Lightweight Axiom Pinpointing via Replicated Driver and Customized SAT-Solving

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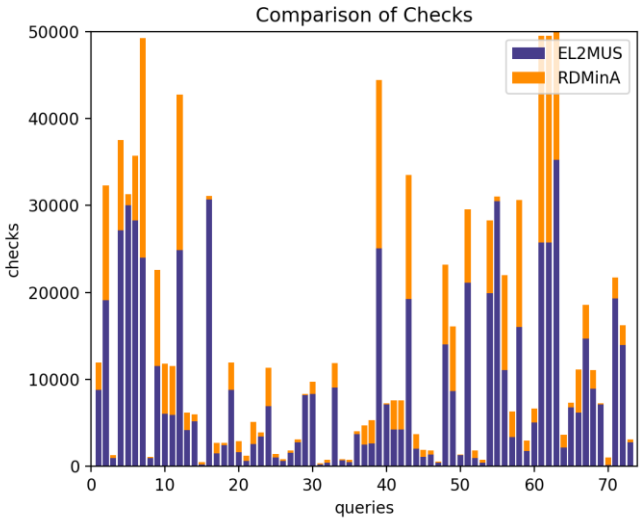
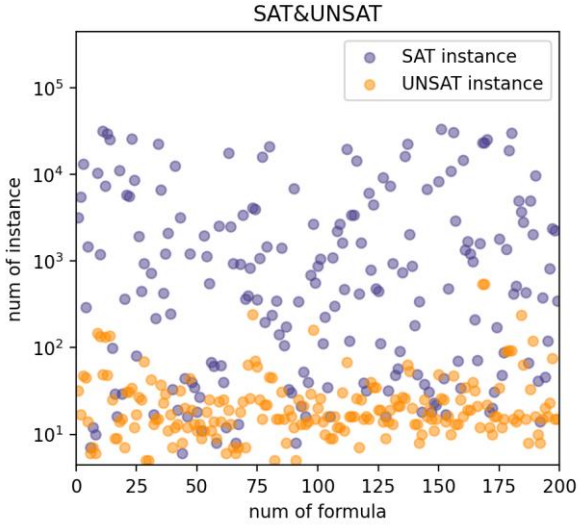
Problems & Ideas

- Problems of conventional axiom pinpointing algorithms:
  - Few work focuses on the optimization of all MinA enumeration system.
  - Consistency checking of candidate MinAs will become a big burden of axiom pinpointing in large-scale ontologies.
- Ideas:
  - A replicated driver discovers new justifications from explored justifications through cheap (polynomial) resolution.
  - Adjust the strategies of the built-in SAT solver of axiom pinpointing algorithm according to the Horn pinpointing formula.

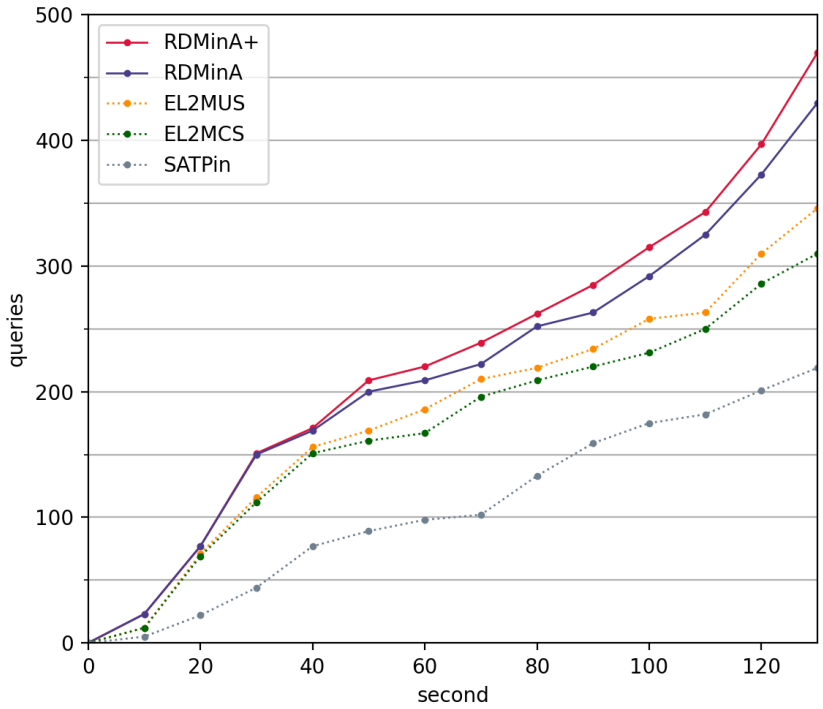




The figure on the left shows the effect of replicated driver. The axiom pinpointing algorithm with replicated driver calls fewer candidate MinA checks. The figure on the right shows the satisfiability of the seeds in Horn pinpointing formula. We customize the combinatorial SAT-solving strategy according to the characteristics of the Horn pinpointing formula.

Main Contributions

- Contributions:
  - A replication system for explored MinAs, it can reduce the consistency checking of seeds in the MinA enumeration algorithm.
  - A customized SAT solver which improves the efficiency of verifying whether the seed of the Horn pinpointing formula is a candidate MinA.



The figture above shows the numbers of solved queries within specified time durations with MinAs enumeration algorithm RDMinA ,RDMinA+, EL2MUS, EL2MCS and SATPin. Each vertex represents the number of queries successfully enumerated within the limited time. The number of RDMinA is larger than other methods,