Choosing a Solver for Your Query

An SVM-based Query Classification

Oscar Soria Dustmann, Felix Rath, Philipp Martin, Klaus Wehrle

Observation

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Which solver is the best?

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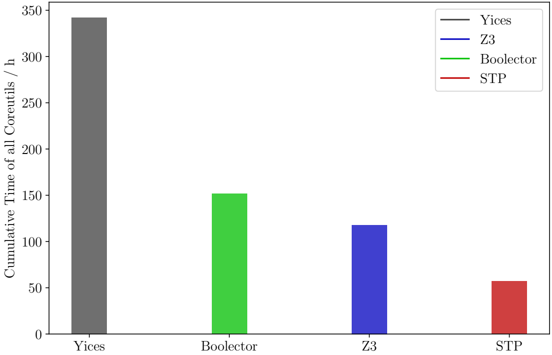

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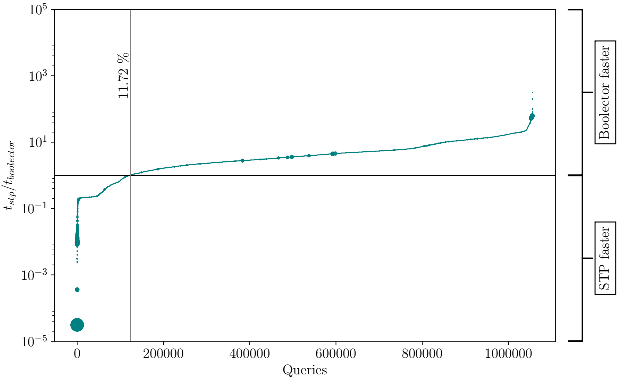

Solver Choice

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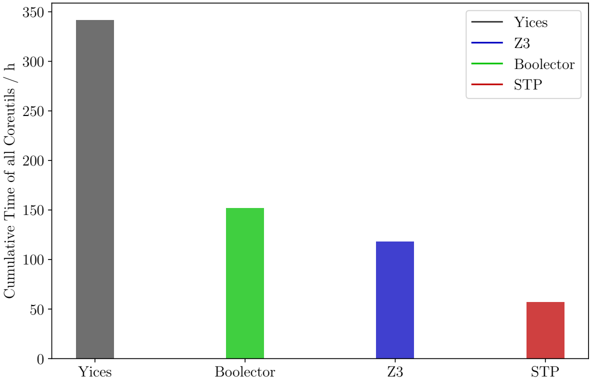

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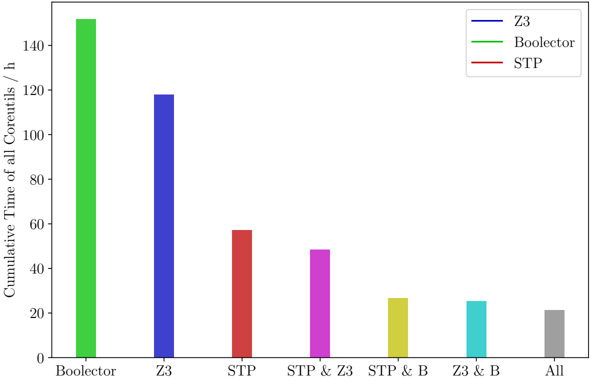

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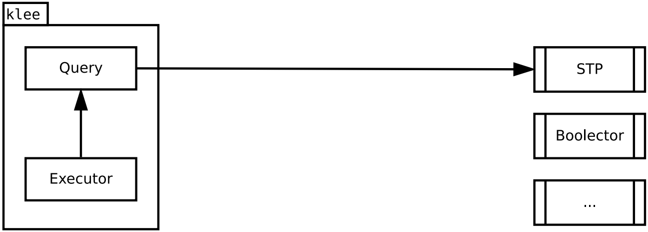
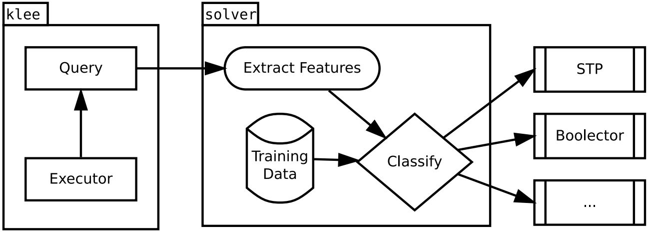


