The Art of Growing Three Dimensional Cell Model in Evolutional Space

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In this piece, I would like to present the three-dimensional plastic art of computer image applied by the fundamental principle of cellular model from the viewpoint of art. The self-organization of the three-dimensional space which is composed with a mass of voxel can generate complex evolving space. This idea is aroused from the theory of the self automaton in two-dimensional space. The model of three-dimensional cell model can bring about unexpectable, delicate, and emergent vibration from the very simple rule.

We will use a lattice coordinates to simulate the life and death of the cell in three-dimensional space. We also use a term of voxel as an elemental cube in the lattice coordinates. A group of voxel would make a three-dimensional object just like millions of cell make a life form in nature.

I explained the trial of application of three-dimensional cell automaton into the state of art in this paper. It means that the success of the self organization system of the voxel in correlation is gained with the animation of the plastic art which is experimented in the setting of the voxel space.

I tried to experiment the cell model as a self-organization in the space of artificial life, not just as a simple life game. And the fact that the part of result of the experiment was made public as an artwork in SIGGRAPH '93 Electronic Theatre (Film and Video Show) prove that it can also be handled as an independent state of art.

In the three-dimensional metro polis mode, it is difficult to expect the increase or decrease of the number of voxel. Therefore, I decided to use the method as follows to solve this problem.

(a) If there are too many voxels and the space is almost saturated, the factor which cause increase is restrained.

(b) If there are seldom voxels, the restraint of the factor is removed. That is, the factor which cause increase added.

It will be more helpful if you think the interactive increase and decrease of voxel as like this. Suffice it to say that there is a kind of ecological relation in the voxel space. As you see in the first example above, the number of voxel is limited by the food if it spread too much. As a result, the appropriate space is reserved in the voxel space. It is just like a season, the condition can be controlled as the spring-summer season is jumped into the more severe fall-winter season. And as you can see in the second example above, the number of voxel is increased by feeding it on the eve of extermination. It is like jumping from the fall-winter season into spring-summer season. To put it in a concrete, the increase or decrease of the numerical value $(G(i), i=1.5)$ is needed.

(1) Survive : In case of the total amount of live cell that surround a live cell is $(G1)$ or $(G2)$, the cell would survive.

(2) Die : In case of the total amount of live cell that surround a live cell is less than $(G3)$ or $(G4)$, the cell would die.

(3) Resurrect : In case of total amount of live cell that surround a dead cell is $(G5)$, the cell would resurrect.

I presenteded the trial of application of three-dimensional metropolis model into the state of art in this paper. It means that the success of the self-organization system of the voxel in correlation is gained with the animation of the plastic art which is experimented in the setting of the voxel space.

I tried to experiment the cell as a self organization in the space of artificial life, not just as a simple life game. And the fact that the part of result of the experiment was made public as an artwork in SIGGRAPH '93 Electronic Theatre (Film and Video Show) prove that it can also be handled as an independent state of art. I hope as many as people to enjoy the new world of three-dimensional cell from now on.