I think that consciousness and life are the same concept.

I think that an entropy engine near a critical point is conscious, so that I try to obtain an artificial life using the simplest system to be studied numerically: the Ising model for a two-dimensional system near a critical temperature.

I study the Ising model using the Metropolis algoritm, that optimize a spin (in random position) at a time, and I use a mean over 800 Metropolis solution to obtain the energy.

The Ising energy have a single minimum (like the Hopfield network) at zero temperature, and this is the problem for the consciousness (there cannot be a single mental state): I obtain multiple zeros of the Ising model using different interactions $J_{ij} \neq J_{kl}$ for different spins in the Ising grid, so that energy is not a positive definite quadratic function, with a single minimum.

I try the simplest change in the interaction: I create square clusters with equal ferromagnetic interactions, separated by antiferromagnetic borders: each cluster can take two magnetization (all the spin +1 or -1), because of the interaction between cluster are blocked by the antiferromagnetic frontiers; at zero temperature there are N cluster with random magnetization, while for temperatures near the critical point there are interaction between clusters that can change in the time the magnetization of the clusters.

If the clusters have regions that are connected with an external sensor or an actuator, then there might be an evolution with the environment (changing the J_{ij} with the genetic evolution); a more complex interaction between spin give more complex Ising model; I hyphotesize that any complex two dimensional Ising network have transition temperature, and that the Life is an entropy engine near a statistical critical point (like this Ising model with complex interactions).

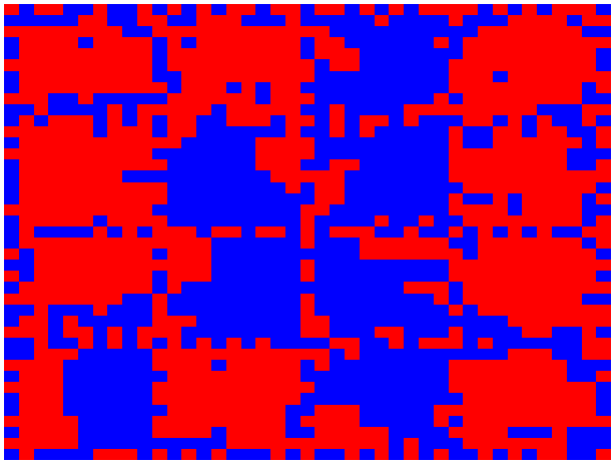

Figure 1: A single solution for Ferromagnetic-antiferromagnetic Ising model for T=167 °K: it is not an equilibrium point

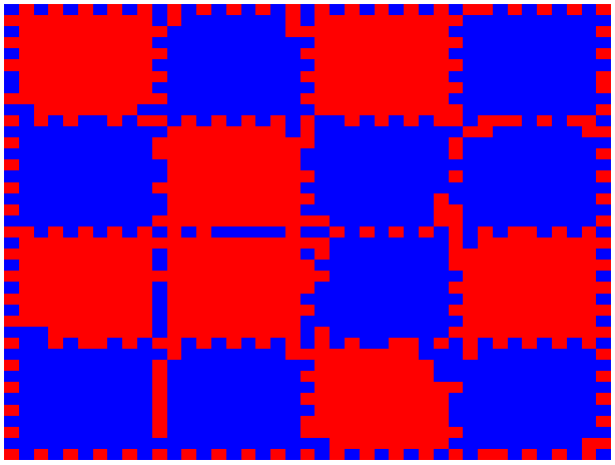

Figure 2: A single Ferromagnetic-antiferromagnetic Ising model for T=10^{-6} °K

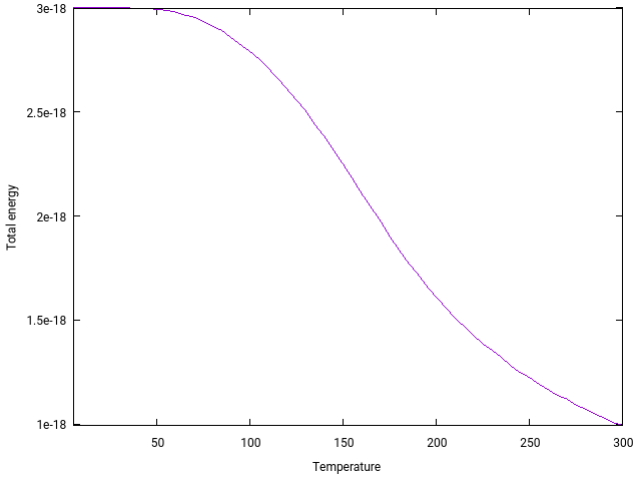

Figure 3: Mean of the energy for ferromagnetic-antiferromagnetic Ising model (800 execution)