Choose Best Solver for Each Query with Machine Learning



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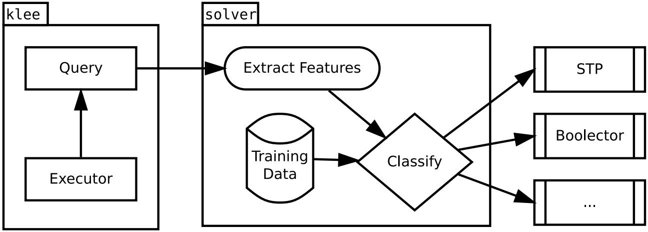

Features

- size, domain and range of arrays
- operators, constants and variables in constraints
- occurrence of the latter in the query overall

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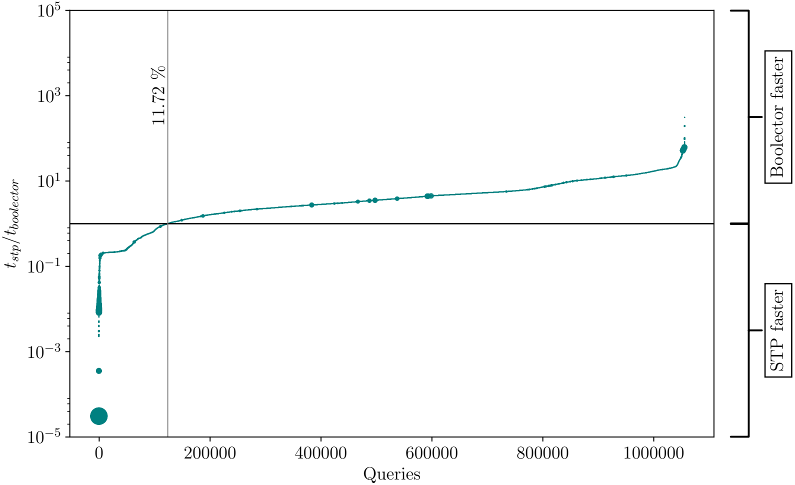

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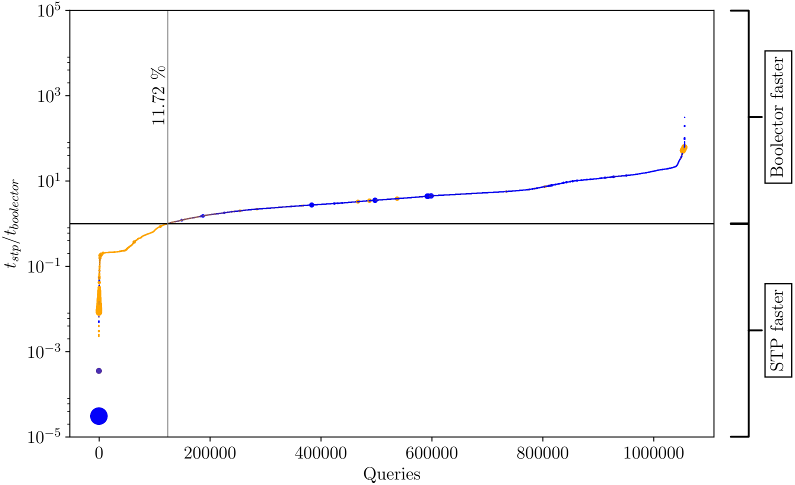
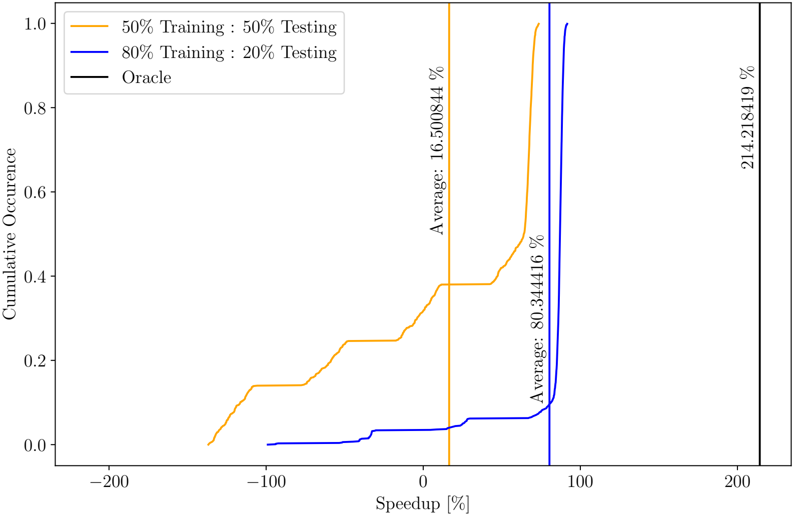


