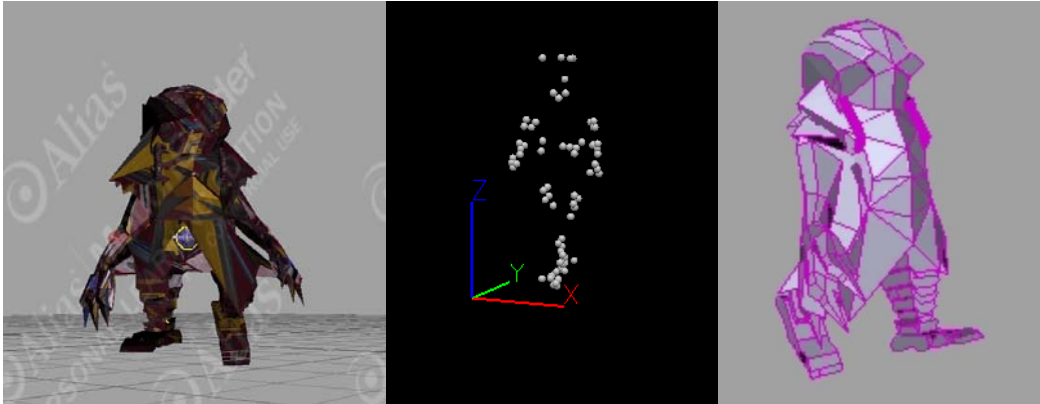


Recognizing Visually Aesthetic Computer Animated Human Motions



Purpose

The purpose of this work is to create a method to automatically recognize visually aesthetic computer animated human motions. This recognition will fall into two broad categories, those that look real and those do not look real to humans. This research will improve an animator's ability to create naturally looking animations and help biomechanist to classify human motions from motion capture data.

At this time, animation methods that try to create realistic human motions are time consuming and costly. Creating animation requires traditional key frame animators, or animations based on data collected using a motion capture systems that are limited in their range of motion or require extensive cleanup [1].

The problem stems from our keen sense of what does not look real. It is difficult to produce computer generated human motions that do not stand out as being unnatural and mechanical looking. Even small differences between actual movement and computer generated movement causes us to perceive that the movement is bad or unnatural.

Creating a system that quantifies movements based on visual aesthetics may also provide benefits to biomechanical research that uses motion capture equipment to study gait and differences in individual human movement.

Methods

The patterns human motions create can be expressed as a digital signal through time. These time dependant signals can be manipulated mathematically and clustered to find similarity. This work will attempt to classify computer animated human movements of motion capture data in unique ways to find a metric for visually aesthetic human movement.

Data will be collected using a Vicon optical motion capture system in the SFSU Department of Kinesiology [2] and from the Carnegie Mellon University Graphics Lab Motion Capture Database [3].

A user survey will be conducted to define what 'visually aesthetic' means to humans. These data will be used in experiments to create an effective algorithm and aesthetic metric for determining if a computer animated human motion is visually aesthetic.

In order to test the applications correctness the aesthetic metric will be used to classify a set of human movements. The same set of human movements will be used in a survey of real users similar to the one in [4]; a comparison between the two sets of results will be used to gauge the applications robustness in correctly identifying visually aesthetic human movements.

Assumptions or Significance of Work

Humans react negatively to synthetic motions and automatically acknowledge it as unnatural. For example, motion capture data driven animations can create artifacts like footskate that makes the foot appear to slide across the ground [1]. This artifact in the animation causes us to perceive the motion as not being real, except in the cases where human motions actually produce sliding motions like ice skating.

Providing a system to recognize visually aesthetic and not displeasing human motions will give animators and biomechanical researchers a more reliable, less subjective, method to detect differences in the human movements of computer generated motions.

Aside from the obvious benefits to animation and biomechanics, having a computational system to predict the aesthetics of computer generated human movements might also be useful in the development of prosthetic devices.

A computational human movement aesthetic metric could aid in producing more natural human movements, which could increase the quality of life for people who use artificial limbs or other mechanical medical devices that aid in human movement.

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