Simulation graphique de la machine Enigma I

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Abstract

We analyze the geometry of the species– and genotype-size distribution in evolving and adapting populations of single-stranded self-replicating genomes: here programs in the Avida world. We find that a scale-free distribution (power law) emerges in complex landscapes that achieve a separation of two fundamental time scales: the relaxation time (time for population to return to equilibrium after a perturbation) and the time between mutations that produce fitter genotypes. The latter can be dialed by changing the mutation rate. In the scaling regime, we determine the critical exponent of the distribution of sizes and strengths of avalanches in a system without coevolution, described by first-order phase transitions in single finite niches.

Introduction
Self-Organization in Evolution
Acknowledgements

References