

Hinge Loss and Support Vector Machines

Maximum Margin Classification



Primary Loss Function for SVM

Loss function focused on maximizing the margin between classes

Margin-based Penalty: Penalizes only predictions within margin or misclassified

Confident Predictions: Encourages correct predictions beyond the margin

Outlier Robustness: Less sensitive to outliers compared to cross-entropy

✓ Use Cases

- Binary classification problems
- Large-margin classifiers

Hinge Loss Variants

L

Linear Hinge Loss

$$\max(0, 1 - y \cdot f(x))$$

Standard hinge loss

Margin-based linear penalty

S

Squared Hinge Loss

$$\max(0, 1 - y \cdot f(x))^2$$

Smoother variant

Differentiable smooth form