Influence of the Training Set



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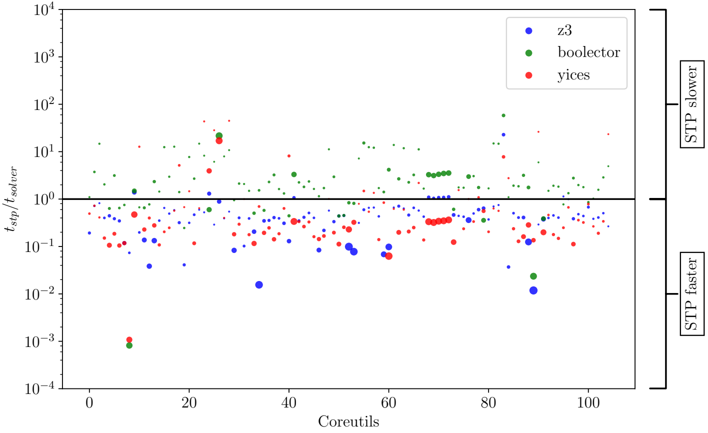
  - Understand/fix over-selection of Boolector
  - Identify more relevant properties of queries
  - Find reliable / stable training set

Per-Tool-Comparison



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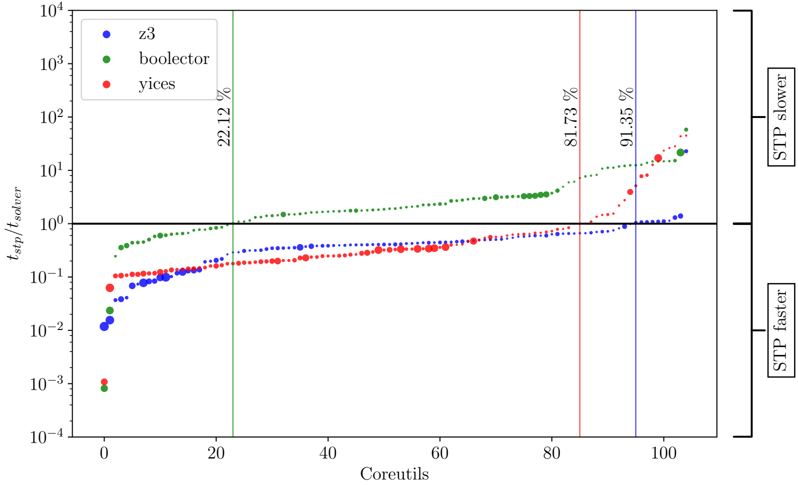

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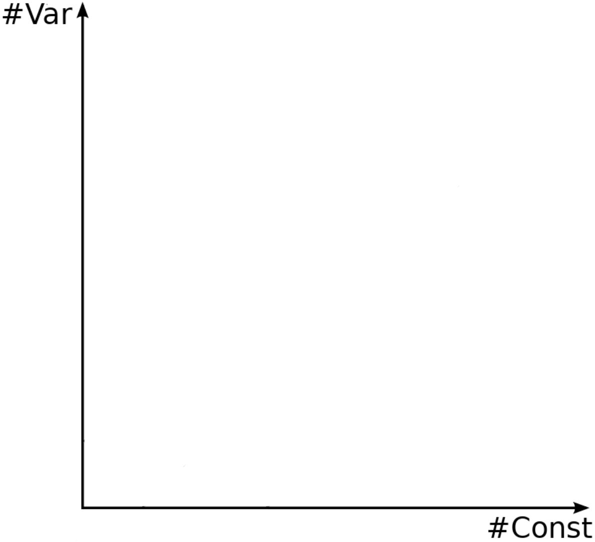

