Artificial Neural Networks: Exercise Set 4

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April 25, 2016

1 Question 3

As shown by the data given, new inputs which vary from the original P generate the same output as that of P, even though this is incorrect for the new data, it is due to the fact that the network has been trained to generate the T of P and not on the relationship between P and T.

2 Question 9

If there is only one pattern and one target then our equation

$$t = f(Wq + b) \tag{1}$$

need only fit the target perfectly, with no need to interpolate new data. Since t,f and q are already known, all that is needed is to solve for W and b. W and b can be combined into V where $V = [Wb]$ by appending p into q with $q = [p; 1]$. This then transforms the equation into

$$t = f(Vq) \tag{2}$$

Thereby leaving us with only one unknown, V. The equation can then be easily transformed to solve for V

$$\begin{aligned} t &= f(Vq) \\ Vq &= f^{-1}(t) \\ V &= f^{-1}(t)/q \end{aligned} \tag{3}$$

Since this equation has an exact solution, a perfect fitting from p to t can be found by solving for V. As stated before, this solution will be ill-advised for a neural network as it only fits these data points and cannot properly equate any new points in the system.