

Training Argumentation Skills with Argumentative Writing Support

Christian Stab[†] and Iryna Gurevych^{†‡}

[†]Ubiquitous Knowledge Processing Lab (UKP-TUDA)

Department of Computer Science, Technische Universität Darmstadt

[‡]Ubiquitous Knowledge Processing Lab (UKP-DIPF)

German Institute for Educational Research

www.ukp.tu-darmstadt.de

Abstract

We present an writing support system for assessing written arguments. Our system incorporates three analysis models allowing for rich feedback about argumentation structure, quality of reasons, and presence of opposing arguments.

1 Introduction

Persuasive essay writing is an established method for training argumentation skills. By analyzing different views on a (predefined) controversial topic, the author trains to recognize logical flaws in arguments, to anticipate counter arguments, and to formulate sufficient reasons for strengthening the own standpoint (to name only some of these skills). The effective development of argumentative abilities requires, however, formative feedback, which indicates particular flaws in the argumentation and provides guidelines for correcting them. So far, the provision of feedback about argumentation has been considered a manual task. While existing *Automated Essay Evaluation* (AWE) systems provide feedback about grammar, discourse structure, and lexical richness (Shermis and Burstein, 2013), they are not yet capable of assessing written arguments.

In order to bridge this gap, we developed an *Argumentative Writing Support* (AWS) system, that complements existing AWE systems with argument analysis methods. In particular, our AWS system incorporates three different argument analysis models that allow for feedback about the argumentation structure, the sufficiency of reasons, and the consideration of opposing arguments. In this paper, we introduce the feedback types of our AWS system and describe how the results of the analysis models are converted to human understandable feedback.

2 Argumentative Writing Support

Our AWS system builds upon three argument analysis models. The first model (`struct`) identifies the argumentation structure of the essay as a connected tree using an ILP-joint model (Stab and Gurevych, 2017a). It first segments the text into argument components, classifies each component as major claim, claim or premise and finally links the argument components using support and attack relations. The second model (`suff`) recognizes if the premises of an argument are sufficient for supporting its claim (Stab and Gurevych, 2017b). It is based on the sufficiency criterion proposed by Johnson and Blair (1977) and classifies a given argument as sufficient or insufficient. The third model (`bias`) recognizes if the author ignores opposing arguments (Stab and Gurevych, 2016), which is known as *myside bias*. It has been shown that guiding authors to include opposing arguments in their argumentation significantly improves the argumentation quality and the precision of claims (Wolfe and Britt, 2009).

2.1 Argumentative Feedback

Given the results of the analysis models, our AWS system generates (1) *document level feedback* about the entire essay well as (2) *paragraph level feedback* for each paragraph separately.

At the document level, the system first checks if the essay has a title and if it includes at least four paragraphs (introduction, two body paragraphs, and a conclusion) by examining line breaks.¹ In addition, the bias model recognizes opposing arguments to indicate *myside biases*.

At the paragraph level, the AWS first compares the argumentation structure identified with the `struct` model to the common rules of writing

¹Note that a proper essay structure guarantees the best possible results of our argument analysis models.

