2 Multiple linear regression

Multiple linear regression : mathematical framework.

— Being able to explain what the omitted variable bias means.

— Being able to explain what is a dummy variable.

— How the determination coefficient and the correlation coefficient are related in the multiple linear regression framework ?

Multiple linear regression : statistical framework.

— Being able to list and explain the statistical hypotheses such that the OLS estimator is unbiased.

— Being able to explain if conditional unbiasedness implies unconditional unbiasedness (i.e., does $E(\beta|X) = \beta$ imply that $E(\beta) = \beta$?).

— Being able to explain if the conditional variance of the OLS estimator is equal to the unconditional variance of the OLS estimator.

— Being able to perform a statistical test on one parameter given the expectation and the covariance matrix of the OLS estimator.

— Being able to perform a Fisher test given the relevant information related to the restricted and the unrestricted regressions.

— Being able to explain what stationarity means for a time series.

— How do we stationarize time series exhibiting a linear or an exponential trend ?

— Being able to interpret a QQ-plot and to explain its purpose.

Multiple linear regression : Big data.

— Understanding the loss functions of the Ridge and the Lasso estimator (i.e., the penalized SSR).

— Being able to give the advantages and the drawbacks of the Ridge estimator.

— Being able to give the advantages and the drawbacks of the Lasso estimator.