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Xdom: A Graphical, X-Based Front-End for Domineering

DAN GARCIA

ABSTRACT. This article is an overview of Xdom, a mouse-oriented program for playing Domineering. Xdom allows a user to input an initial position, then play against the computer or another user. Optionally, it can determine the value and predicted winner of any position, show the available moves of either or both players, and give hints.

Xdom is an X-based program for the player of Domineering, running under UNIX and written in Tcl/Tk. It uses David Wolfe's Gamesman's Toolkit [Wolfe 1996], a powerful text-based game-analysis program that allows users to explore combinatorial games, and in particular determine game values, but is not designed to play out games interactively. The basic functionality of the Gamesman's Toolkit consists of computing the value of a position specified by the user:

```
unix% games
Type 'help' and 'help help'
> dom
Enter Domineering position followed by extra <cr>
* *** ***
* * * * *
*** ***

3/4
>
```

Xdom builds on top of this functionality, providing a nice interface for the game of Domineering. Using Xdom, the user can play Domineering games against

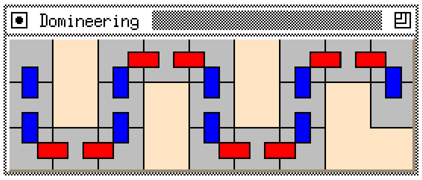

Figure 1. Starting domineering position loaded in from the file `bigsnake.com`. Each slot (square on the board) is 30 pixes wide for the example in the text.

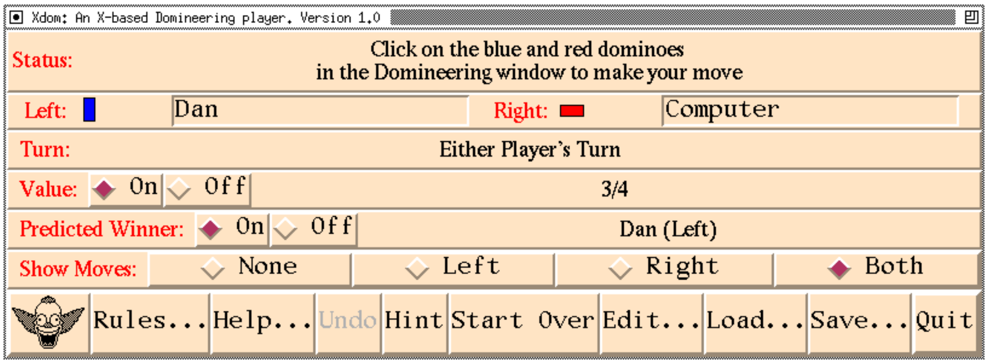

Figure 2. The main Xdom window.

the computer or another user, create new positions, read positions from and save positions into files, undo moves, etc. If the user wishes, Xdom will show the value and predicted winner of any position, show the available moves of either or both players, and propose good moves. It also documents the rules of Domineering and its own functions.

Xdom is called from a Unix shell, with two optional arguments: the name of a file containing a starting Domineering position, and the size, in pixels, that the slots on the board should have. For example, typing the the command

```
Xdom bigsnake.dom 30
```

to the Unix shell will result in the configuration shown in Figure 1, corresponding to the Toolkit example given above. (The contents of the initialization file are identical to the Toolkit input in the example above; the name of the file must end in `.dom`.) The defaults are a rectangle of 4×3 slots, with 60 pixels per slot.

Upon startup, Xdom creates two windows: the main window and the playing board. The main window (Figure 2) allows the user to interact with the program, show or hide values and predictions, show or hide the moves on the board, create new positions, load old positions from files, or save existing positions into files.

The playing board, shown in Figure 1, is made up of gray slots (squares) and possibly beige areas, indicating slots that are not, or are no longer, in play; they appear light gray in Figure 1.

Optionally, the playing board indicates Left's moves with miniature upright dominoes, and Right's moves with miniature horizontal dominoes. When the user clicks on such a domino, he is making a move: the two slots that together contain the domino are removed from play. On color monitors, Left and Right dominoes appear blue and red, respectively; in Figure 1 they appear black and dark gray.

When a move is made, Xdom calls the Gamesman's Toolkit to find the value of this new game, and who is expected to win. This value and the prediction are displayed in the main Xdom window, if that feature is turned on. Because the value calculation may not be doable in a reasonable amount of time for a board bigger than (say) 5×5, the feature should be turned off in such cases. Two human players can then play arbitrarily large games.

At any time, the user has the choice of viewing the moves available only to Left, those available only to Right, both or neither. By default, the program shows the moves of the player whose turn it is to play. The user can override this choice, and not only view the moves the player who has just played, but even play again for that player.

Hints (best possible moves) may be indicated at any time; one just clicks the Hint button. This feature can be used to simulate a computer opponent. The user simply makes a move, then clicks Hint to determine the move to make for the computer opponent. In this fashion, the user can get a feel for optimal strategies at various positions. (The Hint feature, and game evaluations in general, depends on Xdom obtaining a response from the Gamesman's Toolkit. These evaluations are not done in the background, so these features shouldn't be used for positions that take too long to evaluate with the Toolkit.)

Users can create their own Domineering positions or edit existing positions interactively, using a special window called up by clicking the Edit button. A user-created position, or a position reached in the course of a game, can be saved to a `.dom` file, using the Save button, and later reloaded, using the Load button. Since the internal format of .dom files is very simple, such files can also be created manually, using a text editor.

Availability

Xdom is available for downloading at http://http.cs.berkeley.edu/~ddgarcia/software/xdom/. The current version is 1.0.

Dan Garcia
Computer Science Division
535 Soda Hall
University of California
Berkeley, CA 94720
ddgarcia@cs.berkeley.edu