Non-Humanoid Creature Performance from Human Acting

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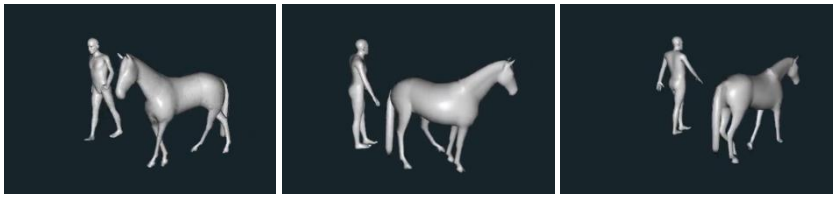

Figure 1: A human performance triggers animation clips and motion retargeting techniques in the horse model.

Abstract

We propose a framework for using human acting as input for the animation of non-humanoid creatures; captured motion is classified using machine learning techniques, and a combination of pre-existing clips and motion retargeting are used to synthetize new motions. This should lead to a broader use of motion capture.

Keywords: Performance Capture, Creature Animation, Machine Learning, Motion Retargeting.

Concepts: • **Computing methodologies → Animation;** *Motion Processing;*

1 Introduction and Motivation

Motion capture is effectively used across different niches of the entertainment industry. A large portion of this capture is done using human actors to control humanoid creatures; it is commonplace for these captures to have a naturalistic aspect. The games industry is one example of a niche where motion capture makes itself present in large parts of the work. The feature animation industry is skeptical about motion capture, but some animated TV series do use motion capture as a means to make productions viable. Previous works which discuss broadening the use of motion capture have dealt with moderate anatomical differences, mostly changes in proportions; our approach, however, intends transfer captured performances onto non-humanoid characters, possibly expanding the use of motion capture data to a broader set of niches.

2 Technical Approach

When dealing with anatomical differences in motion captured data a common approach is retargeting, for which many techniques have been developed. But when anatomical differences are not restricted to proportions and joint numbers, existing solutions are insufficient to animate the target model; this is their main limitation. The novelty of our approach relies on coding the motion into higher level descriptors that have low or no anatomical variance. For basic motion on individual limbs we use retargeting techniques. For actions that convey the whole body we use a machine learning approach to classify the motion.

3 Implementation and Future Work

Using principal component analysis (PCA), after being captured the performance is segmented by an algorithm based on dimensionality reduction, as proposed by [Barbic et al. 2004]. This enables for motion clustering in a non-supervised manner. The segmented motion is then tested by a time delayed neural network (TDNN), an approach that has proven efficient in the classification of movement [Ming-Hsuan and Ahuja 1999]. The resulting inference is then used to trigger clips in a library of pre-animated creatures; the transition in between clips is handled through linear interpolation. A fallback retargeting scheme is set up for each creature, and is used when no classification is available via TDNN. The movement of each human limb is stored in a joint invariant way, consisting of an angle, and a distance from the limb's origin, and an inverse kinematic plane orientation, as described in [Kulpa et al. 2005]. In this way any limb can be used as input for any other limb. Additionally, each classified motion may use this retargeting technique in some of the body parts, for example, a walk clip may use retargeted head movements. We intend to further develop our framework by implementing hierarchical motion classification, and handling object interactions.

References

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