Combinational Circuit-Definition: Quiz Solution

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1. Traffic light controller

The traffic light-controller, in general, is a sequential circuit, as it should keep the time and each state depends on the previous states and some input signals. However, most of the functionalities in a traffic light controller can be implemented by a combinational circuit. An example will clarify that, later in this section.

2. 4-bit integer multiplier

A combinational circuit can implement this operation.

3. Binary counter

A counter in its general form is a sequential circuit as each output at each state depends on the previous circuit states. However, a limited version of a counter circuit can be combinational.

4. A three-layer perceptron neural network

Conceptually a three-layer perceptron neural network can be implemented by a combinational circuit. However, it depends on the resources available on the target FPGA and the desired performance and throughput. Usually, a pipelined version of a large three-layer perceptron neural network can provide higher throughput.

5. A recurrent neural network

Based on the definition, the outputs of a recurrent neural network depend not only on the current inputs but also on the previous inputs via the circuit states. Therefore, its design will not be combinational.