

On the upper bounds for the $(1,0)$ - super solutions for the regular balanced random $(k,2s)$ -SAT problem

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Problems & Ideas

- Problems of the conditions making a regular balanced random $(k,2s)$ -CNF formula $(1,0)$ -unsatisfiable with high probability :
 - It is necessary to find robust solutions for many practical problems arising in uncertain, dynamic, or interactive environments.
 - A $(1, 0)$ -super solution of a conjunctive normal form (CNF) formula is a robust solution of the formula.
 - Regular balanced $(k,2s)$ -CNF formulas have some structural properties to carry handily out a probabilistic analysis so that they have attracted the attention of many scholars .
- Ideas: performing a probabilistic analysis to use the first moment method and using the first moment method to obtain the conditions.

Main Contributions

- Contributions:
 - Let F be a regular balanced random $(k,2s)$ -CNF formula where $k \geq 3$, then there exists a number s_0 such that F is $(1,0)$ -unsatisfiable with high probability if $s > s_0$;
 - Conducted simulated experiments and the experiments verify the theoretical result;
 - The experiments also suggest that a regular balanced random $(k,2s)$ -CNF formula is $(1,0)$ -satisfiable with high probability if s is less than a certain value.

Table The ratios r_s when $k = 5$

s	1	2	3	4	5	6	7	8	9	10	11	12
$N = 85$	0	0	0	0	0.08	1	1	1	1	1	1	1
$N = 90$	0	0	0	0	0.06	1	1	1	1	1	1	1
$N = 95$	0	0	0	0	0.05	1	1	1	1	1	1	1
$N = 100$	0	0	0	0	0.01	1	1	1	1	1	1	1

The ratio r is a simulation of the probability that a regular balanced random $(k,2s)$ -CNF formula is $(1,0)$ -unsatisfiable and the number $s_0 \approx 5.3515$ for $k=5$.