

Motion retargetting for group animation based on Conway's Life

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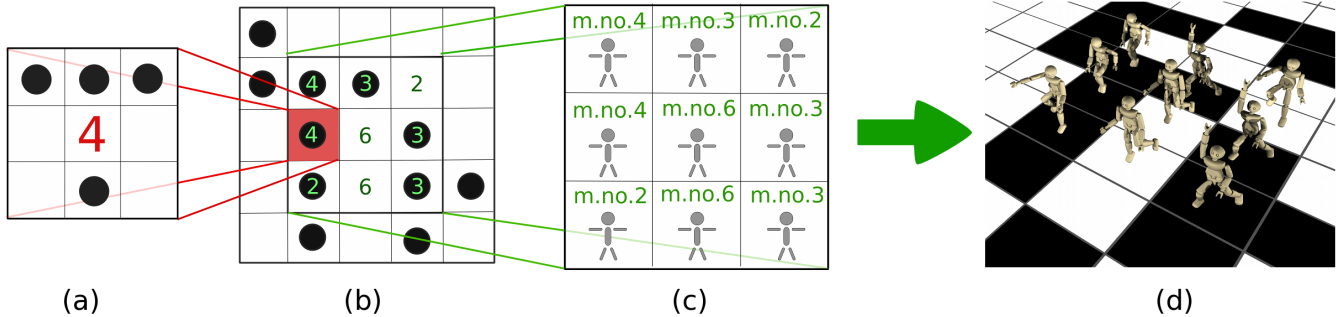


Figure 1: Our approach in a nutshell: (a) Moore neighborhood (8-neighborhood) of a cell with neighbors in black (b) One step of an automaton (3x3 grid) (c) mapping to movements of a group (d) final render

1 Introduction

Animation of a group is an interesting topic, as could be seen in various motion pictures. There are many ways to it from pure manual definition till fully automated. Manual ones bring full control to an artist and more automated are procedural with less control to an artist. Procedural ones are controlled by an algorithm.

Modern methods combine this two approaches and try to develop techniques, that would help artist to focus on the motion itself, not on the tools. In our approach, we are dealing with automatic retargetting of a motion and control over the animation. This way, we still leave motion control to the artists.

Motion retargetting was interesting also to other authors in the past [Gleicher 1998]. Our approach is new in a way how we set animations of an individuals as we use specific cellular automaton (CA) - Conway's Game of Life [Conway et al. 1982]. Although CA was previously used for control over the group, it was used only for behavioral changes, than changes in motion itself [Sarmady et al. 2009].

2 Our method

Steps of our method are shown in fig. 1. At first we have predefined characters, that we would like to animate and ordered database of motions. Then we use CA as binary grid, where true means occupied and false means empty. Cells are associated with the characters. Simple way of this mapping is one-to-one, where each individual is associated with one cell.

Then we count number of neighbors in Moore neighborhood (8-neighborhood) for each cell. This number is connected to the motion from the database. Then this movement is retargetted to the specific character. Then each state of an automaton animates group using retargetting of the motion specified by the sum of neighbors.

As motions are chosen from the database, change of database can create very different looking animation of a group.

Automaton is changed according to the rules of simple Conway's Game of Life. Initial state is set randomly. CA is changed slowly when the motion ends. This could create animation with various lengths or even infinite loop. Therefore it is not the best CA for this purpose and rules are hardly manipulated to bring meaningful animations. We are still trying to set better rules for this approach, but it also in this state it could be successfully used for random dancing scene, such as parties.

Moreover, it is possible to change mapping - with more individuals to one cell, which will create same motion to a smaller group. This effect is more similar to real dancing scenes. It is also possible to create hierarchical grids with many CA connected to a non oriented graph and get more variable in motion.

3 Conclusion

We propose unusual way of motion retargetting and group animation with use of cellular automaton, that allows us to do automatic retargetting and control over the group and leave artists control to the motion itself.

References

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