1.041/1.200 Spring 2024: Recitation 9

Date: Apr 15, 2:00 PM

Join Zoom link: https://mit.zoom.us/j/94725988704

1 Problem 1 : Neural Networks and Backpropagation

Consider the neural network presented in Figure 1. $I1$ and $I2$ denote the input neurons. $O1$ and $O2$ denote the output neurons. $H1$, $H2$ and $H3$ denote the hidden neurons. Two biases are denoted by $B1$ and $B2$.

1. What is the purpose of using an activation function in a neural network?
2. Assume we are using standard logistic function as the activation function for this neural network.

   $$f(x) = \frac{1}{1 + \exp -x}$$

   Suppose we use squared error as the error function.

   $$Error_{total} = \sum (\text{target} - \text{output})^2$$

   Using a learning rate α of 0.5, make a forward pass in the network with the following data point.

   $$I1 = 0.02, I2 = 0.2$$
   $$O1 = 0.1, O2 = 0.9$$

   Show all your workings in your answer.
3. Update the weight of the link $H1 - O1$ using gradient decent.

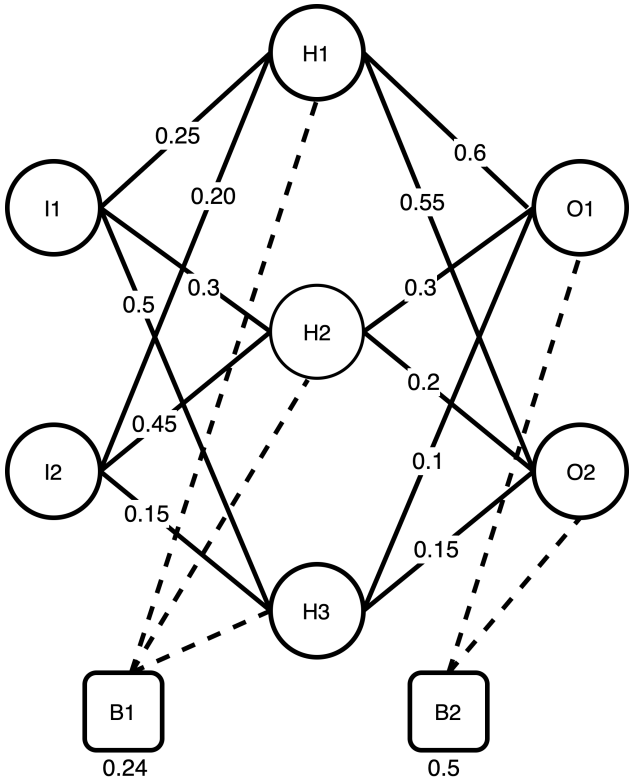

Figure 1

2 Going through DQN demo

See the demo: https://colab.research.google.com/drive/1riWzp-POE9a0g7kZH28-0LaIaJ8vGPsf#scrollTo=0YvncyNU6RWw