**Madaline**

Several ADALINEs arranged in a multilayer net is known as Many ADALINES, or Many Adaptive Linear Neurons, or MADALINE in short. The architecture of a two input, one output, one hidden layer consisting of two hidden MADALINE is shown in Figure. MADALINE is computationally more powerful than ADALINE. The enhanced computational power of the MADALINE is due to the hidden ADALINE units. Salient features of MADALINE are mentioned below.

All units, except the inputs, employ the same activation function as in ADALINE, i.e.,

As mentioned earlier, the enhanced computational power of the MADALINE is due to the hidden ADALINE units. However, existence of the hidden units makes the training process more complicated.

There are two training algorithms for MADALINE, viz., MR-I and MR-II.



**Conclusion**

MADALINE (Multiple Adaptive Linear Neuron) is one of the earliest neural network models used for pattern classification and adaptive learning. It enhances the perceptron by incorporating multiple layers and using the **MR (Minimum Risk) rule** for training, making it capable of handling linearly non-separable problems. With its ability to learn in real-time and adapt to changing inputs, MADALINE has been foundational in the development of modern deep learning architectures.

**Key Takeaways:**

**Handles Non-Linearly Separable Problems** – Unlike simple perceptron, MADALINE can classify complex patterns using multiple adaptive linear neurons.  
**Employs the MR Learning Rule** – The weight adjustment technique minimizes classification errors, improving accuracy.  
**Early Form of Deep Learning** – Introduced multilayer processing, laying the groundwork for modern neural networks.

Though limited by its reliance on **threshold-based activation functions**, MADALINE remains an important milestone in AI. Its principles continue to inspire advancements in adaptive learning and neural network training methodologies.