Self-Adapting Character Animations
using Genetic Algorithms

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Abstract

The emergence of evolving search techniques (e.g., genetic algorithms) has paved the way for innovative character animation solutions. For example, generating human movements without key-frame data. Instead character animations can be created using biologically inspired algorithms in conjunction with physics-based systems. In addition, the development of highly parallel processors, such as the graphical processing unit (GPU), has opened the door to performance accelerated techniques allowing us to solve complex physical simulations in reasonable time frames. The combined acceleration techniques in conjunction with sophisticated planning and control methodologies enable us to synthesize ever more realistic characters that go beyond pre-recorded ragdolls towards more self-driven problem solving avatars. While traditional data-driven applications of physics within interactive environments have largely been confined to producing puppets and rocks, we explore a constrained autonomous procedural approach. The core difficulty is that simulating an animated character is easy, while controlling one is difficult. Since the control problem is not confined to human type models, e.g., creatures with multiple legs, such as dogs and spiders, ideally there would be a way of producing motions for arbitrary physically simulated agents. This paper focuses on an evolutionary genetic algorithms, compared to the traditional data-driven approach. This paper explores generic evolutionary techniques to emulate physically-plausible and life-like animations for a wide range of articulated creatures in dynamic environments. We demonstrate how genetic search algorithm are well suited to highly parallel computational environment, such as the graphical processing unit (GPU).