

Araucaria-PL: Software for Teaching Argumentation Theory

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Abstract. The paper aims to present the software system Araucaria-PL which is the only Polish tool designed to teach argumentation theory. It is developed on the basis of Araucaria by Reed and Rowe and extended with a module capturing persuasive aspects of argumentation. The tool has been used to create a Polish on-line corpus of analyzed argumentation ArgDB-pl. Moreover, the paper presents the preliminary study of usefulness of Araucaria-PL for teaching about argument structures and schemes at the standard Polish courses of logic and rhetoric.

Keywords: argumentation, pedagogy, software tools.

Introduction

One of the most important methods in pedagogy of argumentation theory is the graph-theoretic technique of argument diagramming. An argument is described as a directed graph $D = (V, E)$, where V is a set of vertices representing premises or conclusion, and E is a set of arrows which are 2-element ordered pairs of V representing the relation of support or attack between statements. Diagrams allow the visualization of the structure of argumentation, i.e. its components and interrelations among them (see e.g. [21,12,2]), as well as the schemes of argumentation, i.e. patterns of reasoning (see e.g. [23,8,10,12]). Visualization can then be used by an analyst as a starting point to critically evaluate the argument properties such as acceptability of premises or the strength of the inference.

The pioneering application of argument diagramming (“mapping”) in pedagogy of logic was proposed by the English logician Whately in 1830s [25]. He proposed to start analysis with finding a main claim of a text and then its premises. The procedure should be iterated so many times so that all the premises, including the basic ones, are found. Nowadays, argument diagrams have been attracting increasing attention and have become a standard topic in textbooks on informal logic (see e.g. [24]) and in philosophy classes [6]. The diagramming method has been shown to have a significant effect on teaching philosophy [22]. An interest in diagramming methods triggered the development of numerous software tools supporting argument mapping.¹ While there is a growing number of the tools which require the command of English to use them,

¹ Examples of softwares for argument analysis: Argunet (<http://www.argunet.org/debates/>), Argumentative (<http://sourceforge.net/projects/argumentative/>), Athena [15], Carneades [5], Cohere [17], Debategraph (<http://debategraph.org/>), Parmenides [1], Rationale (<http://rationale.austhink.com/>), TruthMapping (<http://truthmapping.com/>).

Araucaria-PL is a first Polish tool supporting analysis of argumentation. Araucaria-PL is the Polish version of Araucaria developed by Reed and Rowe [13] extended with a module capturing persuasive aspects of argumentation.

The main contribution of the paper is the presentation of the software Araucaria-PL, its module extending the original Araucaria with the persuasive context of arguments, a first corpus of analyzed Polish arguments and preliminary pilot evaluation study of the usefulness of the software for teaching logic and argumentation theory in Poland.

1 Araucaria

Araucaria [13] is a software system which supports an analyst in reconstructing and diagramming argumentative texts. Even though there are numerous software systems supporting argument analysis, the strong advantage of Araucaria is its rich argument-theoretic background. The tool does not only map a main claim, arguments pro- and con- or evaluation of argument, but it also allows to visually represent the deep structure of argumentation. It also makes use of argumentation schemes which allow the analyst to describe reasoning patterns employed in a given case. Araucaria provides five argumentation schemesets, e.g., Perelman's schemeset [10] consisting of 38 schemes.

The rich theoretical background of Araucaria makes it especially suitable for pedagogical aims. It allows a teacher to introduce different models of structure and schemes of argumentation. Its influence on enhancing skills in argumentation theory can then support skills in other disciplines (as shown for philosophy in [16]). Araucaria has been showed to be useful by its successful application in teaching philosophy, argumentation theory and law in many universities in America and in Europe.

2 Teaching Argumentation Theory in Poland

Poland has a strong tradition in formal logic, however, in the last decade the tendency to more informal approach can be observed. This tendency is particularly strong in introductory logic courses in the humanities. At the same time, a few Polish textbooks on argumentation theory were published: [19], which was the first textbook entirely dedicated to pedagogy of argumentation theory and critical thinking, and [20,7].

The first two textbooks dedicate a lot of attention to argumentation schemes and structure and to the method of argument diagramming. Still, there was no software designed to support courses in argumentation theory without the additional burden of students having to work in English. Such a situation is all the more difficult as in the humanities, where there is the most interest in the informal approach, the majority of students do not speak English to a degree which would allow them to use a non-Polish software. That was the motivation for developing Araucaria-PL.

