3iA Côte d'Azur

Interdisciplinary Institute for Artificial Intelligence

Ph.D. research topic

- Title of the proposed topic: **Mining arguments over time**
- **Research axis of the 3IA: Axis 1**
- **Supervisor (name, affiliation, email): Serena Villata (CNRS), villata@i3s.unice.fr**
- Co-supervisor (name, affiliation):
- The laboratory and/or research group: WIMMICS teams (Université Côte d'Azur, CNRS, Inria). . The research fields of the team are graph-oriented knowledge representation, reasoning and operationalization to model and support actors, actions and interactions in web-based epistemic communities.

Apply by sending an email directly to the supervisor and the co-supervisor.
The application will include:

- Letter of recommendation of the supervisor indicated above
- Curriculum vitæ.
- Motivation Letter.
- Academic transcripts of a master's degree(s) or equivalent.
- At least, one letter of recommendation.
- Internship report, if possible.

Context and research challenges

Argumentation pervades human intelligent behavior, and it is a mandatory element to conceive artificial machines that can exploit argumentation models and tools in the cognitive tasks they are required to carry out. The field of artificial argumentation [1] plays an important role in AI. The reason for this is based on the recognition that if we are to develop robust intelligent machines able to act in mixed human-machine teams, then it is imperative that they can handle incomplete and inconsistent information in a way that somehow emulates the way humans tackle such a complex task. To do so, artificial argumentation combines formal argumentation, based on critical reasoning, with human natural argumentation extracted through argument mining methods.

Argument(ation) mining (AM) [2] is the research field in artificial argumentation aiming at automatically processing natural language arguments and reason upon them. It aims at extracting natural language arguments and their relations from text, with the final goal of providing machine-processable structured data for computational models of argument.

Roughly, each argument is a set of premises or assumptions that, together with a claim, is obtained by a reasoning process. The overall goal of argumentation is to increase or decrease the acceptability of claims by supporting or attacking them with new arguments.

The goal of this PhD position will be to investigate the dynamics of the argumentation over time. More precisely, the way argumentation is carried out in public discourse, political debates and scientific communication changes over time. Another mid-term goal of the team will be to automatically explore the dynamics of inter and intra-argument structures over time. On the one side, the task will be to investigate through semi-supervised and unsupervised learning methods how the argumentation evolved over time. For instance, for political debates, we plan to start with the USElecDeb60To20 dataset, containing all the US presidential debates since 1960 to 2020. The objective is to study the temporal evolution trends of the argumentation, to see how the structure of the arguments evolved (e.g., number and fine-grade degree of the premises, presence of major claims, employment of rhetorical elements, choice of news events, change points). On the other side, the task will consist in the investigation of the dynamics of the argumentation in terms of attacks and supports among the candidates' arguments (i.e., graph level analysis of the argumentation). The final goal will be to assess if and how the dynamics of the argumentation impacted the outcome of the decision making process. For instance, this would allow us to learn from past argumentation dynamics to predict the results of the future elections in a country.

Expected skills

The candidate should be a Master student in a AI, NLP and/or Machine Learning program, with a strong background in computer science and mathematics. Programming skills are required. Fluent English required, both oral and written. French is appreciated but not mandatory.

References

[1] Katie Atkinson, Pietro Baroni, Massimiliano Giacomin, Anthony Hunter, Henry Prakken, Chris Reed, Guillermo Ricardo Simari, Matthias Thimm, Serena Villata: Towards Artificial Argumentation. AI Mag. 38(3): 25-36 (2017).

[2] Elena Cabrio, Serena Villata. Five Years of Argument Mining: a Data-driven Analysis. Proceedings of 27th International Joint Conference on Artificial Intelligence (IJCAI 2018), pages 5427-5433.