Getting Started with Machine Learning

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We’ve learned to calculate the loss of Regression model using Mean Squared Error.

So, is there any loss function to measure loss in Classification models ?

Well there is.

But we will go into specifics.

We’re trying to get a loss function for binary classification problem.

So the loss function we use is Log Loss aka Logarithmic Loss aka Binary Cross Entropy.

Logarithmic loss (related to cross-entropy) measures the performance of a classification model where the prediction input is a probability value between 0 and 1.

Source : http://wiki.fast.ai/index.php/Log_Loss

$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\big(P(\hat{y_i})\big) - (1 - y_i).\log(1 - P(\hat{y_i}))$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
1	0.64770326
1	0.76805063

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
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$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=1}^{6} -0.\log(0.47248545) - (1 - 0).\log(1 - 0.47248545)$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
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$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\left(P(\widehat{y_i})\right) - (1 - y_i).\log(1 - P(\widehat{y_i}))$$

$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=1}^{6} -0.\log(0.47248545) - (1 - 0).\log(1 - 0.47248545)$$

$$LL_{(y,\hat{y})} = \frac{(0.6395)}{6}$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
1	0.64770326
1	0.76805063

$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\big(P(\hat{y}_i)\big) - (1 - y_i).\log(1 - P(\hat{y}_i))$$

$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=2}^{6} -0.\log(0.53776089\ ) - (1 - 0).\log(1 - 0.53776089\ )$$

$$LL_{(y,\hat{y})} = \frac{(0.6395 + 0.7716)}{6}$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
1	0.64770326
1	0.76805063

$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\left(P(\hat{y}_i)\right) - (1-y_i).\log(1-P(\hat{y}_i))$$

$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=3}^{6} -0.\log(0.57005666) - (1-0).\log(1-0.57005666)$$

$$LL_{(y,\hat{y})} = \frac{(0.6395 + 0.7716 + 0.8441)}{6}$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
1	0.64770326
1	0.76805063

$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\big(P(\hat{y}_i)\big) - (1 - y_i).\log(1 - P(\hat{y}_i))$$

$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=4}^{6} -1.\log(0.70484142) - (1 - 1).\log(1 - 0.70484142)$$

$$LL_{(y,\hat{y})} = \frac{(0.6395 + 0.7716 + 0.8441 + 0.3497)}{6}$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
1	0.64770326
1	0.76805063

$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\big(P(\hat{y}_i)\big) - (1-y_i).\log(1-P(\hat{y}_i))$$

$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=5}^{6} -1.\log(0.64770326) - (1-1).\log(1-0.64770326)$$

$$LL_{(y,\hat{y})} = \frac{(0.6395 + 0.7716 + 0.8441 + 0.3497 + 0.4343)}{6}$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
1	0.64770326
1	0.76805063

$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\big(P(\hat{y}_i)\big) - (1 - y_i).\log(1 - P(\hat{y}_i))$$

$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=6}^{6} -1.\log(0.76805063) - (1 - 1).\log(1 - 0.76805063)$$

$$LL_{(y,\hat{y})} = \frac{(0.6395 + 0.7716 + 0.8441 + 0.3497 + 0.4343 + 0.2638)}{6}$$

y	y_pred (Probabilities)
0	0.47248545
0	0.53776089
0	0.57005666
1	0.70484142
1	0.64770326
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$$LL_{(y,\hat{y})} = \frac{1}{N}\sum_{i=1}^{N} -y_i.\log\big(P(\hat{y}_i)\big) - (1 - y_i).\log(1 - P(\hat{y}_i))$$

$$LL_{(y,\hat{y})} = \frac{1}{6}\sum_{i=6}^{6} -1.\log(0.76805063) - (1 - 1).\log(1 - 0.76805063)$$

$$LL_{(y,\hat{y})} = \frac{(0.6395 + 0.7716 + 0.8441 + 0.3497 + 0.4343 + 0.2638)}{6} = \frac{3.3033}{6} = 0.5505$$