Experimental observation of the SAT-UNSAT phase transition of the random 3-SAT problem from its model perspective

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Problems & Ideas

- Problem of whether the function $\alpha_3(N)$ describing the SAT-UNSAT phase transition of the random 3-SAT problem converges to a fixed value when N is large enough:
  - The problem is an open problem;
  - The existing experimental observation method has a restriction on the flexibility of the parameter value.
- Ideas: generate a novel class of random 3-CNF formulas to experimentally observe the SAT-UNSAT phase transition of the random 3-SAT problem.

Main Contributions

- Contributions:
  - An algorithm is proposed to generate the novel class of random 3-CNF formulas;
  - For each carefully selected set of parameters, the algorithm is run 100 times to conduct experiments ;
  - The observation method differs from the existing one and eliminates the restriction on the flexibility of the parameter value in the existing observation method.