"From Fundamentals to Building Your Own Intelligent System"

AI & Machine Learning Bootcamp 2025

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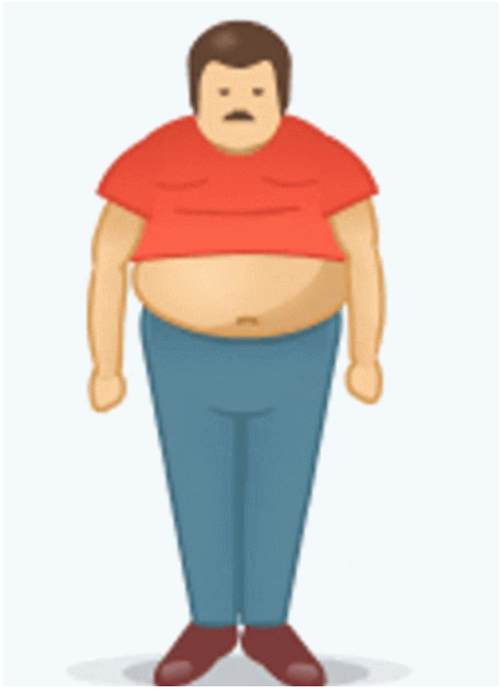
Loss Function

Have you ever tried losing weight?



The extra weight = Actual weight — Your desired weight

**Image Source: Tanmoy Chowdhury, “Easy Way to Understand and Visualize Loss and Cost Functions,” Medium, 2019.

Loss Function

- A mathematical function that quantifies error

Error = Actual Prediction – Model's Prediction

Most Important Loss Functions for Beginners

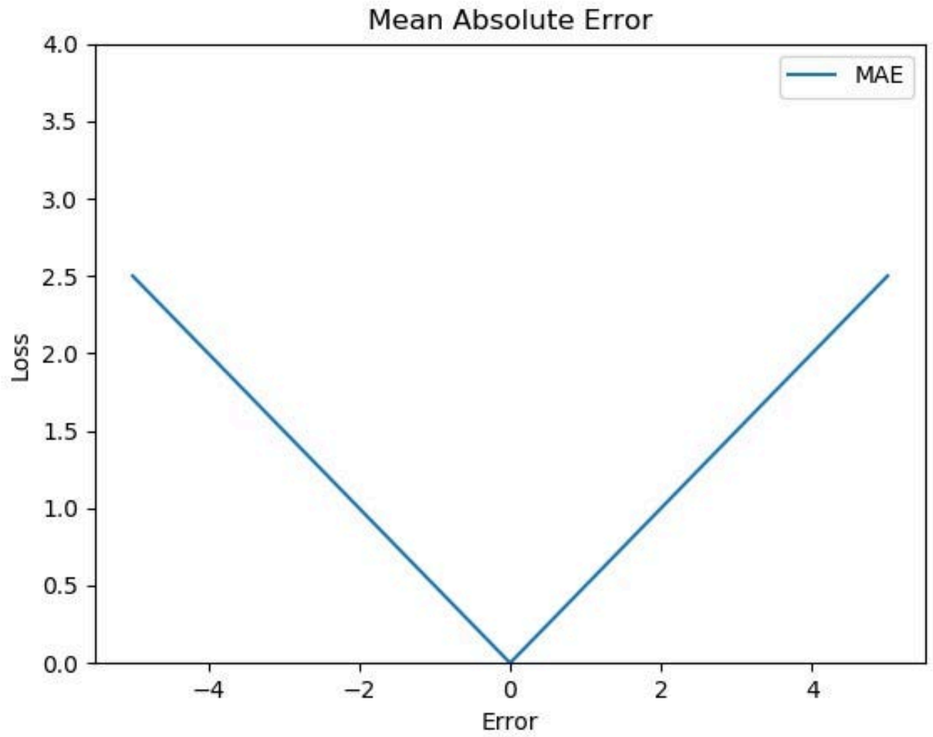
1. Mean Absolute Error (MAE)

"The Simple Difference"

$$\text{MAE} = \frac{1}{n}\sum_{i=1}^{n}|y_i - \hat{y}_i|$$

Easier approach:

