

Step evolution - improving the performance of open-ended evolution simulations.

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A common issue in Artificial Life research, and mainly in open-ended evolution simulations, is that of defining the bootstrap conditions of the simulations. One usual technique employed is the random initialization of individuals at the start of each simulation. However, by using this initialization method, we force the evolutionary process to always start from scratch, and thus require more time to accomplish the objective. Artificial Life simulations, being typically, very time consuming, suffer particularly when applying this method. We describe a technique we call step evolution, analogous to incremental evolution techniques, that can be used to shorten the time needed to evolve complex behaviors in open-ended evolutionary simulations. We further present an extension to this technique that automates the process of stepping the simulation. We provide results from experiments done on an open-ended evolution of foraging scenario, where agents evolve, adapting to a world with a day and night cycle. The results show that the employment of this technique can improve both the overall success of simulation runs, and the time needed to evolve the observed behaviours.

Keywords: Artificial life, Multi-agent systems, Open-ended evolution, Incremental evolution.