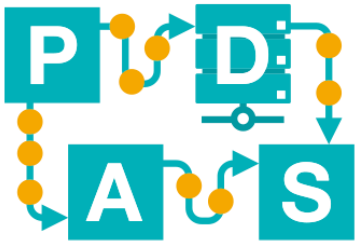
Instruction of Neural Network2

IDS



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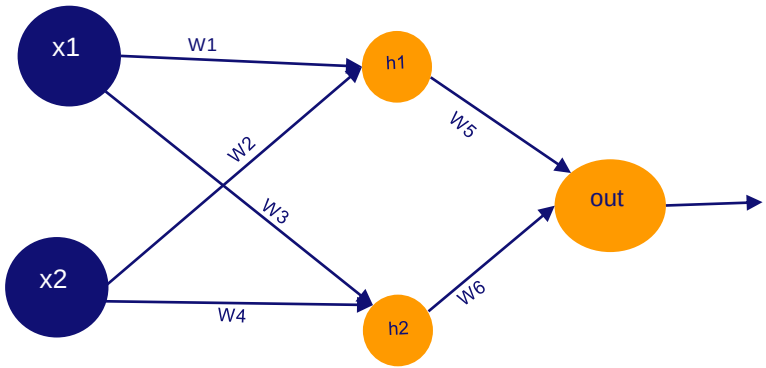
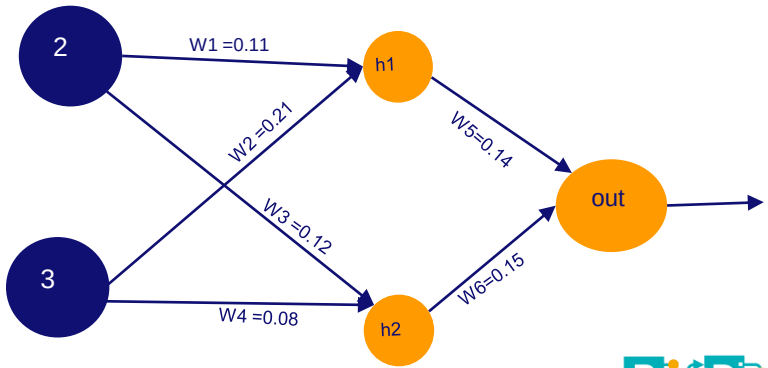
Exercise.1

- **Imagine a neural network with two inputs and one hidden layer same as below. Calculate the new weights based on back propagation.**
  - **Learning rate = 0.0.5**
  - **The real output is 1**
  - **There is no activation function in the neurons.**





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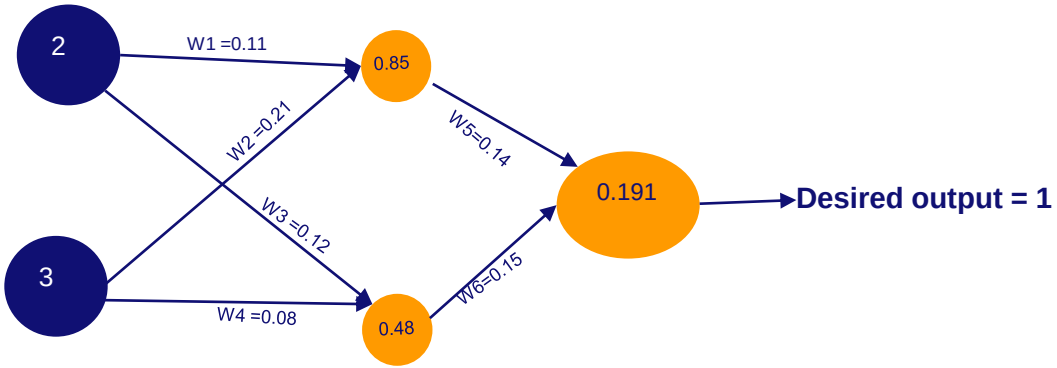
Solution.1



