```
import numpy as np
theta = 1
epoch = 3


class Perceptron(object):
    def __init__(self, input_size, learning_rate=0.2):
        self.learning_rate = learning_rate
        self.weights = np.zeros(input_size + 1) # zero init for weights and bias
    def predict(self, x):
        return (np.dot(x, self.weights[1:]) + self.weights[0]) # X.W+ B
    def train(self, x, y, weights):
        for inputs, label in zip(x, y):
            net_in = self.predict(inputs)
            if net_in > theta:
                y_out = 1
            elif net_in < -theta:
                y_out = -1
            else:
                y_out = 0
            if y_out != label: # updating the net on incorrect prediction
                self.weights[1:] += self.learning_rate * label *inputs # W = alpha * Y * X
                self.weights[0] += self.learning_rate * label # B =alpha * Y
            print(inputs, net_in, label, y_out, self.weights)


if __name__ == "__main__":
    x = []
    x.append(np.array([1, 1]))
    x.append(np.array([1, -1]))
    x.append(np.array([-1, 1]))
    x.append(np.array([-1, -1]))
    y = np.array([1, -1, -1, -1])


perceptron = Perceptron(2)


for i in range(epoch):
    print("Epoch",i)
    print("X1 X2 ", " Net ", " T ", " Y ", " B Weights")
    weights = perceptron.weights
    print("Initial Weights", weights)
    perceptron.train(x, y, weights)
```

```
 Epoch 0
 X1 X2   Net   T   Y   B Weights
 Initial Weights [0. 0. 0.]
 [1 1] 0.0 1 0 [0.2 0.2 0.2]
 [ 1 -1] 0.2 -1 0 [0.  0.  0.4]
 [-1  1] 0.4 -1 0 [-0.2  0.2  0.2]
 [-1 -1] -0.6000000000000001 -1 0 [-0.4  0.4  0.4]
 Epoch 1
 X1 X2   Net   T   Y   B Weights
 Initial Weights [-0.4  0.4  0.4]
 [1 1] 0.4 1 0 [-0.2  0.6  0.6]
 [ 1 -1] -0.2 -1 0 [-0.4  0.4  0.8]
 [-1  1] -5.551115123125783e-17 -1 0 [-0.6  0.6  0.6]
 [-1 -1] -1.8000000000000003 -1 -1 [-0.6  0.6  0.6]
 Epoch 2
 X1 X2   Net   T   Y   B Weights
 Initial Weights [-0.6  0.6  0.6]
 [1 1] 0.6000000000000001 1 0 [-0.4  0.8  0.8]
 [ 1 -1] -0.4000000000000001 -1 0 [-0.6  0.6  1. ]
 [-1  1] -0.20000000000000018 -1 0 [-0.8  0.8  0.8]
 [-1 -1] -2.4000000000000004 -1 -1 [-0.8  0.8  0.8]
```

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