Simulation Result #1

Qr code

Description automatically generated

Simulation Result #2

A picture containing text

Description automatically generated

Simulation Result #3

Text

Description automatically generated with low confidence

Simulation Result #4

Text

Description automatically generated with medium confidence

Simulation Result #5

A picture containing text

Description automatically generated

Simulation Result #6

Text

Description automatically generated with low confidence

**Comparison (#1 & #2):**

Since the equation of this neural network is y = x1 + x2, the actual output is the sum of the two test values which are 0.1 + 0.2 = 0.3. Therefore, Result #2 is much more accurate than Result #1 because Result #2 is much closer to 0.3.

**Comparison (#1 & #3):**

Since Result #3 is much closer to 0.3 which is the sum of test value, Result #3 is much more accurate than Result #1.

**Comparison (#3 & #4):**

Since Result #3 is closer to 0.3 which is the sum of test value, Result #3 is more accurate than Result #4.

**Comparison (#5 & #6):**

The equation of this neural network is y = x1 + x2 + x3, the actual output is the sum of the three test values which are 0.2+ 0.1 + 0.2 = 0.5. Since Result #6 is closer to 0.5 which is the sum of test value, Result #6 is more accurate than Result #5.

**Conclusion:**

Result #1 and #3 are calculated by singer-layer feed forward and Result #2 and #4 are calculated by multi-layer feed forward. Basically, the number of hidden layers should depend on the complexity of the problem, but the problem is not complex in this case (summation of two values). Also, after trying several times of these exercises, I found that the results of singer-layer feed forward is more accurate than those of multi-layer feed forward sometimes.

Result #3 is trained with 100 data and Result #1 and #2 is trained with 10 data. Since more training data allow the neural network model to enhance its coverage for the problem, Result #3 is more closer to 0.3 than Result #1 and #2. However, irrationally large training dataset may cause overfitting problem.

Result #5 and #6 is calculated with 3 inputs by singer-layer feed forward and multi-layer feed forward respectively. Since the complexity of the problem increases with the number of inputs, the result of multi-layer feed forward is more accurate than that of singer-layer feed forward in this case

On balance, I believe that number of hidden layers work better when the complexity of the problem is high. Also, a rational large number of training data benefit the accuracy of the model.