Tailoring Scientific Argument Mining for Scientific Literature Correction

Yagmur Ozturk

Cyril Labbé, François Portet Univ. Grenoble Alpes, CNRS, Grenoble INP, LIG, 38000, Grenoble, France

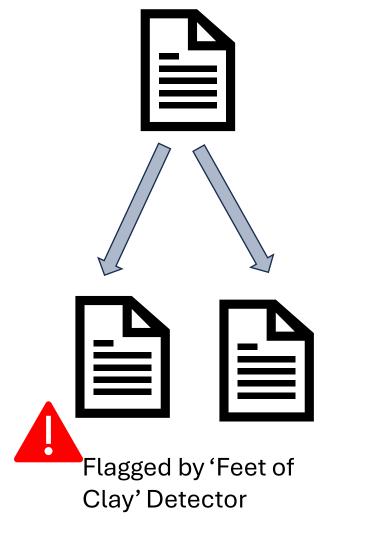
What is scientific literature correction?

Scientific Argument Mining (SAM)

PRACTICES

- Retraction of articles
- Post publication peer review





PLATFORMS

 Problematic paper screener [1]





AIM: Providing a tool that helps with the correction process

Can **SAM** be used to assess if retracted citations weaken the validity of claims and results in a paper?

Extraction of the argument structure of scientific articles

- > Argumentative Units: Labels to identify and classify parts of argument structure (BACKGROUND/AIM...)
- > Argumentative Relations: Labels to classify relations between units (SUPPORT/ELABORATION...)
- > Citation Functions: Purpose of a citation, not always included in SAM frameworks

Example: Argument structure with SAM



RELATED WORK

Brown et. al. [1] mentions the usage of ... in their work. Smith et al. [2] demonstrated that endosomal escape is possible under conditions...first ones to prove that...

Relation Type: [2]ELABORATION

[2] BY-MEANS

METHODOLOGY

We used the same conditions as Smith et.al. in our experiments...and explore extensions on their baseline...

[2] OWN RESULT

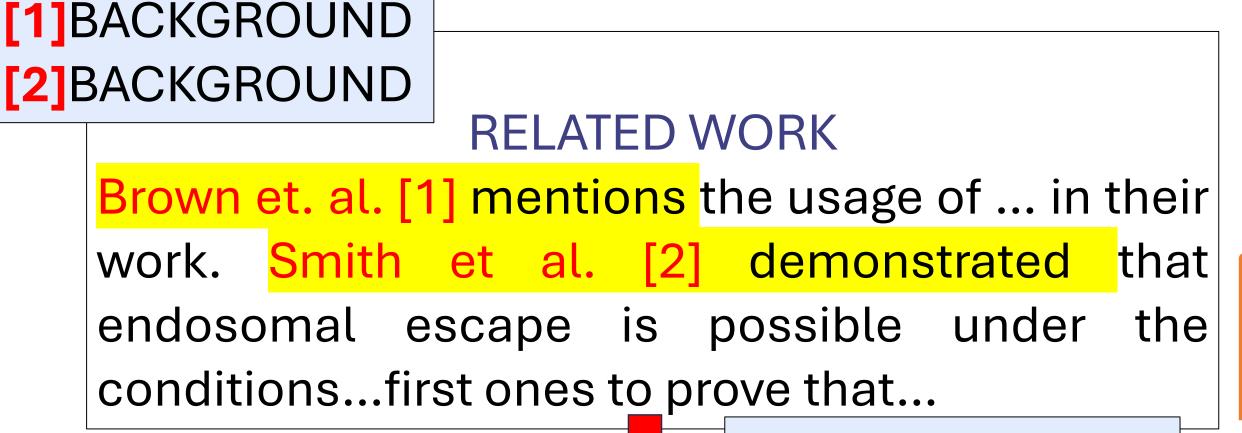
[2] USE/BASIS

RESULTS

We prove that building on [2], we are able to explore the application of endosomal escape towards...

Unit Type:

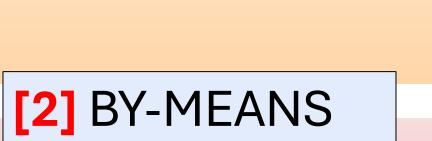
When Smith and Brown are retracted





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Related Works on SAM

Author	Domain	Corpus Size	Unit Spans	Relation Labels
Teufel [2]	Comp. Ling.	80 articles	Sentence	X
Teufel [3]	Chem	50 articles	Sentence	X
Lauscher [4]	Comp. Imaging	40 articles	Token- level	In corpus but not automatized
Binder [5]	Comp.Imaging	39 articles	Mixed	

Why tailoring of these works is necessary for our task

- Scarce gold data
- \triangleright Fine grained annotations [2,3]: complex human annotation tasks
- > Coarse-grained annotations [4,5]: Not enough to reflect the argumentative complexity
- > Token level: span detection of argument units is weak
- > Sentence level: Usually one sentence IS NOT one argument unit

Applying SAM to a new domain

- > New dataset annotated for argumentation using guidelines of [2,3] which overlaps with [4]
- Applying SAM to nanobiology
- Applying SAM to scientific literature correction practices
- > Evaluating automatic SAM system of [5] on new data
- Leveraging from citation function systems

References

[1] G. Cabanac, C. Labbé, and A. Magazinov, 'The 'Problematic Paper Screener' automatically selects suspect publications for post-publication (re)assessment', in 7th World Conference on Research Integrity (WCRI 2022), 2022 [2] S. Teufel, J. Carletta, and M. Moens, 'An annotation scheme for discourse-level argumentation in research articles', in Ninth Conference of the European Chapter of the Association for Computational Linguistics, 1999 [3] S. Teufel, A. Siddharthan, and C. Batchelor, 'Towards Domain-Independent Argumentative Zoning: Evidence from Chemistry and Computational Linguistics', in Proceedings of the 2009 Conference on Empirical Methods in Natural

Language Processing, 2009 [4] A. Lauscher, G. Glavaš, and K. Eckert, 'ArguminSci: A Tool for Analyzing Argumentation and Rhetorical Aspects in Scientific Writing', in *Proceedings of the 5th Workshop on Argument Mining*, 2018

[5] A. Binder, L. Hennig, and B. Verma, 'Full-Text Argumentation Mining on Scientific Publications', in *Proceedings of*

the first Workshop on Information Extraction from Scientific Publications, 2022 [6] F. Bordignon et al., 'Nano bubbles: how, when and why does science fail to correct itself?' 2023.





