Assignment 1: Difficulty measures for puzzle games

You get a lot of time for each assignment. Therefore, we ask you to take:

- Proper time for thinking: do not get stuck on the first reasonable idea, but think further if there are other options. Weigh the advantages and disadvantages.
- Proper time for careful execution: avoid that a stupid programming bug renders all experimental results useless.
- Proper time for reporting: avoid typos, substandard layout, inconsistent terminology, etc.

Research is all about being careful and taking time to do it right. All assignments can be solved in half the time, but this is not what we expect you to do.

Handing in assignments: Use e-mail and send to Marc (m.j.vankreveld@uu.nl). Make a pdf and use a specific format for the file name: INFOMSCIP-1-Y.pdf and Y is the group number. The pdf itself should start with the names and student numbers of everyone in the group. **Always cc the whole group when submitting an assignment** (so that the whole group knows that the assignment was submitted on time, and I can group-reply the feedback and assessment).

Assignment: Read the paper by van Kreveld, Löffler and Mutser on puzzle game difficulty (individually). The paper and the corresponding presentation are accessible on the website of the course. Discuss the paper together, face-to-face, so that you realize the main contributions. Also together, choose an abstract puzzle game and identify the elements that can be used to devise a difficulty function, similar to the ones in the paper you read. Discuss this with each other.

Which elements make sense and why? Make sure that these elements are well-defined. Separate in elements that can be determined from the puzzle instance and elements that require the solution, or the solution sequence.

A basic difficulty function would be a weighted linear function in its elements. If the function were to be non-linear, which two elements of your chosen puzzle game would you combine in a non-linear term, and how? Options are to square one of the elements before weighing, or using the multiplication of two different elements, or anything else that may appear reasonable. Motivate this choice, that is, explain why your non-linear version of the weighted difficulty function may perform better than a linear version.

Make sure that the questions above are discussed face-to-face by the whole group. Make appointments immediately, commit to the time investment, and agree when the activities happen.

Hand in 2-3 pages in which you first describe the puzzle game, including a typical picture (screenshot) and then address the questions given above. Organize your hand-in well, for example use the sections: 1. Puzzle game description; 2. Puzzle game elements that influence difficulty; 3. Non-linear options for a difficulty function.

Time investment: Reading and understanding paper: 3 hours; choosing a suitable puzzle game, playing a few levels, and selecting elements: 2 hours; non-linearity question: 2 hours; careful write-up, checking, and perfectioning: 5 hours. Total investment per person: 12 hours.

Deadline: Monday September 16, 2019 at 3pm. Remember to cc the whole group.

Assessment criteria: Suitable choice of a puzzle game (20%), choice of the puzzle game elements and motivation (20%), choice of the non-linear component and its motivation (20%), quality of the hand-in (careful explanation, proper argumentation, layout, structure, language; 40%).