Simple Crowd Simulation of a Mexican Wave (Extended Abstract)

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1 Introduction

Traditional techniques of computer animation include lot of artistic work with every movement for every individual described and defined by the skilled artist. More automatic solutions can be used for large crowds when camera is further away and motion of individuals does not need to be perfect.

Mexican wave simulation is an interesting topic and some solutions were already found [Farkas et al., 2003], [Chaudhuri et al., 2004], [Yilmaz et al., 2011], but none of them used cellular automaton which is used in our solution. We show how it could be used for simple solution.

2 Our approach

Firstly, layout of a stadium is loaded, where seats are associated with the rectangular grid. Each cell in a grid is one seat. Every member of a crowd seats on exactly one seat, but not every seat needs to be occupied. Crowd is created only in the area with seats and each individual has set of values, that describe personality. From these values we use only join mood (0.0-1.0). The higher the value is the more is person willing to join the wave propagation.

State of the cells in each step are calculated according to the simple 8-neighborhood. Cells become active (joins the wave propagation) if there is a least one cell which is already in the active state. However to create mexican wave pattern, only cells which are in front, behind and to the right are taken into account. Cell may change state even if it is not occupied. If cell is not active it has state according to the sum of active cells in the neighborhood.

Propagation of a mexican wave can be either clockwise, or counterclockwise. We show our method for the clockwise solution, but counterclockwise could be defined with simple mirroring of the rules. Wave spreads to the new person from the neighbors to the



Figure 1: Result during simulation.

right of the person, therefore also our neighborhood is defined only to the right and only in distance of one (in 8-neighborhood). To find out which cells are *to the right* we associate in the initialization step looking direction to each person, by calculating angle to the center as following:

When we tried these simple rules, CA behaved well, creating straight line pattern when propagating in the direction that was axis aligned see fig. 1. Although this direction is what we expected, in the corners there were some errors, when pattern is distracted and some cells are in active state very lately which is unnatural. In the future work, we would like incorporate visual system and bring more realistic solution.

References

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