RNA logic gates

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0.1 Results

To test the perceptron compiling and training, 5 different truth tables were used, ranging from 2 to 3 inputs. The correct output was reached after 16-23 iterations of the learning algorithm. Input sizes greater than 3 was not tested, as the training time increases exponentially in time with the input size.

| Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

(a) Truth table for the 2-input AND gate.
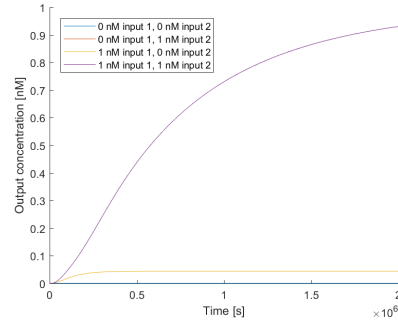
(b) .

Figure 1: Simulation results of the trained 2-input AND gate. The network is trained to activate when both of the inputs are active. The correct output was obtained after 21 iterations of the training algorithm, with a weight of 1.9 for all inputs, and a threshold of 10.

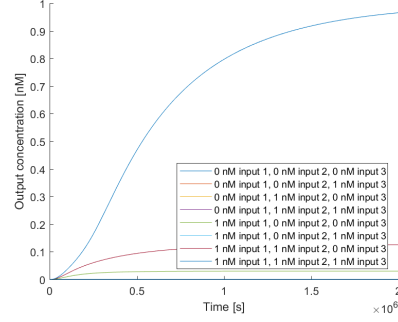| Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1

(a) Truth table for the 2-input OR gate.
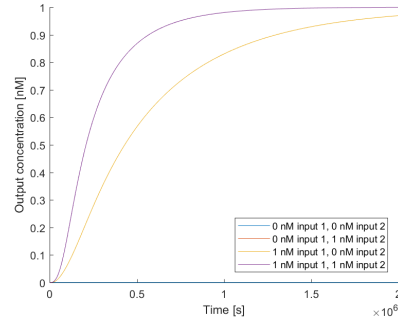
(b) .

Figure 2: Simulation results of the trained 2-input OR gate. The network is trained to activate when one of the inputs is active. The correct output was obtained after 22 iterations of the training algorithm, with a weight of 2.1 for all inputs, and a threshold of 10.

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Input 1	Input 2	Input 3	Output
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

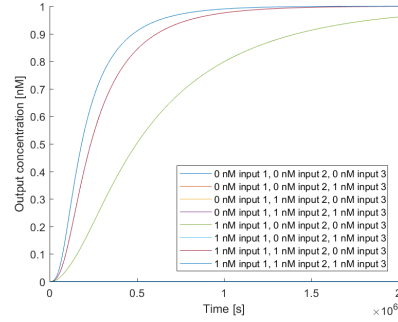(a) Truth table for the 3-input AND gate.   (b) .

Figure 3: Simulation results of the trained 3-input AND gate. The network is trained to activate when all of the inputs are active. The correct output was obtained after 14 iterations of the training algorithm, with a weight of 1.2 for all inputs, and a threshold of 10.

Input 1	Input 2	Input 3	Output
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

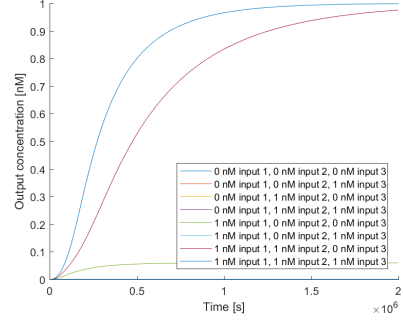(a) Truth table for the 3-input 1-OR gate.   (b) .

Figure 4: Simulation results of the trained 3-input 1-OR gate. The network is trained to activate when at least 1 of the inputs is active. The correct output was obtained after 16 iterations of the training algorithm, with a weight of 1.3 for all inputs, and a threshold of 10.

Input 1	Input 2	Input 3	Out
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

(a) Truth table for the 3-input 2-OR gate.

(b) .

Figure 5: Simulation results of the trained 3-input 2-OR gate. The network is trained to activate when at least 2 of the inputs is active. The correct output was obtained after 15 iterations of the training algorithm, with a weight of 1.3 for all inputs, and a threshold of 10.