ADALINE AND MADALINE NEURAL NETWORK ARCHITECTURE

NEURAL NETWORK AND FUZZY LOGIC CONTROL
(PE-EC702C)

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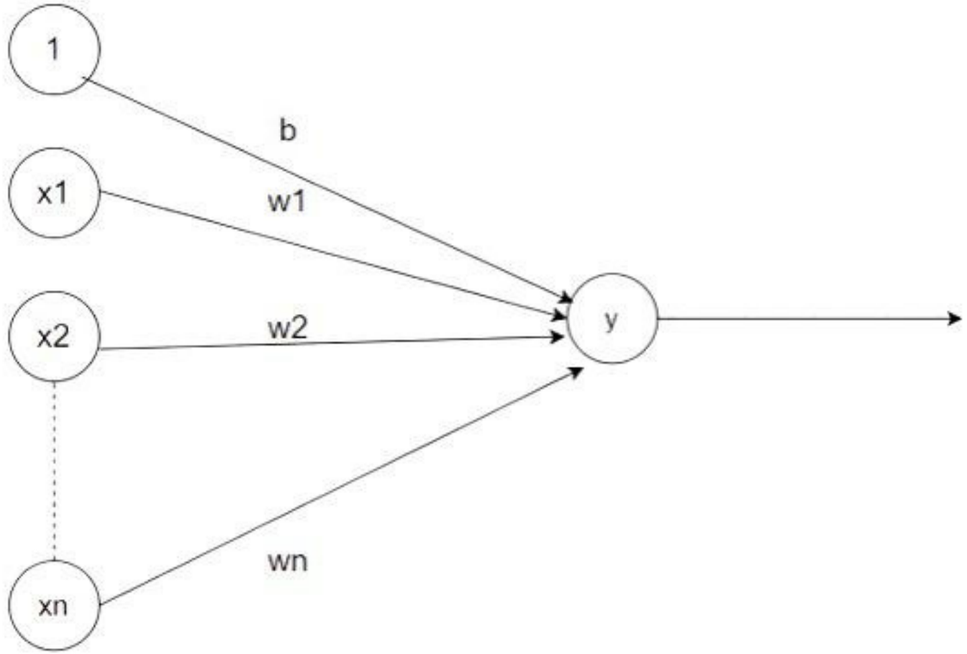
Introduction

- Adaline and Madaline are two basic types of neural networks.
- Adaline stands for **Adaptive Linear Neural**, while Madaline stands for **Many ADALINE**.
- Adaline is a single-layer artificial neural network, while Madaline is a multi-layer network of ADALINE units.

Adaline

- Adaline is a network with a single linear unit.
- It has only one output unit and output values are bipolar (+1,-1).
- Weights between the input unit and output unit are adjustable
- In Adaline, all the input neurons are directly connected to the output neuron with a weighted connected path.



Adaline Architecture

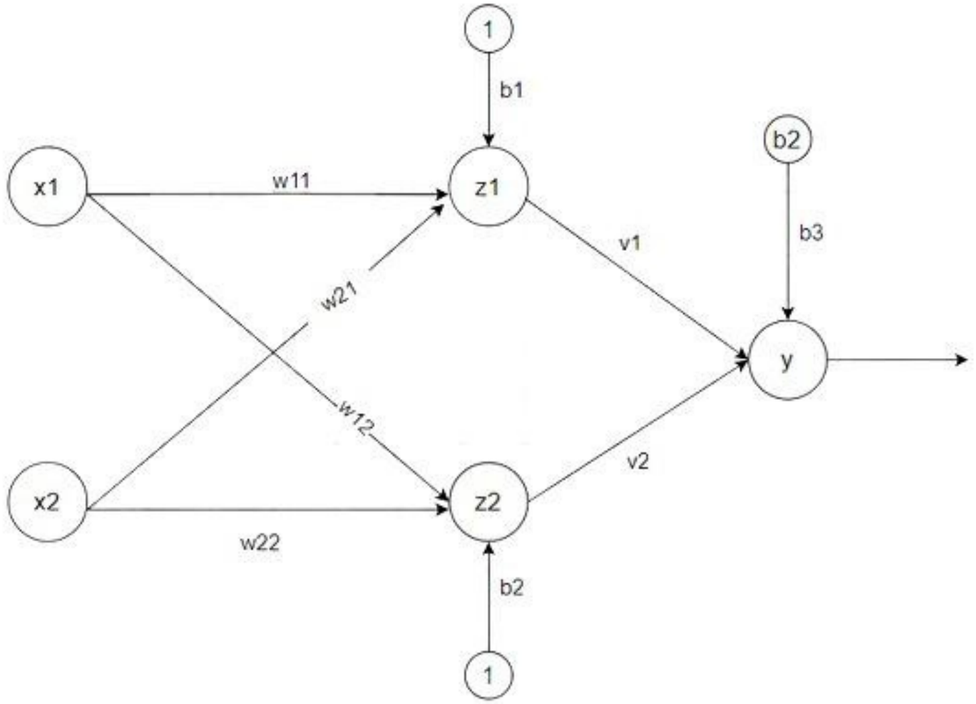
Adaline Training Algorithm

- The Adaline training algorithm is based on the delta rule, which is used to minimize the mean square error between the activation and target values.

- The Adaline training algorithm updates the weights of the network based on the error between the actual output and the calculated output. This allows the network to learn from its mistakes and improve its performance over time.

Madaline

- Madaline is a three-layer (input, hidden, output), fully connected, feed-forward artificial neural network architecture.
- It uses ADALINE units in its hidden and output layers.



Madaline Architecture

Madaline Training Algorithms

Three different training algorithms for MADALINE networks have been suggested, called Rule I, Rule II, and Rule III.

- **MADALINE Rule I (MRI)** - The first of these dates back to 1962 and cannot adapt the weights of the hidden-output connection.
- **MADALINE Rule II (MRII)** - The second training algorithm improved on Rule I and was described in 1988. The Rule II training algorithm is based on a principle called “minimal disturbance”.
- **MADALINE Rule III (MRIII)** - The third “Rule” applied to a modified network with sigmoid activations instead of signum; it was later found to be equivalent to backpropagation.

Conclusion

- Adaline and Madaline are two basic types of neural networks that have their own unique architectures and learning rules.
- They can be used for various classification tasks with varying levels of complexity.

thank you!