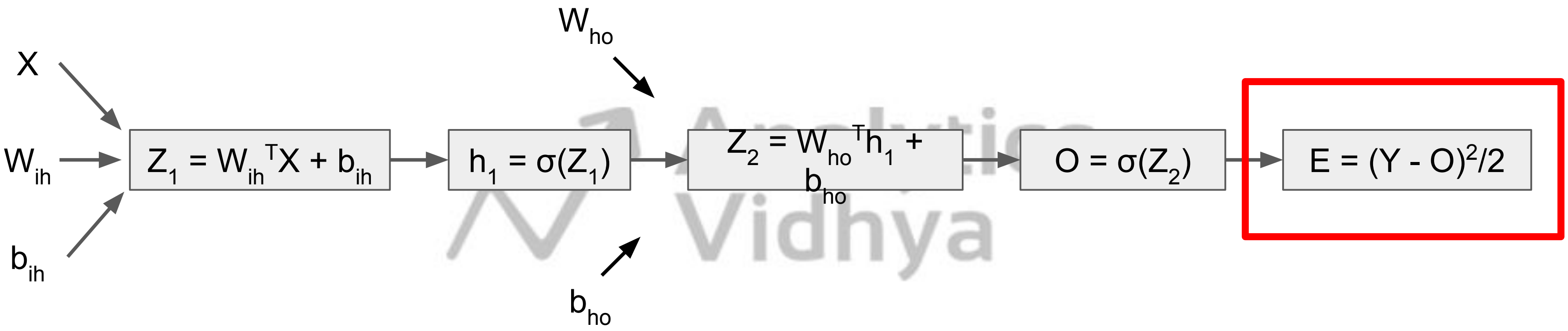
Introduction to Loss Function

Recap: Neural Networks

X, W_{ih}, b_{ih} → $Z_1 = W_{ih}^T X + b_{ih}$ → $h_1 = \sigma(Z_1)$ → (W_{ho}, b_{ho}) → $Z_2 = W_{ho}^T h_1 + b_{ho}$ → $O = \sigma(Z_2)$ → $E = (Y - O)^2/2$

Recap: Neural Networks



Mean Squared Error

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

Mean Squared Error

Actual Values	Predicted Values
19	28
37	33
25	20
9	16
22	15

Mean Squared Error

Actual Values	Predicted Values
19	28
37	33
25	20
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22	15

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

Mean Squared Error

Actual Values	Predicted Values	Squared Error
19	28	81
37	33	16
25	20	25
9	16	49
22	15	49

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

Mean Squared Error

Actual Values	Predicted Values	Squared Error
19	28	81
37	33	16
25	20	25
9	16	49
22	15	49

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

MSE = 44

Loss Functions for Regression problem

- Mean Absolute Error
- Mean Squared Error
- Root Mean Squared Error

Mean Absolute Error

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

Mean Absolute Error

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

Actual Values	Predicted Values	Absolute Error
19	28	9
37	33	4
25	20	5
9	16	7
22	15	7

Mean Absolute Error

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

Actual Values	Predicted Values	Absolute Error
19	28	9
37	33	4
25	20	5
9	16	7
22	15	7

MAE = 6.4

Root Mean Squared Error

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

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N}(Predicted_i - Actual_i)^2}{N}}$$

Root Mean Squared Error

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N} (Predicted_i - Actual_i)^2}{N}}$$

MSE = 44

Actual Values	Predicted Values	Squared Error
19	28	81
37	33	16
25	20	25
9	16	49
22	15	49

Root Mean Squared Error

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N} (Predicted_i - Actual_i)^2}{N}}$$

Actual Values	Predicted Values	Squared Error
19	28	81
37	33	16
25	20	25
9	16	49
22	15	49

MSE = 44

RMSE = 6.63

Thank You