ALIAS

A Library for Implementing Argumentation Systems

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Introduction

Argumentation frameworks can be used to define and represent conflicting data

Nodes in the graph represent each individual record in the data and edges represent conflicts between the records

Semantics are used to decide which of the sub-sets of the data are acceptable and which are rejected

There might be many sub-sets of acceptable arguments, each representing a different way to resolve the conflict

Goals and Aims

- Implement solver for computing argumentation semantics
- Solver should comply to ICCMA competition standards
- Solver should have good performance for all types of frameworks
- Solver must be easy to setup and use
- Implement Web User Interface for solver

Implementation

4 Approaches have been implemented

- **3** Direct approaches for computing maximal conflict free (MFC) sets using different data structures
  - MCF with Sets
  - MCF with Dictionaries
  - MCF with PyTables
- **1** Reduction approach using SAT solver
  - SAT Solver

3 Semantics included in ALIAS: Complete, Stable and Preferred

4 Tasks per semantic:

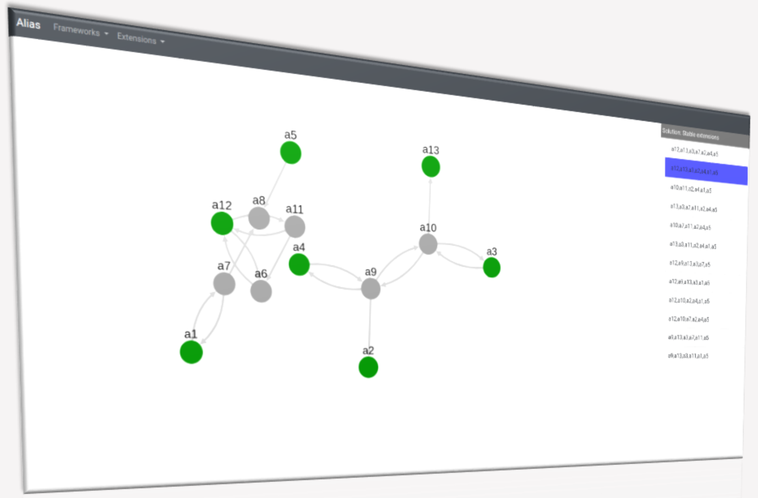
- Compute all extensions
- Compute some extensions
- Check if given argument is credulously accepted for extension
- Check if given argument is skeptically accepted for extension

1 Web User Interface implemented

50 Benchmark argumentation frameworks for each extension

200 Hours of benchmark testing

2 High performance solvers from ICCMA 2017 competition have been used for comparison



Results

Direct approach (Maximal Conflict Free sets)		Reduction approach (SAT Solver)
Slower performance due to combinatorial approach		Good performance. SAT solver is using backtracking search algorithm to find solutions
Enumerating all maximal sets guarantees correct solution		Correctness highly depends on encodings
Can only evaluate semantics using maximality of the sets		Can be used to compute different semantics
Limited to small changes for optimization		Can be easily extended to improve performance and compute other semantics

ALIAS	vs	High performance solvers
Good performance for small and medium frameworks		Great performance for all types of frameworks
Easy to setup		Difficult to setup
Easy to use as a library and through Web User Interface		Can only be used as a stand alone command line application

Conclusion

- ALIAS is a Python library allowing user to compute three semantics of abstract argumentation frameworks
- ALIAS is easy to setup. Furthermore, it provides Web User Interface to enhance its usability
- Although ALIAS cannot outperform high performance solvers it is able to work on small and medium frameworks

Future Work

- **Encodings**: Improve semantic encodings for SAT solver to improve performance
- **Semantics**: Extend ALIAS to be able to compute all semantics for argumentation frameworks
- **Web UI**: Improve Web UI to enhance usability and extend available functionalities