

Experiment 6

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Aim: To study and implement perceptron learning algorithm.

Theory: Perceptron learning is a fundamental concept in machine learning and artificial neural networks. The perceptron was developed by Frank Rosenblatt in 1957 and is considered one of the earliest neural network models.

Structure of a perceptron includes the input nodes associated with weights and an output node. The inputs and weights are multiplied and the weighted sum is passed through an activation function. The output is a binary decision based on whether the weighted sum exceeds a certain threshold which is usually a step function.

The process involves the following steps:-

- i) Initialization - Initialize the inputs (x) and weights (w) and the learning constant (c)
- ii) Calculation for each input compute the weighted sum and get the output theory
- iii) Error calculation and weight update.

$$\Delta w = c \cdot (\text{desired} - \text{output}) x_i$$

$$w_{i+1} = \Delta w + w_i$$

- iv) Repeat steps ii & iii for a specific number of iterations until the weight converge.

Advantage -

- Efficient method and very easy to understand and implement
- It laid the foundation of more complex neural networks.
- These are yet used in certain applications in context of neural network history & development.

Limitation -

- Perception learning algorithm may not converge if the data is not linearly separable.
- It is sensitive to the choice of initial weights and learning rate.

Conclusion: Perception Learning is a straight forward method for training a basic neural network model while it has limitations it played a crucial role in history of neural network and set the foundation for sophisticated models.