Playing Lorenzen dialogue games on the web

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Abstract

We announce an interactive website for exploring logic with the help of Lorenzen dialogue games.

Lorenzen dialogue games [6, 5] are two-player logic games [4] in which a Proponent starts by laying down a logical formula that the Opponent then attacks; the game proceeds in alternating turns by breaking down the initial formula (or possibly returning to previously asserted formulas) according to its principal connective. The aim of each player is to force the other player into a position for which no more moves can be made. The structure and outcome of the game is supposed to say something about the logical content of the formula with which it started.

These games can be played with a computer, and indeed playing with a computer is valuable because it can help ensure that one is following the rules, which, for Lorenzen dialogue games, are not without some measure of arbitrariness and require some experience. Moreover, a computer-based approach helps one to play games more games than would be possible otherwise, thereby giving the dialogue game enthusiast a deeper exposure to the subject.

The purpose of this note is to announce an interactive website for playing Lorenzen dialogue games. The site allows one to specify a signature (at this point restricted to a propositional one), to specify an initial formula, to play the game, to see what game rules apply, and indeed to edit the rules in a rudimentary way (thereby allowing one to get a better sense for what rules play which logical roles).

Our work was inspired by the DiaLog system [2, 1], developed in the late 90s by J. Ehrensberger. DiaLog is written in the Scheme programming language and has a graphical interface via the TK framework. As well as providing an attractive interface for playing dialogue games, DiaLog's main advantage is that it supports investigations of *strategies* (as well as paying particular games). DiaLog is a well-polished, professional system and is even used for teaching logic in a classroom setting in Erlangen.

DiaLog is considerably more advanced than ours (at least for now). The principal difference between DiaLog and our system is that our work is web-based and thus requires no custom software beyond a standard web browser.

The site is live at `http://dialogical-logic.info/`. It is implemented with the UnCommon Web framework for building dynamic websites in the Common Lisp programming language [7]. A Lisp-based solution allows for considerable flexibility both developing and maintaining the system. It is our hope that by putting the system on the web, we can attract a wide audience to dialogue games.

A number of further features for exploring Lorenzen dialogue games are planned. An extension of the system to deal with full first-order logic is to be desired. An extension of the dialogue framework to other logics, such as modal logic and linear logic, would be also desired. Most significantly, the site as it now stands does not provide (directly) for exploring dialogue game strategies (unlike DiaLog). Like many other logic games, particular "runs" of a Lorenzen dialogue game can be instructive but their lack

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interesting metamathematical content, which arises when one shifts attention from particular "runs" of the game to (winning) *strategies*. For Lorenzen games, winning strategies for Proponent (who starts the game by laying down the initial formula) correspond to intuitionistic validities [3]. We aim to implement a mechanism for exploring this equivalence, which is based on a mapping between winning strategies and intuitionistic sequent calculus.

References

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