MAE = | Actual Value – Predicted Value |



Most Important Loss Functions for Beginners

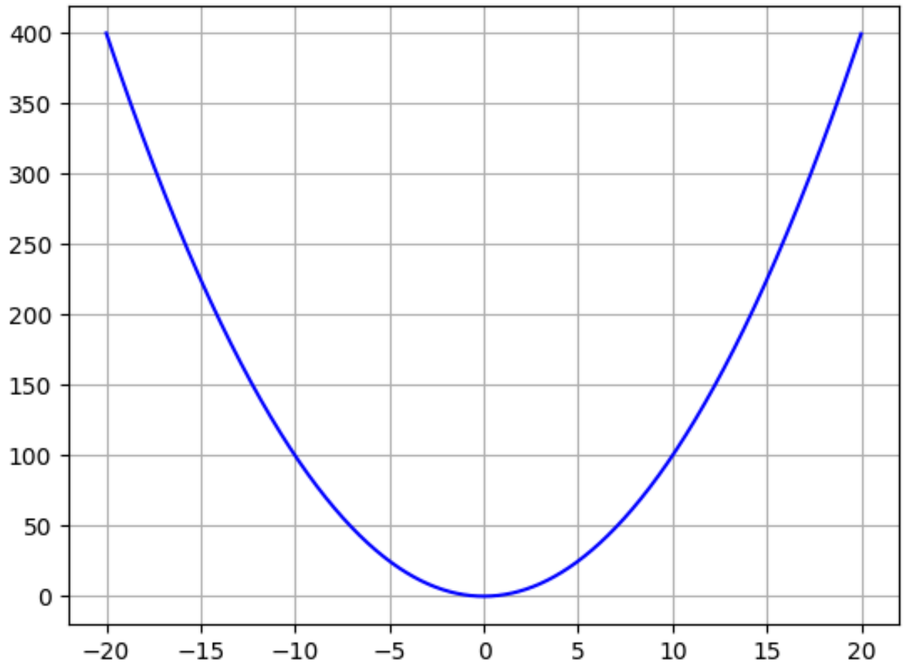
2. Mean Squared Error (MSE)

"Harsh Teacher"

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

Easier approach:

MSE = (Actual Value – Predicted Value)² |



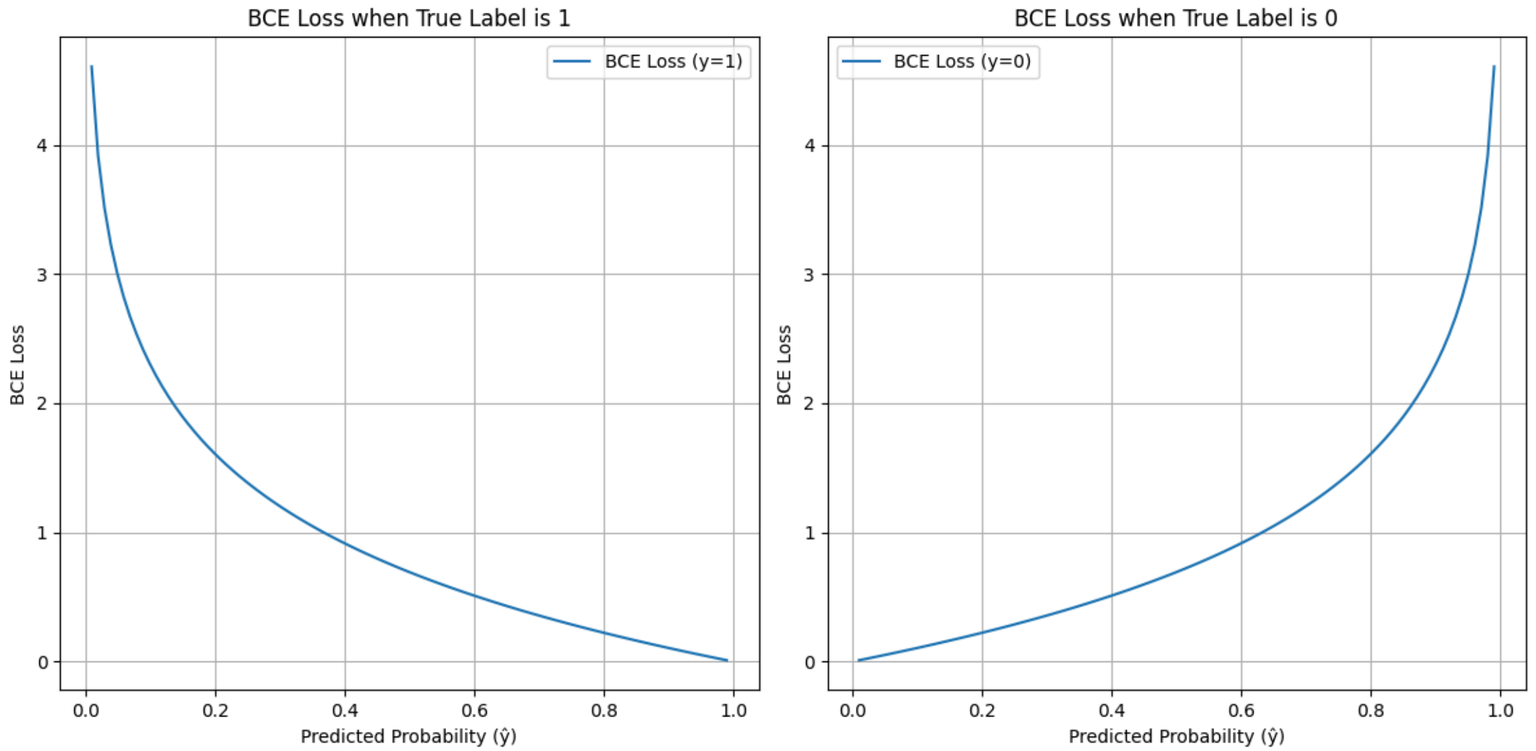
Most Important Loss Functions for Beginners

