CS7641 Machine Learning
Problem Set 1

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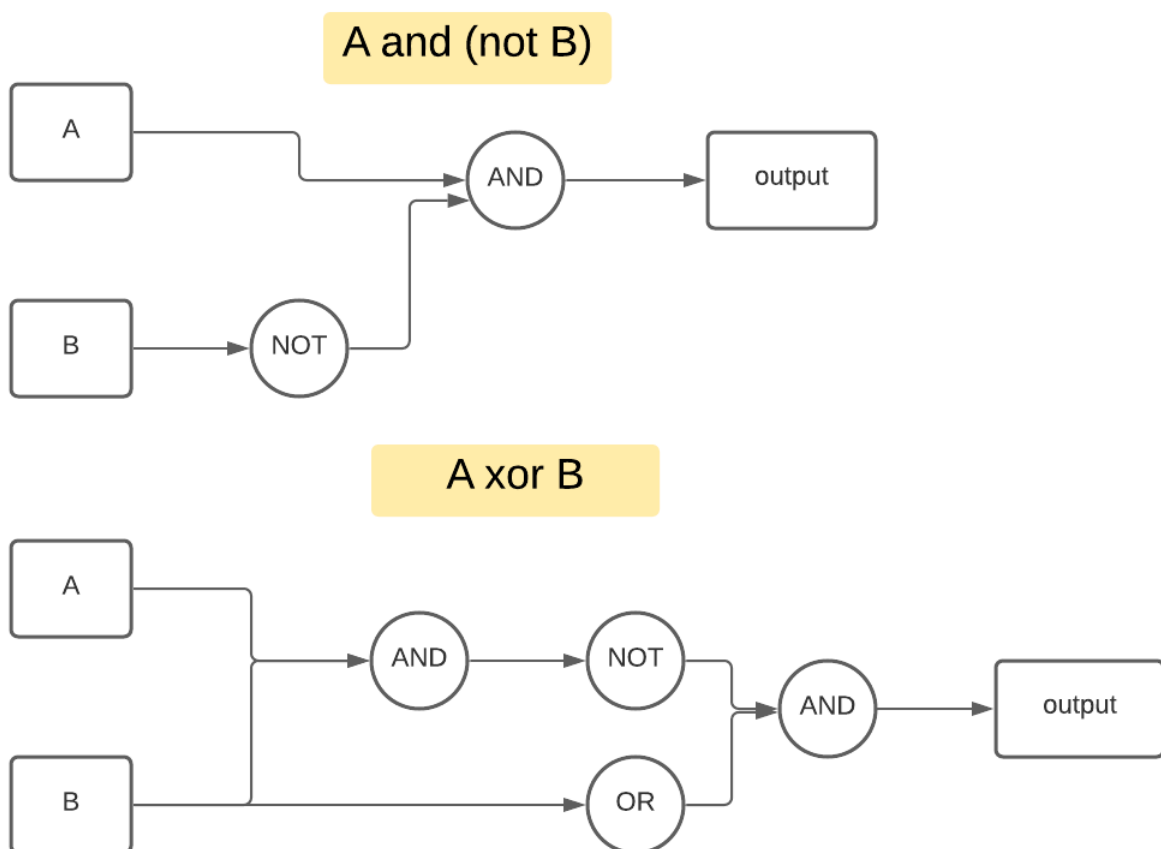
1 Question-2: Designing neural networks

Figure 1: Perceptrons

2 Question-3: Training rules of Neural Networks

2.1 Perceptron training rule:

Output is defined as below :

$$o = w_0 + w_1 x_1 + w_1 x_1^2 + ... + w_n x_n + w_n x_n^2$$

$$= \sum_{i=0}^{n} w_i (x_i + x_i^2)$$

$$input = \{1, x_1 + x_1^2, ... x_n + x_n^2\}$$

As per Perceptron rule :

$$\triangle w_i = n(t - o)x_i$$

$n-> learning rate, t-> target output$

$$\triangle w_i = n(t - \sum_{i=0}^{n} w_i (x_i + x_i^2))(x_i + x_i^2)$$

$$output\, o = 1, when \sum_{i=0}^{n} w_i(x_i + x_i^2)) >= t$$

2.2 Gradient descent training rule:

The gradient descent training rule specifies how the weights are to be changed at each step of the learning procedure so that the prediction error of the unit decreases the most.

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References