

Introducing the Fourth International Competition on Computational Models of Argumentation

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1: CRIL, CNRS and Université d'Artois, Lens
2: LIPADE - Distributed Artificial Intelligence

Third International Workshop on Systems and Algorithms for Formal
Argumentation (SAFA 2020)

- *The competition aims at nurturing research and development of implementations for computational models of argumentation.*
<http://argumentationcompetition.org/>
- Current steering committee: S. Gaggl (Pres.), N. Oren (Vice-Pres.), J.-G. Maily (Secr.), F. Cerutti, M. Thimm, M. Vallati, S. Villata
- ICCMA 2015: M. Thimm and S. Villata
 - 18 solvers
- ICCMA 2017: S. Gaggl, T. Linsbichler, M. Maratea and S. Woltran
 - 16 solvers/6 benchmarks
- ICCMA 2019: S. Bistarelli, F. Santini, L. Kotthoff, T. Mantadelis and C. Taticchi
 - 9 solvers/2 benchmarks
- ICCMA 2021: J.-M. Lagniez, E. Lonca, J.-G. Maily and J. Rossit



1 Background: AFs and ABA

2 Competition Rules

3 Conclusion

Argumentation Framework (AF) and Extension Semantics

$F = (A, R)$ where A is a set of arguments and $R \subseteq A \times A$ represents attacks between arguments. $S \subseteq A$ is

- *conflict-free* (**cf**) if there is no $a, b \in S$ s.t. $(a, b) \in R$
- *admissible* (**ad**) if $S \in \mathbf{cf}(F)$ and S defends all its elements
- *stable* (**stb**) if $S \in \mathbf{cf}(F)$ and S attacks each argument in $A \setminus S$
- *complete* (**co**) if $S \in \mathbf{ad}(F)$ and S doesn't defend any argument in $A \setminus S$
- *preferred* (**pr**) if S is \subseteq -maximal in $\mathbf{ad}(F)$
- *semi-stable* (**sst**) if $S \in \mathbf{co}(F)$ and S is range-maximal in $\mathbf{co}(F)$
- *stage* (**stg**) if $S \in \mathbf{cf}(F)$ and S is range-maximal in $\mathbf{cf}(F)$
- *ideal* (**id**) if $S \in \mathbf{ad}(F)$ s.t. $\forall S' \in \mathbf{pr}(F), S \subseteq S'$, and S is \subseteq -maximal among those sets

ABA Framework

$F = (L, R, A, \bar{})$ where

- L : set of symbols (language)
- R : set of rules $x_0 \leftarrow x_1, \dots, x_n$, $x_i \in L$ and $n \geq 0$
- $A \subseteq L$: assumptions
- $\bar{} : A \rightarrow L$: contrariness

ABA Arguments and Attacks: An Example

$F = \langle L, R, A, \bar{} \rangle$ with $L = \{a, b, c, p, q, r, s, t\}$, $R = \{(p \leftarrow q, a), (q \leftarrow), (r \leftarrow b, c)\}$, $A = \{a, b, c\}$ and $\bar{a} = r$, $\bar{b} = s$, $\bar{c} = t$.

- $Arg_1 = (\{b, c\} \vdash r)$: from the rule $r \leftarrow b, c$
- $Arg_2 = (\{a\} \vdash p)$: from the rules $q \leftarrow$ and $p \leftarrow q, a$
- Arg_1 attacks Arg_2 : r (concl. of Arg_1) is contrary of a (an assumption in Arg_2)

Assumption-based Extensions

- $A_1 \subseteq A$ attacks $A_2 \subseteq A$ iff an argument supported by a subset of A_1 attacks an argument supported by a subset of A_2
- A set of assumptions A_1 defends an assumption a if A_1 attacks each set of assumptions that attacks a
- Then, extension semantics are defined classically, e.g. for $S_A \in A$,
 - $S_A \in \mathbf{cf}(F)$ iff it does not attack itself
 - $S_A \in \mathbf{ad}(F)$ if $S_A \in \mathbf{cf}(F)$ and S_A defends all its elements
 - ...

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- Main track: static abstract argumentation
- Dynamic track: evolving AFs
- Structured argumentation: ABA
- In each track, one sub-track for each semantics
- In each sub-track, several reasoning tasks

- Semantics under consideration: $\sigma \in \{\mathbf{co}, \mathbf{pr}, \mathbf{stb}, \mathbf{sst}, \mathbf{stg}, \mathbf{id}\}$
 - we choose to remove the grounded semantics (not challenging enough)
- Tasks: Given an AF $F = \langle A, R \rangle$
 - **CE**- σ : give the number of σ -extensions of F
 - **SE**- σ : give one σ -extension of F
 - **DC**- σ : for $a \in A$ an argument, is a credulously accepted in F ?
 - **DS**- σ : $a \in A$ an argument, is a skeptically accepted in F ?
- Four problems for each subtrack except $\sigma = \mathbf{id}$ (**CE-id** = 1, and **DC-id** = **DS-id**)

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- Tasks: **CE**- σ , **SE**- σ , **DC**- σ , **DS**- σ
- **New**: instead of reading the full set of updates in a text file given as an input, the solvers will wait for updates on the standard input
 - “online” behaviour
 - seems closer to the process of a real debate: one does not generally know all the future arguments at once

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- Tasks: **CE**- σ , **SE**- σ , **DC**- σ , **DS**- σ
 - Reminder: we consider the assumption version of the semantics

- One ranking for each sub-track
 - six rankings for abstract argumentation
 - three rankings for dynamic argumentation
 - three rankings for ABA
 - To be ranked, a solver must participate to the full sub-track
 - No requirement to participate to all the (sub-)tracks
- Scoring:
 - Any wrong result: exclusion from the sub-track
 - Correct answer in the runtime limit: 1 point
 - Timeout or non-parsable output: 0 point
 - Tie-break: cumulated runtime over the instances correctly solved

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- Solver interface, call for participation and call for benchmarks will be released before the end of 2020
- Tentative deadlines:
 - Jan 15, 2021: Declaration of intent by participants
 - Feb 1, 2021: Benchmark submission
 - Mar 15, 2021: Solver submission
 - Apr 15, 2021: System descriptions
 - Aug, 2021: Presentation of results
- For up to date information,
 - Official website: <http://argumentationcompetition.org/2021/>
 - Mailing list: argumentationcompetition@inria.fr
 - Soon: probably Twitter
- For any question, iccm2021@cril.univ-artois.fr
- We welcome all participations from academics, students, or anyone: spread the word!