3 Araucaria-PL

Araucaria-PL is a software tool for argument analysis based on AML (the Argument Markup Language) designed in XML. The tool has two main functionalities: it supports

argument diagramming and argument evaluation. Araucaria-PL is the Polish version of Araucaria [13] and is the first and only tool for argument analysis that has a Polish language interface and Polish schemesets.

The diagramming starts with uploading an argument saved as plain text. The text appears in the blue box on the left of the main window (see Fig. 1). The first node of a diagram is created by selecting (with the mouse) the portion of the text corresponding to a premise or a conclusion of argumentation. When the mouse is clicked in the white box on the right, the node appears at the yellow bar at the bottom. When two or more argument components are identified, their interrelation can be represented. The analyst should select one node with the mouse and drag it to the other node. The first node will be diagrammed as the premise of an argument and the second one as its conclusion. Once other nodes are identified, the structure of arguments is created by dragging the mouse from the new nodes to the node at the existing diagram. The nodes can show either a letter assigned to a unit of text (as in Fig. 1) or its full text (as in Fig. 2).

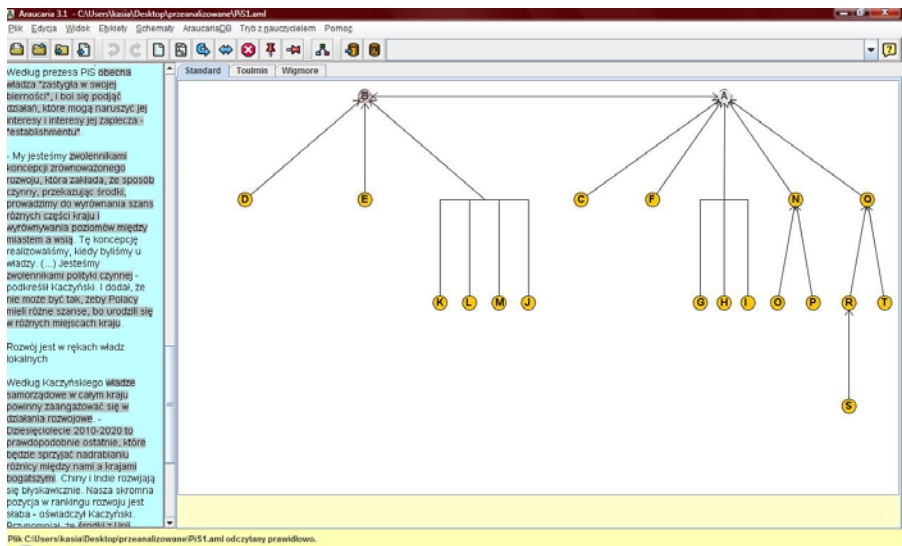


Fig. 1. Araucaria-PL main window (the example taken from ArgDB-pl corpus, the text comes from the Polish leading newspaper *Gazeta Wyborcza*, 16th Oct 2010)

Araucaria-PL supports representation of various argument structures according to different models: standard, Toulmin [21] and Wigmore [26]. In the standard model, Araucaria-PL allows visualization of structures such as linked argument (e.g. the nodes K, L, M, J, B in Fig. 1), convergent argument (e.g. O, P, B), serial argument (e.g. the chain of nodes S-R-Q-A), enthymemes (missing components of argumentation structure, e.g., A) and refutations (e.g. the node B is the refutation of A). An enthymeme is typed in by the analyst and visualized as a grey node with dashed borders. A refutation is represented as a pink node. Araucaria-PL allows also to mark the owner of the claim as e.g. Ann or Bob in Fig. 2.

One of the important features of Araucaria-PL is its support for argumentation schemes showing reasoning patterns used to draw conclusions in a given argument. For instance, the diagram in Fig. 2 visualizes the argument that was created according to the Argumentation Scheme from Consequences. The analyst can choose from different schemesets proposed by various theorists of argumentation: Walton [23], Pollock [12], Perelman and Olbrechts-Tyteca [10], Katzav and Reed [8] and Budzynska [3] (the schemeset unique for Araucaria-PL). Moreover, Araucaria-PL allows the analyst to define a new schemeset and save it in a schemeset file. When a schemeset is uploaded, the components of an argument can be selected with the mouse. Then, an appropriate scheme can be chosen from the list of the schemeset. The scheme is visualized as a shaded region (see Fig. 2). Both structure and schemes of argumentation can easily be changed with the help of ‘undo’ and ‘redo’ options. Analyzed arguments are saved in a format AML or as a JPEG image.

