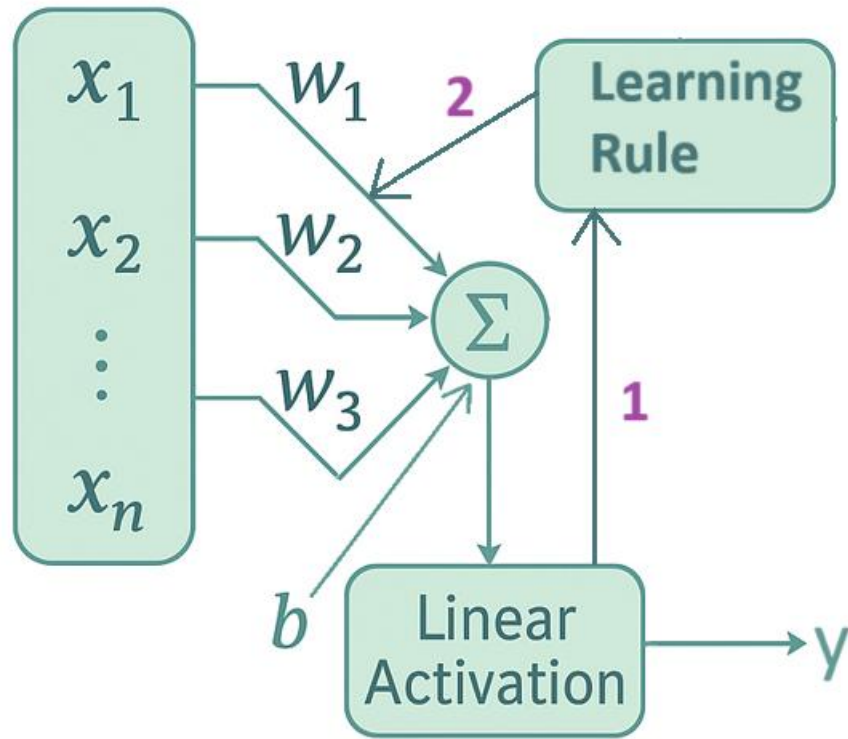


Adaline

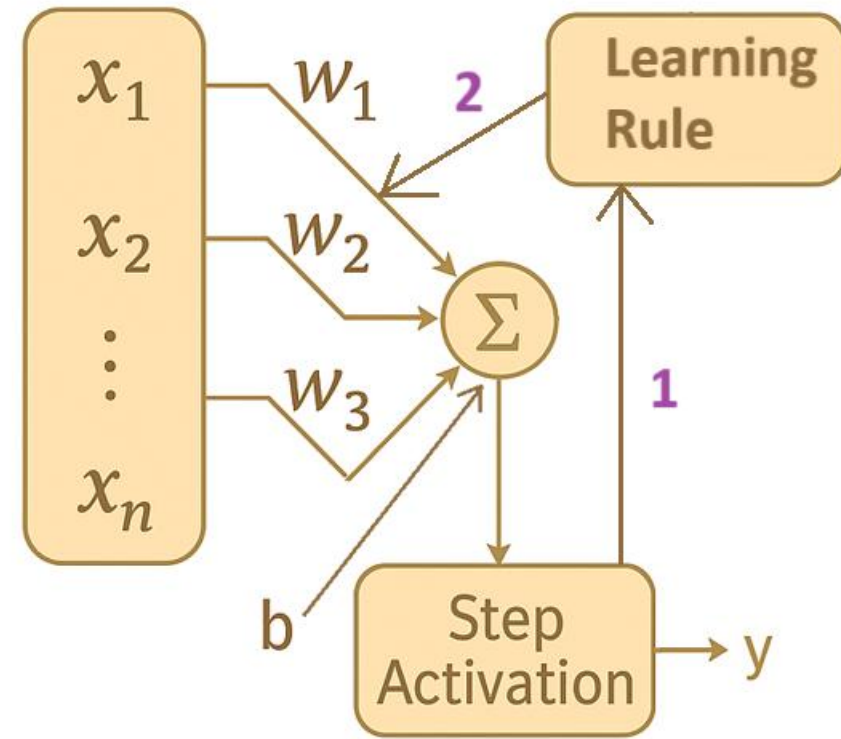
ADALINE Model (Adaptive Linear Neuron)

- ❑ The **ADALINE** model is a type of **single-layer neural network** used for **classification and prediction tasks**.
- ❑ The main **difference from the perceptron** is in its **activation and learning rule**:
 - **ADALINE** uses a **linear activation** followed by error correction based on **mean squared error (MSE)**.
 - **Perceptron** uses a **step activation** and updates weights only when a sample is misclassified.

ADALINE MODEL



PERCEPTRON MODEL



1 ---> Wrong Prediction 2---> Updated Weights

Linear —————> Step

2. Architecture (from image)

Looking at the left side of the image (ADALINE model):

1. Inputs (x_1, x_2, \dots, x_n)

- These are the feature values provided as input to the network.

2. Weights (w_1, w_2, \dots, w_n)

- Each input has a corresponding adjustable weight.
- During learning, these weights are tuned according to the **Learning Rule** shown in the diagram.

3. Bias (b)

- An extra input added with fixed value = 1.
- Helps in shifting the decision boundary.

4. Summation Unit (Σ)

- Computes the **net input**:

$$net = \sum_{i=1}^n w_i x_i + b$$

5. Activation Function (Linear)

- In ADALINE, the output of the summation goes through a **linear activation**.
- So the actual output is:

$$y = net$$

6. Learning Rule

- The learning block (green in the image) updates the weights based on prediction error.
- The diagram flow shows:
 - **Step 1** → **Wrong prediction** (output \neq desired).
 - **Step 2** → **Updated weights** (applied back into the system).