Measuring Transferability in Simulated Robotics

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Abstract

The techniques of Evolutionary Robotics have successfully evolved robot morphologies and controllers. Most of this success has happened within a simulated physical environment. Although the same techniques can be applied in principle to a real environment, in practice the hardware may break down, the environment is harder to control, and the time required may be impractical. Ideally, one could evolve a robot in simulation and transfer that design to a physical robot with minimal or no adjustments. However, the transferability of a design is difficult to assess. The question is, how can one measure the transferability of evolved robot morphologies and controllers from a simulated physical environment to the real world? This paper proposes using the variance between different physical simulations as a proxy to measure transferability. The intuition being that each physical simulation aims to produce realistic physical behavior, but each simulation will fail in different ways to meet this ideal. Thus the behaviors that coincide are more likely to represent tranferable behaviors. This work is currently in preparation.