

An information-theoretic landscape analysis of neuro-controlled embodied organisms

Abstract

Recently, there has been a lot of interest in evolving controllers for both physically simulated creatures as well as for real physical robots. However, a range of different ANN architectures are used for controller evolution, and, in the majority of the work conducted, the choice of the architecture used is made arbitrarily. No fitness landscape analysis was provided for the underlying fitness landscape of the controller's search space. As such, the literature remains largely inconclusive as to which ANN architecture provides the most efficient and effective space for searching the range of possible controllers through evolutionary methods. This represents the motivation for this paper where we compare the search space for four different types of ANN architecture for controller evolution through an information-theoretic analysis of the fitness landscape associated with each type of architecture.