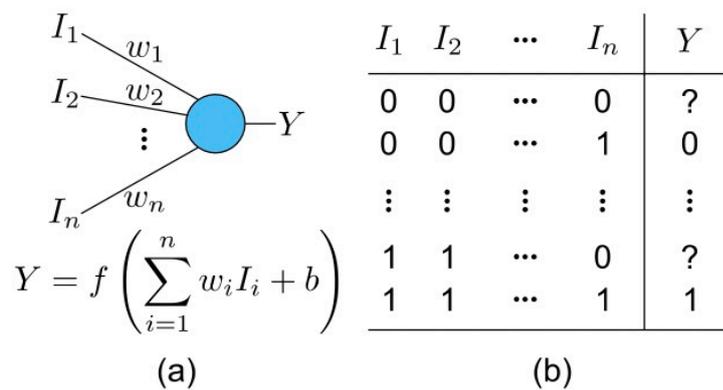# Automatic combinational circuit generation with neural networks

In this master thesis, an automatic combinational circuit generation with neural networks will be explored. Specifically, a specific test bench is first provided as the training data for a neural network. Afterwards, the neural network is trained with the data while maximizing the accuracy. After training, the neural networks will be quantized and thus converted to a combinational logic design according to the following figure. The candidate also needs to evaluate the effectiveness of this automatic combinational circuit generation method.

I_1	I_2	$\cdots$	I_n	Y
0	0	$\cdots$	0	?
0	0	$\cdots$	1	0
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
1	1	$\cdots$	0	?
1	1	$\cdots$	1	1

$$Y = f\left(\sum_{i=1}^{n} w_i I_i + b\right)$$

(a)   (b)

A neuron and its truth table from training data. (a) A neuron with n inputs and one output. (b) The truth table of this neuron.

If you are interested in this topic for master thesis, please contact:

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