

Model assessment

15 Feb 2023

Table of contents

loss functions	1
classification loss functions	2
selection vs assessment	2
train-validation-test	2

```
## use help("image-methods", "Matrix")
## lattice graphics: ?lattice:xyplot for details on scales
ifun <- function(x, title = "", ck = FALSE, raster = TRUE) {
  image(Matrix(x),
    sub = "", xlab = "", ylab = "",
    colorkey = ck,
    aspect = "fill",
    scales = list(x = list(draw = FALSE),
                  y = list(draw = FALSE)),
    main = title,
    useRaster = raster
  )
}
```

loss functions

- continuous: L2, L1
- test error (generalization error): prediction error over a **fixed** independent sample

- **expected** prediction error: test error averaged over test sets
- training error (within-sample): expectation

classification loss functions

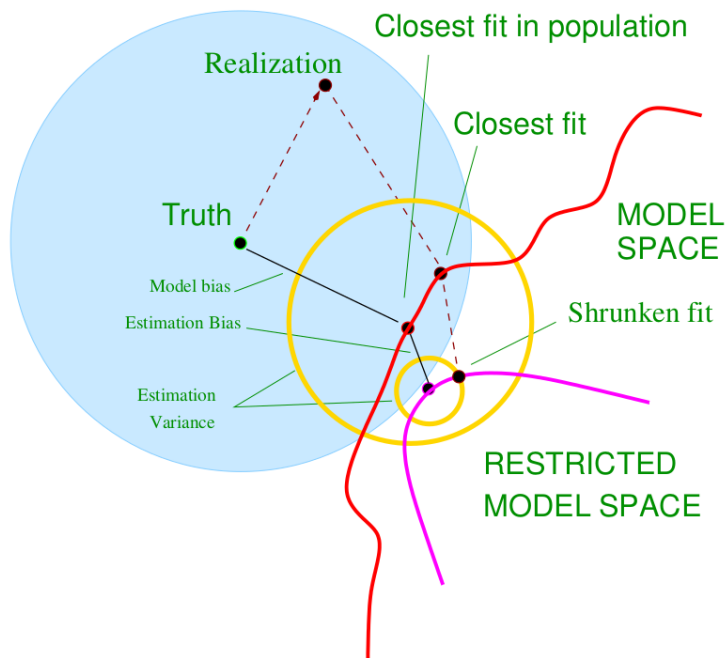
- 0-1
- $-2 \sum I(G = k) \log \hat{p}_k = -2 \log\text{-likelihood}$ (deviance)
- (generalizes to other distributions)

selection vs assessment

train-validation-test

$$E[f(x_0) - x_0^\top \beta^*]^2 + E[x_0^\top \beta^* - E x_0^\top \hat{\beta}_\alpha]^2$$

- estimation bias = 0 for linear regression etc., positive for ridge etc.



- in-sample error:
 - $C_p = \text{err} + 2 d/N\sigma_\epsilon^2$
- leakage:
 - non-independence
 - data-dependence of training