Argumentative Writing Support		Major Claim Claim Premise	
Document Feedback		Paragraph Feedback	Argumentation Structure
Essay		Feedback	Details
Title	Studying overseas		
Intro.	It is every student's desire to study at a good university and experience a new environment. While some students study and live overseas, some prefer to study home because of the difficulties of living and studying overseas.	<ul style="list-style-type: none"> ✗ Thesis statement present ✓ Introduction of topic ✓ No Arguments present 	<p>Insufficient Argument</p> <p>The premises of a well-reasoned argument should provide enough evidence for accepting or rejecting its claim. This criterion is also known as sufficiency criterion. An argument complies with the sufficiency criterion if its premises provide enough evidence for accepting or rejecting the claim. The following example argument illustrates a violation of the sufficiency criterion:</p> <p style="text-align: center;">Example of an insufficient argument</p> <p><i>"It is an undeniable fact that tourism harms the natural habitats of the destination countries. As Australia's Great Barrier Reef has shown, the visitors cause immense destruction by breaking corals as souvenirs."</i></p>
Paragraph2	However, students who study abroad have better paid jobs. For instance, One of my friends studied computer science at the University of London. Today she is employed in a well paid management position at Google Research.	<ul style="list-style-type: none"> ✓ Argument present ✓ One argument per paragraph ✓ All claims supported ✓ Claim is first component ✗ Sufficiently supported 	<p>The premise of this argument represents an example (second sentence) that supports a general claim in the first sentence. The argument is a generalization from one sample to the general case. However, a single sample is not enough to support the general case.</p> <p style="text-align: center;">Example of a sufficient argument</p> <p><i>"Cloning will be beneficial for people who are in need of organ transplants. Cloned organs will match perfectly to the blood group and tissue of patients since they can be raised from cloned stem cells."</i></p>
Paragraph3	Second, one will learn living without depending on anyone else. It also gives you the opportunity to improve your language skills and maybe even the possibility to learn a new language. You also get to know a new culture which is a fascinating experience.	<ul style="list-style-type: none"> ✗ Argument present ✗ One argument per paragraph ✗ All claims supported ✓ Claim is first component ✗ Sufficiently supported 	<p>Example 2 illustrates a sufficiently supported argument. It is reasonable to accept that transplantation patients will benefit from cloning if it enables a better match and an accelerated healing process.</p>
Paragraph4	Also, employers are mostly looking for people who have international and language skills. Therefore, one who has studied and lived overseas will become more eligible for the job than his/her peers.	<ul style="list-style-type: none"> ✓ Argument present ✓ One argument per paragraph ✓ All claims supported ✗ Claim is first component ✓ Sufficiently supported 	
Conc.	Although there are many difficulties a student might face when studying overseas, it is an irreplaceable experience for every student.	<ul style="list-style-type: none"> ✓ Restatement of thesis statement 	

Figure 1: UI showing the paragraph level feedback of an essay about the topic studying abroad.

guidelines. It estimates whether the author takes a stance by checking the presence of a major claim in the introduction and conclusion, and if the introduction includes a non-argumentative description of the controversy. Furthermore, the system verifies if a body paragraph includes a single argument, i.e. a claim supported (or attacked) by at least one premise and whether a body paragraph includes unwarranted claims. Since presenting the claim before premises significantly improves the recall and comprehension of arguments (Britt and Larson, 2003), we also check the order of argument components. The suff model finds logical sufficiency flaws and verifies whether the premises of an argument are enough to support the claim.

2.2 User Interface Design

The user interface of our AWS system consists of three components (columns in Figure 1). The first column shows the paragraphs of the essay with the identified argument components. The feedback component in the second column is based on a checklist metaphor which shows positive (green) and negative (red) feedbacks. For easily spotting the location in the essay, we implemented a brushing-and-linking method that highlights the argument components affected by an entry in the feedback list. The third column provides a description of the selected feedback type and a guideline for improving the argumentation. The user interface also visualizes the argumentation structure in an interactive tree visualization.

3 Conclusion

For the first time, we presented an AWS system that provides rich feedback about written arguments. We described the feedback types which are generated using the results of three argument analysis models. In future work, we plan to conduct user studies to investigate the effectiveness of our AWS for improving argumentation skills.

References

- Anne Britt and Aaron Larson. 2003. Constructing representations of arguments. *Journal of Memory and Language*, 48(4):794 – 810.
- Ralph Johnson and Anthony Blair. 1977. *Logical Self-Defense*. McGraw-Hill Ryerson.
- Mark D. Shermis and Jill Burstein. 2013. *Handbook of Automated Essay Evaluation: Current Applications and New Directions*. Routledge Chapman & Hall.
- Christian Stab and Iryna Gurevych. 2016. Recognizing the absence of opposing arguments in persuasive essays. In *Proceedings of the Workshop on Argument Mining*, pages 113–118, Berlin, Germany.
- Christian Stab and Iryna Gurevych. 2017a. Parsing argumentation structures in persuasive essays. *Computational Linguistics (in press)*, (preprint arXiv:1604.07370).
- Christian Stab and Iryna Gurevych. 2017b. Recognizing insufficiently supported arguments in argumentative essays. In *Proceedings of EAACL*, pages 980–990, Valencia, Spain.
- Christopher Wolfe and Anne Britt. 2009. Argumentation schema and the myside bias in written argumentation. *Written Communication*, 26(2):183–209.