New phase transitions for formulas in Łukasiewicz logic

Mohamed El HALABY, Areeg ABDALLA

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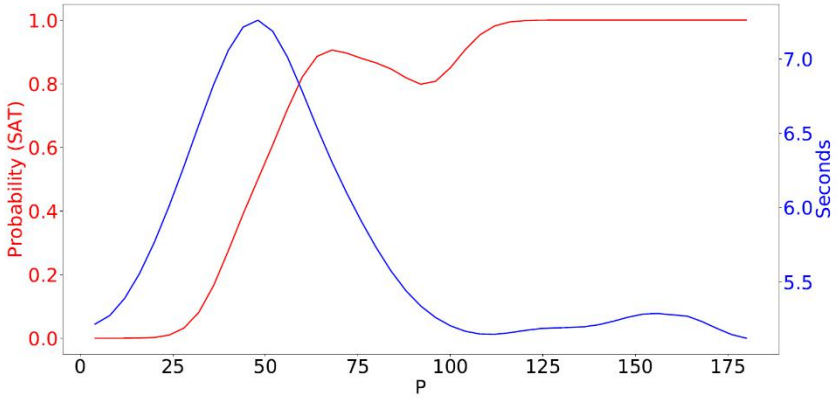
Problems & Ideas

- The satisfiability of Ł-clausal forms have recently been shown to be NP-Complete. More is needed to be investigated, specifically:
  - How can random Ł-clausal forms be generated?
  - What are the parameters that can influence the number of falsified Ł-clauses?
- Ideas: Build a formula generator with the following properties:
  - Study the relationship between the satisfiability of the generated formulas and the parameters of the model.
  - Visualize these relationships and attempt to state theories that can shed light towards the findings.

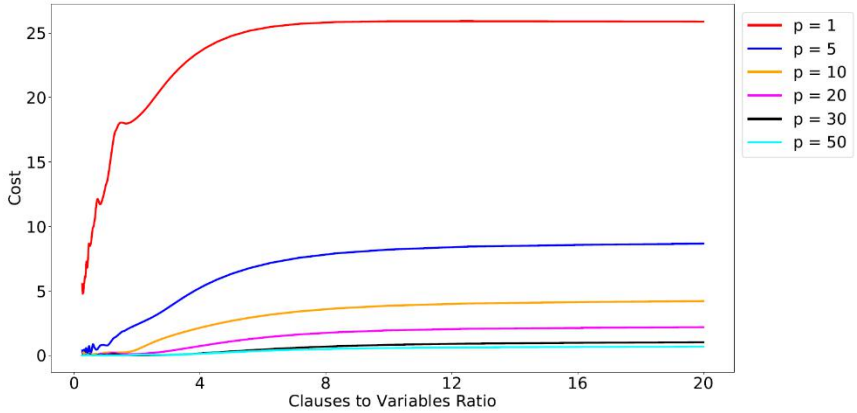
Main Contributions

One of the main findings is stating and proving a theorem that shows if two Ł-clauses sharing a variable appearing with different polarities in two negated can not be simultaneously satisfied.
Secondly, the results show that the new parameters identified can produce formulas with different satisfiability patterns.

- **A phase transition and an easy-hard-easy pattern can be witnessed by varying the new parameter p while having a constant clauses-to-variables ratio.**



- **The effect of the clauses-to-variables ration parameter in the minimum number of falsified Ł-clauses**



Note: P is new parameter setting the degree of absence of negated terms produced by the generator.