

以演化方式模擬人群運動行為

摘要

近年來，在電腦動畫的應用中，虛擬人群模擬的需求越來越多；但人群運動的模擬對於動畫設計師而言，仍是一件十分繁瑣耗時的工作。過去有許多研究曾以虛擬力場模擬簡單的生物群聚行為，但所模擬出的動畫品質與虛擬力場的參數及虛擬環境息息相關，因此經常需要以人工的方式耗時地調整出適當的虛擬力場參數。因此，我們提議以此問題定義成一個基因演算法的問題，針對不同的移動行為，定義適切的適應函數，再由系統根據不同環境自動演化出適當的虛擬力權重組合，以供產生不同人群移動行為之動畫時參考。在本篇論文中，我們已完成基因演算法的設計及人群動畫模擬系統，並設計了不同的典型環境進行電腦模擬實驗，以驗證此方法的可行性。

Abstract

The demands for virtual crowd simulation have been increasing in recent years but creating realistic crowd motions remains a complex and time-consuming task for a computer animator. In the literature, much work has been proposed to use virtual forces to simulate the motion of a group of virtual creatures such as birds and fishes. However, the quality of the simulations largely depends on the weights of the component virtual forces as well as the scene where the agents are situated. Usually it requires the animator to tune these parameters for a specific scene in order to obtain the desired result. In this thesis, we propose to use genetic algorithm to generate an optimal set of weighting parameters for composing virtual forces according to the given environment and desired movement behavior. We have implemented the proposed genetic algorithm as well as the crowd simulation system. Extensive experiments have also been conducted to study the effects of typical scenes and behaviors on the parameter sets and verify the feasibility of the approach.