A Stochastic Computational Approach for Accurate and Efficient Reliability Evaluation

A Python Implementation

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Reliability of Circuits

Gates in a logic circuit are, alas, not perfect. They are susceptible to error, of which there are three main types:

- **Stuck-At-One Error:** The output of the gate goes high, regardless of the expected output.

- **Stuck-At-Zero Error:** The output of the gate goes low, regardless of the expected output.

- **Von Neumann Error:** The output of the gate becomes the inverse of the expected output.

Masking Effects

However, there is a chance that errors in one gate will not propagate all the way to an output. This could be due to one of the following *masking effect*s

- **Electrical Masking:** The error does not have a large enough effect on the amplitude of the logic signal to be detected at an input.

- **Temporal Masking:** The error is input to a latch but occurs at some point in time outside of the latch's detection window.

- **Logical Masking:** The error does not pass through a multi-input logic gate because the value of the other input(s) fix(es) the output of the gate.