regression

(*mse*) *mean squared error*

$0 \leq loss \leq Infinity$

$$\frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{y}_i)^2$$

(*rmse*) *root mean squared error*

$0 \leq loss \leq Infinity$

$$\sqrt{\frac{1}{N}\sum_{i=1}^{N}(y_i - \hat{y}_i)^2}$$

(*rmsle*) *root mean squared logarithmic error*

$0 \leq loss \leq Infinity$

$$\sqrt{\frac{1}{N}\sum_{i=1}^{N}(\log(y_i) - \log(\hat{y}_i)^2}$$

(*rmspe*) *root mean squared percentage error*

$0 \leq loss \leq 100$

$$\sqrt{\frac{1}{N}\sum_{i=1}^{N}(\frac{y_i - \hat{y}_i}{y_i})^2}$$

(*mae*) *mean absolute error*

$0 \leq loss \leq Infinity$

$$\frac{1}{N}\sum_{i=1}^{N} abs(y_i - \hat{y}_i)$$

(*mape*) *mean absolute percentage error*

$0 \leq loss \leq Infinity$

$$\frac{1}{N}\sum_{i=1}^{N} abs(\frac{y_i - \hat{y}_i}{y_i})$$

(*mer*) *median absolute error*

$0 \leq loss \leq Infinity$

$$median_i(abs(y_i - \hat{y}_i))$$

(*R2*) *R2 error*

$-Infinity \leq score \leq 1$

$$\frac{\sum_i (y_i - E[y_i])^2}{\sum(\hat{y}_i - E[y_i])^2}$$

(*smape*) *symmetric mean absolute percentage error*

$0 \leq loss \leq 100$

$$\frac{1}{\quad} 2\, abs(\hat{\quad} \quad y_i)$$

$$\frac{1}{N}\sum_{i}\frac{2.abs(y_i - y_i)}{abs(\hat{y_i}) + abs(y_i)}$$

classification

(*auc*) *receiver operating characteristic area under the curve score*

$0 \leq score \leq 1$

$$\int_{x=0}^{1} \mathrm{TPR}(\mathrm{FPR}^{-1}(x))$$

(*error_rate_binary*) *error rate*

$0 \leq loss \leq 1$

$$\frac{FP + FN}{TP + TN + FP + FN}$$

(*log_loss*) *binary cross entropy loss*

$0 \leq loss \leq Infinity$

$$-\frac{1}{N}\sum_{i=1}^{N}(y_i \log(\hat{y_i}) + (1 - y_i)\log(1 - \hat{y_i}))$$

(*accuracy*) *accuracy*

$0 \leq score \leq 1$

$$1 - \frac{FP + FN}{TP + TN + FP + FN}$$

($F05$) $F05$ *score*

$0 \leq score \leq 1$

$$\frac{5}{4} \cdot \frac{\mathrm{precision} \cdot \mathrm{recall}}{\frac{1}{4} \cdot \mathrm{precision} + \mathrm{recall}}$$

($F1$) *balanced* $F - score$

$0 \leq score \leq 1$

$$2 \cdot \frac{\mathrm{precision} \cdot \mathrm{recall}}{\mathrm{precision} + \mathrm{recall}}$$

($F2$) $F2$ *score*

$0 \leq score \leq 1$

$$5 \cdot \frac{\mathrm{precision} \cdot \mathrm{recall}}{4 \cdot \mathrm{precision} + \mathrm{recall}}$$

($F3$) $F3$ *score*

$0 \leq score \leq 1$

$$10 \cdot \frac{\mathrm{precision} \cdot \mathrm{recall}}{9 \cdot \mathrm{precision} + \mathrm{recall}}$$

($F4$) $F4$ *score*

$0 \leq score \leq 1$

$$17 \cdot \frac{\mathrm{precision} \cdot \mathrm{recall}}{16 \cdot \mathrm{precision} + \mathrm{recall}}$$

$10 \cdot \text{precision} + \text{recall}$

(*mcc*) *Matthews correlation coefficient*

$0 \leq score \leq 1$

$$\frac{TP \times TN - FP \times FN}{\sqrt{(TP + FP)(TP + FN)(TN + FP)(TN + FN)}}$$

