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 Generate


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import numpy as np
import matplotlib.pyplot as plt

learning_rate = 0.01
epochs = 100

# Input Data (e.g., OR Gate)
X = np.array([
    [0, 0],
    [0, 1],
    [1, 0],
    [1, 1]
])

# Target Output
y = np.array([0, 1, 1, 1])

# Initialize Weights and Bias
weights = np.random.rand(2)
bias = np.random.rand()

# Activation Function
def activation_function(x):
    return 1 if x >= 0 else 0

for epoch in range(epochs):
    for i in range(len(X)):
        input_vector = X[i]
        target = y[i]

        # Weighted Sum
        weighted_sum = np.dot(weights, input_vector) + bias

        # Output
        output = activation_function(weighted_sum)

        # Hebbian Learning Rule
        delta_w = learning_rate * input_vector * output
        delta_b = learning_rate * output

        # Update Weights and Bias
        weights += delta_w
        bias += delta_b

# Results
print("Trained Weights:", weights)
print("Trained Bias:", bias)

Trained Weights: [4.6184163  4.46511692]
Trained Bias: 8.09130875504481

# Testing
for i in range(len(X)):
    input_vector = X[i]
    weighted_sum = np.dot(weights, input_vector) + bias
    output = activation_function(weighted_sum)
    print(f"Input: {input_vector}, Predicted Output: {output}")

Input: [0 0], Predicted Output: 1
Input: [0 1], Predicted Output: 1
Input: [1 0], Predicted Output: 1
Input: [1 1], Predicted Output: 1
```

