



TIC TAC TOE AI MODEL

Using LMS error function



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Section: A

The **Least Mean Squared** weight update rule is derived from the **Least Mean Squared** error function. This function is essentially average of the square of the distance between our prediction and the target value.

The weight update rule is:

LMS Weight Update Rule

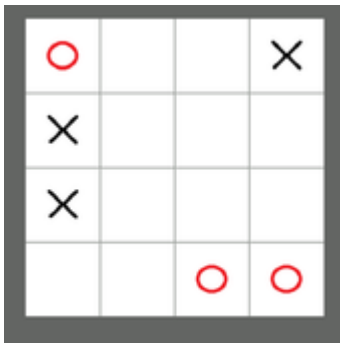
- For each training example $\langle b, V_{train}(b) \rangle$
 - Use the current weights to calculate $\hat{V}(b)$
 - For each weight w_i , update it as

$$w_i \leftarrow w_i + \eta(V_{train}(b) - \hat{V}(b))x_i$$

Where:

- $V_{train}(b)$ is the target for the training example b .
- $V(b)$ is the hypothesis obtained from the weighted sum of input features and weights.
- η is the learning rate.

Input feature extraction from a given 4x4 Tic Tac Toe board:



There are **8*size + 1** number of features:

- 1 is for the bias
- For n {from 1 to size}:
 - Number of rows with n Xs
 - Number of rows with n Os
 - Number of columns with n Xs
 - Number of columns with n Os
 - If major diagonal has n Xs
 - If major diagonal has n Os
 - If minor diagonal has n Xs
 - If minor diagonal has n Os