AI Large Practical
Assignment 3

Alan Smaill

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1   The assignment

The third assignment (Assignment 3) involves extending the system you developed in assignment 2 to allow for the typical situation where there is a proponent and opponent arguing about some conclusion, involving exchange of arguments and a notion of *burden of proof*. The main credit will go to a report you are asked to write on the work you have done in both assignments, placed in context.

This will involve:

- looking at some presentations of the use of argumentation systems in dialogue, and in particular the burden of proof;
  a starting point is in a paper referenced below.

- extending your system to support interchange of arguments following the burden of proof;

- writing a report on the work done, placed in context.

You should write your own code and report. You are not permitted to

- copy programs which someone else wrote.

- show your own programs or report to other students.

but you are encouraged to have discussions with your colleagues.

Please see: `http://www.inf.ed.ac.uk/teaching/plagiarism.html`

2   Submission

Your are required to submit

- program source code, ensuring

  - that the comments allow a reader to understand the intention behind the code, together with
  - some example scenarios treated by your program, and
  - your description of the simple way to run these scenarios.

- Your report.

Put all these in a single directory, and submit using the command in DICE:

```
submit ailp 3 <your-directory>
```

The deadline for Assignment 3 submission is 16:00 on Wed 21st December 2016.

3   Burden of Proof

The first goal is to extend the system to allow a set of arguments to be put together cumulatively, as in a dialogue where a *proponent* aims to establish some conclusion, and an *opponent* to defeat it.

The paper Gordon et al. (2007) describes informally how this can be represented in the Carneades framework.

You will need to work out first how best to approach this. It is probably best to work with an example along the lines described in the paper.

In a legal situation, the prosecution and defence start with each having a body of evidence they bring to bear, and arguments of the relevance of that evidence. You are being asked to model this process, with the shifting burden of proof.

It is possible to model this simply by the execution of successive argumentation updates, taking into account the state of the argumentation graph at successive steps.

However, a better submission will explicitly model where the burden of proof lies at each step, and ideally select automatically from the set of available arguments an appropriate argument to introduce; this is needed to get an A pass in this part of the course.

You should also think if you have example scenarios that allow your mechanism to be tested, and show some good properties of your chosen mechanism.

3.1 Example

Table 1 provides a brief restatement of the discussion on pp. 888-890 of Gordon et al. (2007), showing how the burden of proof shifts as the prosecution and defense successively put forward arguments pro and con the conclusion of murder. The level of abstraction used in the table is adequate for your modelling task; in particular, you are not required to distinguish between the burden of persuasion and the burden of production. The mechanism for determining acceptability of a statement should be the one that was used in Assignment 2 (i.e., via CAES method `acceptable()`.)

The table uses the following conventions:

- **P** and **D** stand for the prosecution and defense, respectively.

- '*murder* accept?' refers to whether murder is acceptable at this point in the discussion.

- 'BoP' indicates where the burden of proof lies.

- Here the assumptions refer to acceptability of aspects of the legal system in question (which could be questioned in some circumstances). This sort of consideration is unlikely to be relevant in your examples.

P/D?	Arg.id	Argument	Assumptions	*murder* accept?	BoP
P		*murder*		no	**P**
P	arg1	[*killing, malice*], ~[§*187 excluded*] $\Rightarrow$ *murder*	§*187 is valid*	yes	**D**
D	arg2	[*self-defense*], ~[§197 excluded] $\Rightarrow$ §*187 excluded*	§*197 is valid*	no	**D**
D	arg3	[*W1 'self-defense'*] ~[*W1 not credible*] $\Rightarrow$ *self-defense*	§*197 is valid*	no	**P**
P	arg4	[*W2 'time to run away'*], ~[*W2 not credible*] $\Rightarrow$ ~*self-defense*	§*197 is valid*	no	**P**

Table 1: Shifting burden of proof

4   The report

Your report should be not longer than 8 pages; there is a template for writing the report on the course web page.

You do not have to use any particular word processing system, but an outline document will be provided in LaTeX.

Your report should

- explain the background to argumentation systems in general, and Carneades in particular — what are they for?

- Describe the functionality you have added to the system, and how you did this.

- Present test cases, explaining why you chose these particular test cases, and why you encoded them in the way you did.

- Evaluate your final system as a tool — what are the strengths and weaknesses, how could it be improved?

Those reports that just describe what you did and what you got, without any analysis or discussion, will not get high marks,

Some thought is required in how best to present the test cases you will have run.

References

Gordon, T. F., Prakken, H. & Walton, D. (2007), 'The Carneades model of argument and burden of proof', *Artificial Intelligence* **171**, 875–896.
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  S0004370207000677