/10 practical)
   - estimation, tests, prediction, variable selection, limitation
3. Regularization et high dimensional settings (13/10 cours, 20/10 TD)
   - Ridge regression and the LASSO
4. `R` project (data analysis extending the methods studied so far

+ use of R-studio (data analysis, publishing report with `Rmarkdown`).

mark: a report for each practical + `R` project (oral + report)

Background

1. Basics in Mathematical Analysis
2. Basics in **Algebra** and **Matrix Calculus**
3. Basics in probability and statistics
4. Basics in **statistical inference**
   - estimation, maximum likelihood estimation, hypothesis testing

A couple of references

- The Element of Statistical Learning: chapitre 2,
  T. Hastie, R. Tibshirani, J. Friedman.
  http://statweb.stanford.edu/~tibs/ElemStatLearn/
- Résumé du cours de modèle de régression,
  Y. Tillé.
  https://www2.unine.ch/files/content/sites/statistics/files/shared/documents/cours_modeles_regression.pdf
- Bases du modèle linéaire,
  J.-J. Daudin, S. Robin, C. Vuillet.
  http://moulon.inra.fr/~mag/modelstat/ModLin_2007.pdf