Review of: "Self-Replication, Spontaneous Mutations, and Exponential Genetic Drift in Neural Cellular Automata"

Aude Maignan[1]

1 Université Grenoble Alpes

Potential competing interests: No potential competing interests to declare.

I am not a specialist of NCA but I work with CA. So I had to read [Mordvintsev, Alexander et al] before reading this paper. The novelty of this paper is to consider replication, whereas [Mordvintsev, Alexander et al] deals with growth, persistency and regeneration. The author used the training phase of the growth approach in order to create his own training phase. The author obtains some very interesting practical results but for me there is no new theoretical results.

My first remark is that the target is more precisely reached in [Mordvintsev, Alexander et al]. Where does it come from? Is it the consequence of the batch substitution? I understand that the batch substitution is usefull to compute the next generations but can we control a little bit more this evolution?
The target alternation of the training phase seems to explain the genetic drift. Here again, can it be controlled? For example can we impose that a fish must have an eye even after several generations?

At the end of the section Introduction it is mentioned that "we merge the world-rule approach of non-neural cellular automata and the convenience of NCA". How this merge has been done? and then what are the CA rules? The randomly asynchronous scheme is far away from the classical CA principal.

And to finish, can those results be generalized?