3. Binary Cross-Entropy Loss /Log Loss

"Yes/No Decisions"

$$\text{BCE} = -\frac{1}{n}\sum_{i=1}^{n}\left[y_i \cdot \log(\hat{y}_i) + (1 - y_i) \cdot \log(1 - \hat{y}_i)\right]$$

Measures how confident the model is when predicting yes/no outcomes.



Most Important Loss Functions for Beginners

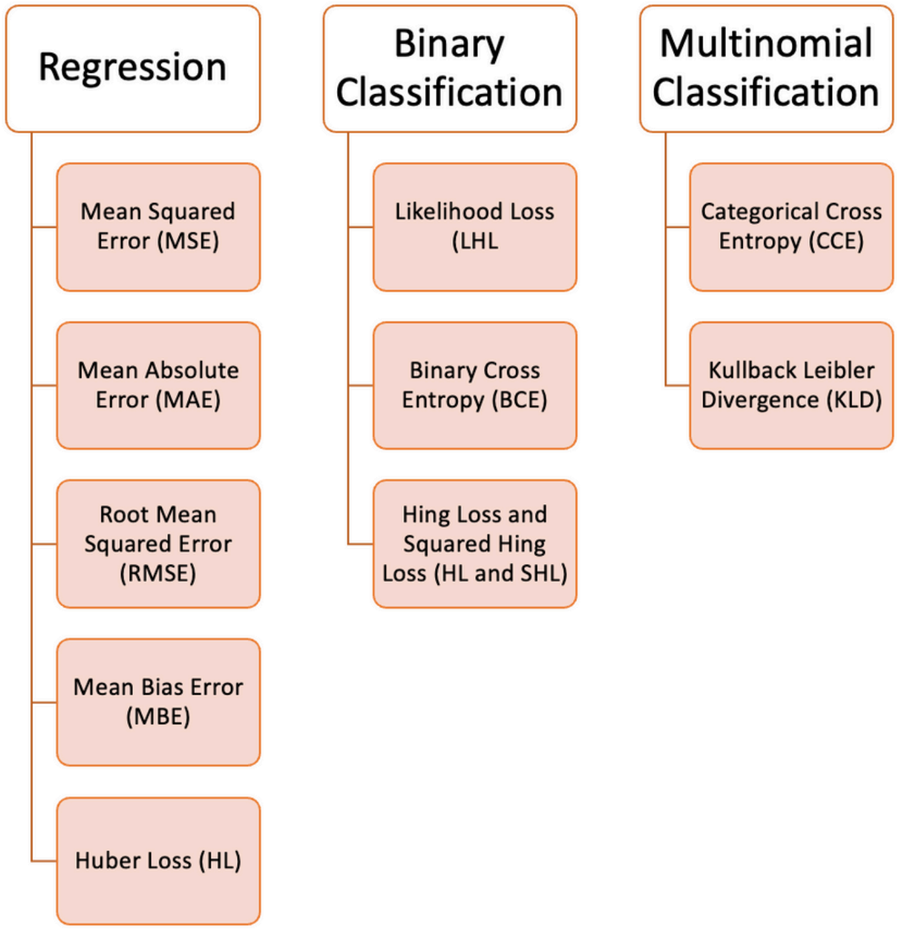
4. Categorical Cross-Entropy Loss

"Choosing the Best Option"

- Measures error when the model has to choose from more than two categories.
- Encourages high probability for the correct category.

$$\text{CCE} = -\frac{1}{n}\sum_{i=1}^{n}\log\left(\hat{y}_{i,c}\right)$$

CHEAT SHEET


Regression
Mean Squared Error (MSE)
Mean Absolute Error (MAE)
Root Mean Squared Error (RMSE)
Mean Bias Error (MBE)
Huber Loss (HL)
Binary Classification
Likelihood Loss (LHL
Binary Cross Entropy (BCE)
Hing Loss and Squared Hing Loss (HL and SHL)
Multinomial Classification
Categorical Cross Entropy (CCE)
Kullback Leibler Divergence (KLD)