MA8701 Advanced methods in statistical inference and learning

L9: Lasso-variants for the linear model

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1/30/23

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1 Generalizations of the lasso penalty

1.1 Reading list

(HTW 4.1-4.3, 4.5-4.6: NB only from a practical point of view)

1.2 Goal for this part

The main goal of this part is to

- know about these special versions of the lasso, and
- to see which practical data situation these can be smart to use.

Maybe one of these is suitable for the Data analysis project?

Theoretical properties and algorithmic details are not on the reading list.

See slides from guest lecturer Benjamin Dunn

1.3 Group activity

(choose one variant to work with)

For the lasso variants

- the elastic net [HTW 4.2]
- the group lasso [HTW 4.3]
- the fused lasso [HTW 4.5]

write down

- which variation on the classic lasso penalty is used (write down the penalty part of the minimization problem)
- make a drawing of the penalty (comparable to the sphere for ridge and the diamond for lasso)
- in which practical data analysis situation is this variation used (e.g. when many correlated variables are present, when the covariates have a natural group structure, …)
- are there any algorithmic challenges?
- anything else you found interesting?

Efron, Bradley, and Trevor Hastie. 2016. *Computer Age Statistical Inference - Algorithms, Evidence, and Data Science.* Cambridge University Press. https://hastie.su.domains/CASI/.