

e-Science应用

一种基于交互式运动编辑与轮廓分析的体育训练方法

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摘要: 已有基于信息高技术的体育运动训练方法主要分为两类。一类是基于虚拟现实的, 往往需要受训者通过虚拟设备与虚拟环境交互, 达到学习和改进动作的目的; 一类是基于视频分析的, 通过对比分析受训者与优秀运动员的动作视频, 给出改进技能的建议。本文提出了一种基于交互式运动编辑与轮廓分析的体育训练方法。在事先记录好的示范动作基础上, 它允许教练以三维图形方式交互修改和设置动作约束, 交互使用运动偏移和动力学验证公式以生成个性化虚拟运动员的模拟动作, 按照训练视频的视点显示模拟结果, 并通过虚拟运动员和受训者轮廓的矩不变量计算分析受训者的动作。该方法较好地规避了已有方法在实际应用中遇到的困难, 它既不受虚拟交互设备的限制, 更适用于体操等竞技体育运动训练, 又能提供与训练视频视点一致的个性化模拟动作的参照视频, 比传统视频分析体育训练方法具有更强的指导意义。

关键词:

A Novel Method for Athlete Training Based on Interactive Motion Editing and Silhouette Analysis

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Abstract: There are mainly two Hi-Tech methods for athlete training. One method is based on virtual reality, where the athlete can learn and improve performance mainly through using virtual equipments to interact with the virtual environment. Another method is based on video analysis, where improvements can be made by comparing the videos of the trainees with those of excellent trainers. In this paper, we present a novel framework for athlete training, which can circumvent difficulties the current methods faced in practical applications. For retargeting the example motion to personalized virtual athlete, the coach interactively sets motion constraints with his experience based on motion warping and motion verification techniques. The display of the simulated motion is adjusted semi-automatically to create the reference virtual video with the same viewpoint as the real one. The moment invariants of both virtual and real athlete's silhouette are computed, and motion analysis result is presented subsequently. This method is more suitable for gymnastic athlete training because of without virtual equipment and more instructive having the same viewpoint in video analysis. Finally, an application of the proposed techniques to trampoline training is implemented.

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