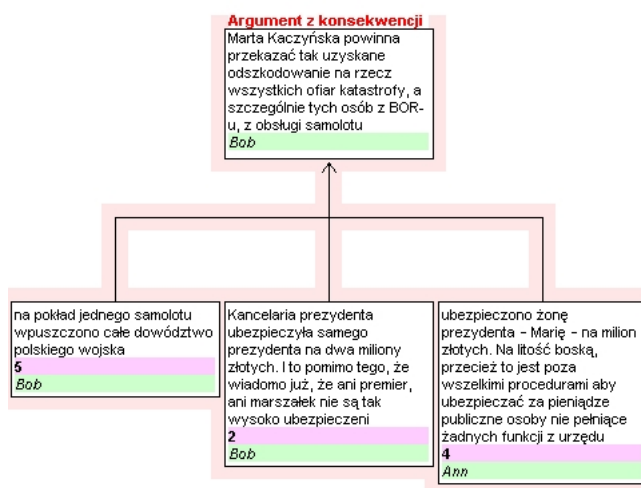


Fig. 2. Argument from Consequences (the example taken from ArgDB-pl corpus, the text comes from the blog of Polish politician Janusz Palikot, 31st May 2010)

Araucaria-PL supports argument evaluation in two different ways: (1) through evaluation labelling, or (2) through critical questions associated with a particular argumentation scheme. The evaluation labelling allows the analyst to show his confidence in the acceptability of premises or the strength of the relation of support or attack. To assign the evaluation, a node or an arrow can be selected with the mouse and the editor should be used to type in evaluation. The strength of this feature in Araucaria-PL is that the analyst can create his own scale of evaluation (e.g. ‘bad–neutral–good’ or ‘1–2–3–4–5’), however, such an assessment is arbitrary. Yet, this feature can be compensated for by the method of testing the argument with the use of critical questions. Once the analyst assigns the argumentation scheme to a given argument, the editor for that scheme provides the set of critical questions that can help the analyst to evaluate the plausibility

of the conclusion inferred on the basis of the given premises and scheme. In a pedagogical setting, the critical questions are powerful tool of enhancing students' skills of argument evaluation, since they give a "hint" as to what should be carefully considered as a potential weak point of an argument which follows the specific reasoning pattern.

Araucaria-PL is free, open-source software. The entire package can be downloaded as a zip file from the project webpage: <http://argumentacja.pdg.pl>

4 Application in Pedagogy

The potential utility of Araucaria-PL for teaching logic and argumentation theory in Poland was tested in a small pilot evaluation study. The character of the study is exploratory, since the tool is newly released (May 2010). In the future, further large scale studies will be conducted to measure pre- and post-performance in various student groups. The study was conducted during a course of logic for logic major graduates (a class of 6 students) and during a course of rhetoric for management major undergraduates (a class of 7 students). In addition, the feedback was gathered from logic teachers.

Student feedback was very positive, but also suggested a number of improvements (some of the comments repeat those discussed in [6]; only unique comments are presented here): (1) it should be possible to select two separate fragments of text which constitute one component of argument and associate them to one node; (2) when the text of two components overlaps, the text should be inserted twice into both nodes; (3) editing the text in a node should be possible; (4) the bigger parts of a diagram should be selectable in an easier way e.g. by using left key of the mouse (instead of clicking on subsequent nodes with "shift" pressed); (5) the same statement appearing in different places of a text should be represented with the same letter; (6) the yellow bar at the bottom could be removed – all operations could be done in the white panel; (7) different owners could be marked with different colors, which is particularly important in a big diagram with a lot of interpersonal interaction; (8) the option of determining one's own types of arguments/evidence (as in Wigmore model) and one's own list of available functionalities or argument descriptors should be allowed; (9) the legend of functions of the tool should be available.

Generally, students pointed out the following strengths of Araucaria-PL: (1) the possibility of building complex diagrams; (2) support for understanding arguments provided in a text; (3) the simplicity of operating; (4) the ease of correcting the diagram and archiving the analyzed arguments; (5) possibility of copying the results of analysis (e.g. to a Word file); (6) applicability to different domains (such as business, law etc.).

Teachers also offered very positive feedback and suggested some possible – if rather demanding and idealistic – enhancements: (1) automated reasoning (other relations among statements should be represented, e.g., the introduction of logical connectives could enable automated reasoning); (2) automated recognition (the system should recognize, e.g., inference, argumentation schemes, evaluate arguments); (3) self-learning (the teacher would prepare the set of examples of arguments with their determined structure and once the student who learns on his own makes a mistake, then the system could inform him about it, e.g., by marking the fault part of the diagram with red color).

