3D 動畫中協同運動計畫-以中國舞獅走梅花樁為例

摘要

透過程序方式有效且快速的自動產生出生動的 3D 電腦動畫,一直以來是該領域中研究人員所追尋的目標。以中國舞獅在梅花樁上的運動為例,用傳統的動畫製作方式,要能在短時間內產生出符合雙人舞獅演員協同運動的限制,並在佈滿不規則梅花樁的場景中搜尋一條可行走的路徑,是相當費時費力的。我們提出了一套動畫產生系統,讓雙人舞獅演員在隨機產生梅花樁的虛擬環境中,透過協同運動的計畫器,搜尋出可行走的路徑。我們的路徑規劃演算法是依據最佳化優先搜尋演算法的精神來建置,最後並以程序的方式自動模擬出行走過程的 3D 電腦動畫。這些動畫包含梅花樁上常見的表演動作,如跳躍和轉身等。我們的實驗結果顯示,擬真的舞獅跳梅花樁動畫,可以用互動的方式由協同運動計畫器自動產生。

Coordinated Motion Planning for 3D Animation:

Using Dancing Lion on Stepping Piles as an Example

Abstract

Creating complex animations of human characters with simple high-level commands has been a design goal of animation software for a long time. Procedural animation is an effective approach in this direction aiming to create animation with algorithmic description of how a motion is generated. Nevertheless, creating coordinated motions between animated characters has always been a great challenge because of the computational complexity of the problem. In this thesis, we will use Chinese lion dance as an example to develop animation procedures that can generate coordinated motions for the two performing dancers moving on tops of piles arranged in various ways. The procedures use motion planning techniques to determine footstep sequences for achieving a goal configuration and adopt procedural animation methods to generate the articulated motion for realizing the footstep movement. Simulation examples are shown in this thesis to demonstrate the effectiveness of the implemented animation system in generating realistic lion dances for a given arrangement of piles.