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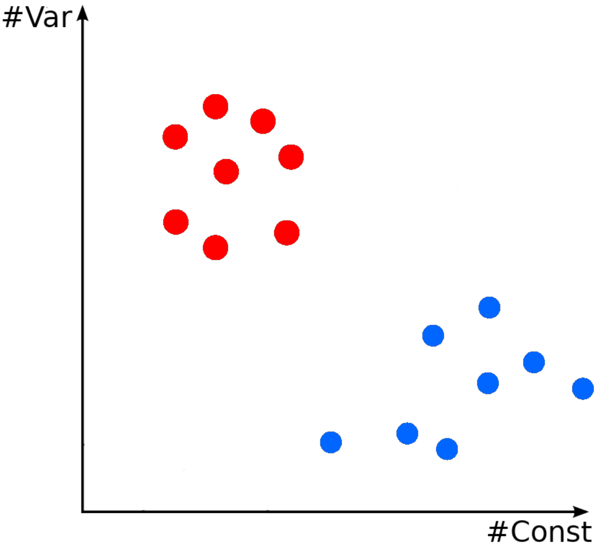

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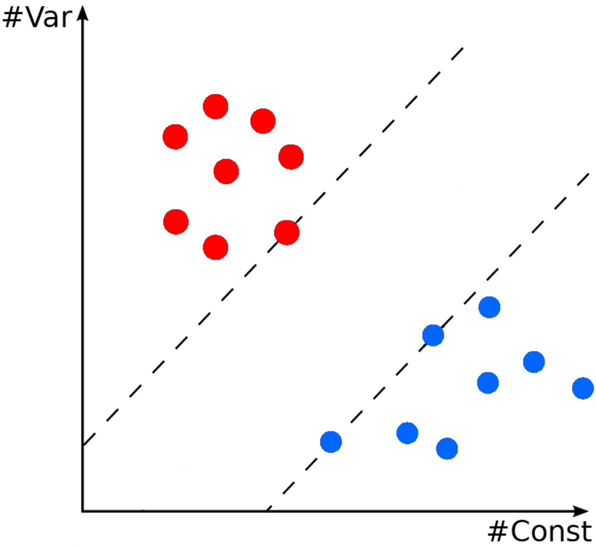

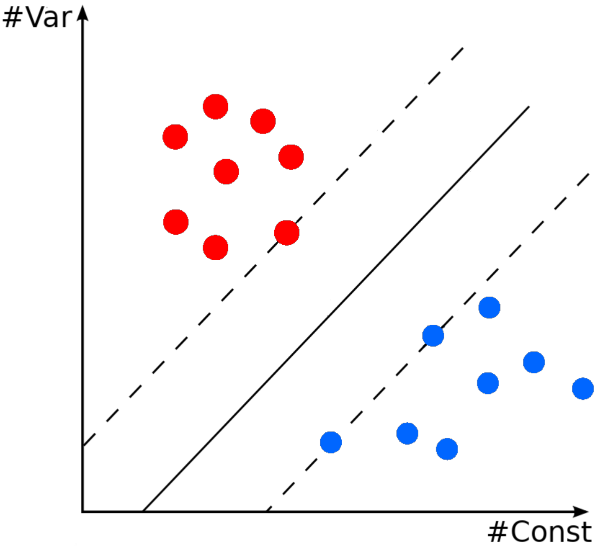
#Var
#Const

Feature Set

Array features	Constraint features	Query features
Number of Arrays	Number of constraints	Constant count
Total size	Total constant count	Variable count
Maximum size	Maximum constant count	Operator count
Minimum size	Minimum constant count	Operator counts by type
Average size	Average constant count	
Maximum domain	Total variable count	
Minimum domain	Maximum variable count	
Average domain	Minimum variable count	
Maximum range	Average variable count	
Minimum range	Total operator count	
Average range	Maximum operator count	
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	Average operator count	
	Operator counts by type	