(*gini*) *Gini score*

$0 \leq score \leq 1$

$2 \times AUC - 1$

(*aucpr*) *precision recall area under the curve score*

$0 \leq score \leq 1$

$$\int_{x=0}^{1} \text{Recall}(\text{Precision}^{-1}(x))$$

(*lift_at*_0.1) *lift at ratio* 0.1

$0 \leq score \leq Infinity$

$$\frac{predicted\ rate}{total\ rate}$$

(*lift_at*_0.2) *lift at ratio* 0.2

$0 \leq score \leq Infinity$

$$\frac{predicted\ rate}{total\ rate}$$

(*lift_at*_0.3) *lift at ratio* 0.3

$0 \leq score \leq Infinity$

$$\frac{predicted\ rate}{total\ rate}$$

(*lift_at*_0.4) *lift at ratio* 0.4

$0 \leq score \leq Infinity$

$$\frac{predicted\ rate}{total\ rate}$$

(*lift_at*_0.5) *lift at ratio* 0.5

$0 \leq score \leq Infinity$

$$\frac{predicted\ rate}{total\ rate}$$

(*lift_at*_0.6) *lift at ratio* 0.6

$0 \leq score \leq Infinity$

$$\frac{predicted\ rate}{total\ rate}$$

(*lift_at*_0.7) *lift at ratio* 0.7

$0 \leq score \leq Infinity$

$$\frac{predicted\ rate}{total\ rate}$$

(*lift_at*_0.8) *lift at ratio* 0.8

$$0 \leq score \leq Infinity$$

$$\frac{predicted\ rate}{total\ rate}$$

$$(lift\_at\_0.9)\ lift\ at\ ratio\ 0.9$$

$$0 \leq score \leq Infinity$$

$$\frac{predicted\ rate}{total\ rate}$$

multiclassification

(*error_rate_multi*) *error rate*

$0 \leq loss \leq 1$

$$\frac{FP + FN}{TP + TN + FP + FN}$$

(*log_loss*) *binary cross entropy loss*

$0 \leq loss \leq Infinity$

$$-\frac{1}{N}\sum_{i=1}^{N}(y_i \log(\hat{y_i}) + (1 - y_i)\log(1 - \hat{y_i}))$$

(*macroF*1) *balanced* $F -$ *score*

$0 \leq score \leq 1$

$$2.\frac{precision.recall}{precision + recall}$$

(*auc*) *receiver operating characteristic area under the curve score*

$0 \leq score \leq 1$

$$\int_{x=0}^{1} \text{TPR}(\text{FPR}^{-1}(x))$$

(*accuracy*) *accuracy*

$0 \leq score \leq 1$

$$\frac{TP + TN}{TP + TN + FP + FN}$$

(*qkappa*) *quadratic weighted kappa*

$0 \leq score \leq 1$

$$\kappa = \frac{Pr(a) - Pr(e)}{1 - Pre(e)}$$

(*map_at_*3) *mean average precision* @3

$0 \leq score \leq 1$

$$\frac{\sum_{i<3} precision(y, \hat{y_i})}{3}$$

(*map_at_*5) *mean average precision* @5

$0 \leq score \leq 1$

$$\frac{\sum_{i<5} precision(y, \hat{y_i})}{5}$$

(*map_at_*10) *mean average precision* @10

$0 \leq score \leq 1$

$$\frac{\sum_{i<10} precision(y, \hat{y_i})}{10}$$

clustering

(*silhouette*) *silhouette score*

$$-1 \leq score \leq 1$$

$$a_i = \frac{1}{|C_i| - 1} \sum_{j \in C_i, i \neq j} d(i,j)$$

$$b_i = \min_{k \neq i} \frac{1}{|C_k|} \sum_{j \in C_k} d(i,j)$$

$$s_i = \begin{cases} 1 - a_i/b_i, & \text{if } a_i < b_i \\ 0, & \text{if } a_i = b_i \\ b(i)/a_i - 1, & \text{if } a_i > b_i \end{cases}$$

$$\frac{1}{N} \sum_{i=1}^{N} (s_i)$$

(*calinski_harabaz*) *calinski harabaz score*

$$0 \leq score \leq Infinity$$

$$n = number\ of\ data\ points$$

$$k = number\ of\ clusters$$

$$W_k = within\ cluster\ variation$$

$$B_k = between\ cluster\ variation.$$

$$\frac{B_k(n-k)}{W_k(k-1)}$$