Weekly Report

# Targets

## Urgent

* Randomly selecting a node, compute its care set, change its care set, synthesize the local circuit, evaluate its area and error rate, accept it with a certain probability.

## Important

* Use approximate confidence interval / hypothesis testing of Bernoulli experiments to evaluate the accuracy of error rate.
* Trade off the accuracy of batch error estimation for speed (even directly use Su’s equation to update Boolean difference), perhaps use hypothesis testing to evaluate the accuracy.
* Combine the simulation of circuits with the simulation of Monte Carlo Tree Search. In other words, in one loop of Monte Carlo Tree Search, merge logic simulation and playout (only simulate circuit once and playout once).
* Represent circuit with AIG because of more potential LAC candidates. For each round, select one or more input wires and replace them with constant 0 or 1. Consider how to combine Wu’s method (choose a subset of input wires and substitute).
* Accelerate Approximate Logic Synthesis Ordered by Monte Carlo Tree Search: reuse the result of batch error estimation in playout.

## Worth Trying

* Enhance default policy with greedy approach or field domain knowledge.
* In expansion process of MCTS, expand more than one layers.
* Tune parameters in MCTS.
* Perform greedy flow on leaves of the final Monte Carlo Search Tree.
* Combine beam search and MCTS.

## Potential Topics

* Relationship between power simulation and logic simulation.
* Combine Binarized Neural Network with approximate computing.
* Relationship between Boolean network and Bayesian Network.
* Approximate TMR.

# Progress

## Map Wu’s Result with ABC

See *single-selection-result-20190312.xls*.

In general, Su’s result is slightly better: Wu’s average area ratio is 81.12%, Su’s average ratio is 80.40%, Wu’s geomean of area ratio is 79.78%, Su’s is 79.10%, Wu’s geomean of area delay product is 48493, Su’s is 47546.

However, Wu’s final approximate circuits for c1908, c5315 and mul8 are better.

## Troubles in approximate mfs

Given a DC set and a circuit, I don’t know how to synthesize it up to now. I tried to find a proper function in ABC but have not succeeded.

Also, how to expand the range of DC set is another problem puzzling me.