

Modelling Cluedo

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For this project, we want to implement a dynamic epistemic modelling tool for a simplified version of Cluedo. This tool will be able to check formulas in a specific Kripke model: it will be able to generate these models from a dealt hand, and it will be able to update as extra information is given. This tool can then be used to analyse specific situations in Cluedo.

Simplification

Because implementing the full scope of cluedo would be too complex to check formulas in a reasonable amount of time, we decided to simplify our version of Cluedo to a game with only six weapons, four persons, and no rooms. This means that there are only four agents (players) who have two cards each. Because we use two categories, there are only two cards in the envelope, instead of the usual three. Since we are only interested in the reasoning within this game and movement has little influence on this, we will leave it out of our implementation. The other rules for the game stay the same [spelregels.info, 2016].

This drastically reduces the number of states the game can have. For a given envelope content, player 1 gets two of the eight remaining cards, player 2 gets two of the six then remaining cards etc. Therefore the total number of possible hands dealt for a given envelope content is:

$$\binom{8}{2} \times \binom{6}{2} \times \binom{4}{2} \times \binom{2}{2} = 2520 \quad (1)$$

Before we deal the cards for the players, one weapon and one person is drawn for the envelope. This means that there are $6 \times 4 = 24$ possible envelope contents, this results in a total number of 60.480 possible states.

Possibilities in a turn

In a turn a player makes a suggestion. In clockwise order the other players say whether they have one of the cards in the suggestion. If a player does not have a card in the suggestion, this is a public announcement that they have neither of these cards. If a player does have one of the cards in the suggestion they have to reply by saying that they have one of the cards and showing that card to the player that made the suggestion. This is a message from one player to the other.

References

spelregels.info. Spelregels Cluedo, February 2016. URL
<http://www.spelregels.info/bordspellen/spelregels-cluedo/>.