5 Persuasive and Dialogical Context of Argumentation

In real-life practice, argumentation is most often performed in persuasive and dialogical contexts. Araucaria was designed purely to support the analyst in describing the process of argumentation, however, some natural arguments can not be adequately represented without the possibility of capturing argumentation context. From educational experience in courses of “pure” argumentation theory (which mostly ignores the dialogical and persuasive context), the majority of students fail to analyze argumentation in which this context played significant role, such as e.g.:

- (1)
 - a. Ann: I think that the attorney who proves the innocence of the defendant should be certain that he didn’t commit a given crime.
 - b. Bob: Really? And should the doctor be certain that the person has a given disease before starting examining him? [19, p12]
- (2)
 - a. I know my son. If he lied, then he certainly did it only because he was afraid of being rejected by his peers. [7, p112]

For (1), the majority of students did not recognize the existence of argument from analogy in (1b). They had to be guided to analyze the subsequent moves of the dialogue and to identify in each of step who is the speaker and what does s/he claims. For (2), the majority of students identified the argument in (2a) as argument from authority, while the mother’s statement “I know my son” is an appeal to her ethos (the credibility of a proponent) as a proponent of the argument supporting the claim that her son is not guilty. Ethos (credibility of a proponent) is a crucial mechanism of persuasion recognized by Aristotle in his theory of rhetoric [9]. The students had to be guided to consider whose credibility is at issue by distinguishing an argument’s proponent from an authority to whom a proponent may refer.

“Pure” argumentation theory does not support students’ skills in analysis of this type of argumentation, nor do tools which are based on such a theoretical background. Some attempts have been made to capture the dialogical context of argumentation [14], however, the theoretical results are not yet implemented in Araucaria or Araucaria-PL.² On the other hand, [3] proposed to represent persuasive aspects of arguments using one of the most influential contemporary theories of persuasion, the Elaboration Likelihood Model (ELM) [11]. The theory was implemented in Araucaria-PL as an additional module. The ELM assumes that there are two routes to persuasion: central and peripheral. The central route to persuasion is related to content-based arguments, while the peripheral route is related to a more insubstantial facet, such as credibility or attractiveness of the proponent. Using the ELM and Walton’s schemeset [23], AraucariaPL provides a schemeset for capturing arguments’ persuasive context. Among peripheral argumentation schemes, are distinguished, e.g.:

x says α , x is credible, therefore (plausibly) α ,
 x says α , x is attractive, therefore (plausibly) α .

² The results are implemented in a tool OVA [18], which slightly differs in functionality from Araucaria.

6 Corpus of Analyzed Polish Argumentation

Araucaria-PL has been used to create the first Polish corpus of analyzed natural argument, ArgDB-pl. ArgDB-pl uses the open AIF standard for argument representation [4]. The AIF aims to bring together a wide variety of argumentation technologies so that they can work together. ArgDB-pl is developed as a Polish version of ArgDB (<http://argdb.computing.dundee.ac.uk/>). This corpus was collected from May 2010 from a variety of domains such as newspapers, news webpages and blogs of politicians. ArgDB-pl allows users to search the database for annotated arguments using several search criteria.

The corpus is freely available online (<http://argumentacja.pdg.pl/argdbpl/>) for both access and update, so it can be easily used for the educational purposes. Its advantage is that it consists of real world arguments, which enrich the teaching experience with realistic examples. ArgDB-pl is useful for both the teacher (as a resource of examples) and the student (for practicing outside the regular classes). The corpus allows the student to first read a text (on the list of argumentative texts) and to try to analyze the text on his own, and then see the exemplary solution by pushing the “see the diagram” button. Since outcomes of analyses are saved not only in the AML format used by Araucaria-PL, but also in the AIF format, a student or a teacher can open an analyzed example of argument in any other software tool which uses the AIF standard language.

7 Conclusions

The paper has presented Araucaria-PL which is the only Polish software supporting pedagogy of argumentation theory. It extends the original Araucaria with a module for handling the persuasive context of argumentation. Araucaria-PL has been demonstrated to be useful in an educational setting not only directly by aiding argument analysis, but also by allowing the creation of ArgDB-pl, which is the first Polish corpus of analyzed natural argument. The corpus can be used by teachers and students as a resource of real-life examples of arguments. The small pilot study showed that students find Araucaria-PL helpful and are satisfied by the functionality of the tool. The students and teachers suggested some useful improvements for Araucaria-PL. In the future, Araucaria-PL will be further used in courses of logic and will be tested for its effectiveness in a larger scale study with more rigorous investigation of the objective impact on teaching argumentation theory in Poland.

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