

# Gene Perturbation and Intervention in Context-Sensitive Stochastic Boolean Networks

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## Additional File 1

The pseudocode for computing the state transition matrix (STM) of a context-sensitive stochastic Boolean network (CSSBN)

For a CSSBN of  $n$  genes with  $k$  contexts, given the number of predictor functions of each gene, the selection probability of each function, the perturbation rate,  $p$ , and context switching probability,  $q$ , as well as the stochastic sequences generated for the aforementioned probabilities, the STM of the CSSBN can be obtained as follows.

```
for  $i = 1: 2^n$ 
  for  $j = 1: k$ 
    {
      Using the CSSBN to obtain the output stochastic sequences that denote the transition probabilities for input  $i$  and context  $j$ :
      {
        For context  $j$ , update the next state of genes for the present (input) gene state  $i$ ;
        If gene perturbation is considered, then use the perturbation sub-network of the CSSBN with a multiplexer (MUX) to obtain the next gene state of the CSSBN with perturbation.
        Update the context, i.e., a new context is selected by determining the stochastic sequences that denote the selection probabilities of the new context.
        (This is done by 2-1 multiplexers with the original and current context selection sequences (probabilities) as inputs and the stochastic sequence denoting the context switching probability  $q$  as the control sequence.)
      }
      Determine the transition probability between the input state  $i$  and context  $j$  and every other state, from the obtained output stochastic sequences of the CSSBN.
    }
  end
end
```