$$2 \times 0.11 + 3 \times 0.21 = 0.85$$

$$2 \times 0.12 + 3 \times 0.08 = 0.48$$

$$0.85 \times 0.14 + 0.48 \times 0.15 = 0.191$$

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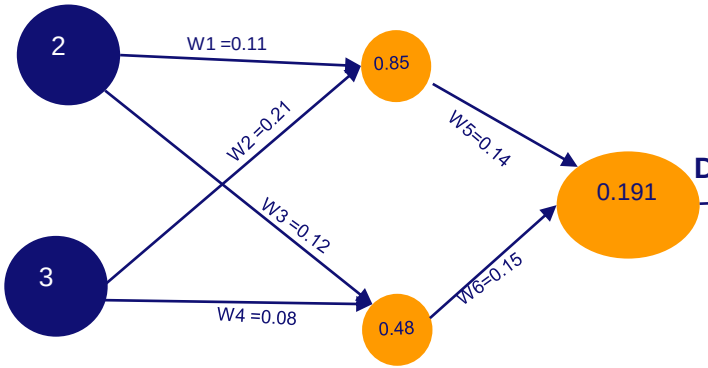
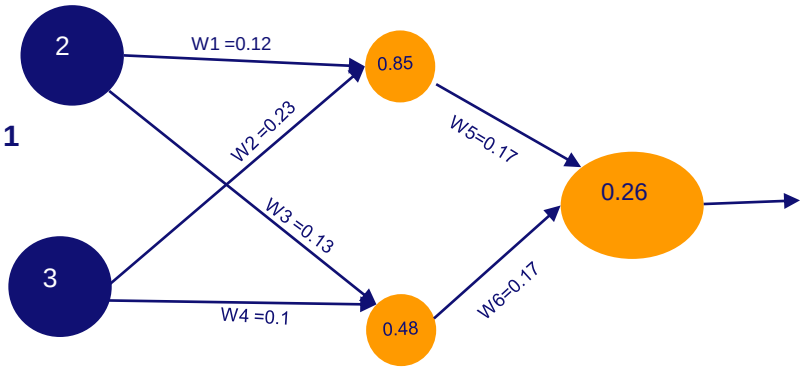
Solution.1



Desired output = 1



$$\text{Error} = 1 - 0.191 = 0.809$$

$$\text{learning\_rate} = 0.05$$

$$E_6 = 0.809$$
$$w_6 = 0.15 + 0.05(0.809)0.48 \quad = 0.17$$

Now repeat feed forward with new weights

$$E_5 = 0.15 * 0.809$$
$$w_4 = 0.08 + 0.05(0.809 * 0.15)3 \quad = 0.1$$

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Exercise.2

- **The following table consists of training data from an employee database. For a given row entry, Count represents the number of data tuples having the values for department, status, age , and salary given in that row.**

department	*status*	*age*	*salary*	*count*
sales	senior	31 … 35	46K … 50K	30
sales	junior	26 … 30	26K … 30K	40
sales	junior	31 … 35	31K … 35K	40
systems	junior	21 … 25	46K … 50K	20
systems	senior	31 … 35	66K … 70K	5
systems	junior	26 … 30	46K … 50K	3
systems	senior	41 … 45	66K … 70K	3
marketing	senior	36 … 40	46K … 50K	10
marketing	junior	31 … 35	41K … 45K	4
secretary	senior	46 … 50	36K … 40K	4
secretary	junior	26 … 30	26K … 30K	6

Exercise.2

- **Let status be the class-label attribute.**
  - **(a) Design a multilayer feed-forward neural network or the given data. Label the nodes in the input and output layers.**
  - **Using the multilayer feed-forward neural network obtained in (a), show the weight values after one iteration of the backpropagation algorithm, given the training instance:**
    - **“(sales, senior, 31 . . . 35, 46K . . 50K)”.**
    - **Indicate your initial weight values learning rate used.**

Solution.2

- **Every feasible solution is correct. Discrete-valued attributes can be encoded such that there is one input unit per domain value.**
- **For hidden layer units, the number should be smaller than that of input units, but larger than that of output units.**

Exercise.3

- **Explain the network architecture knowing that we are trying to distinguish between head and tail!**
  - **And an example of training tuple's is as follows:**
    - **T1{0.6, 0.1, head},**
    - **T2{0.2, 0.3, tail}.**

Solution.3

- **This network should have two inputs and two outputs based on the training samples and also the number of hidden layers can be for example one layer with three neurons.**