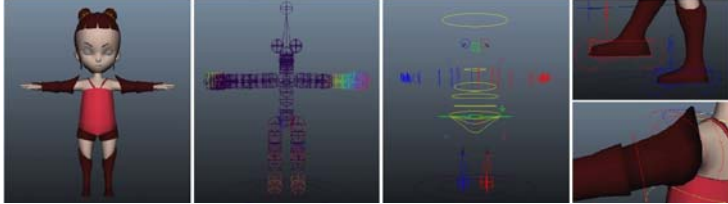# Rig-Space Motion Retargeting

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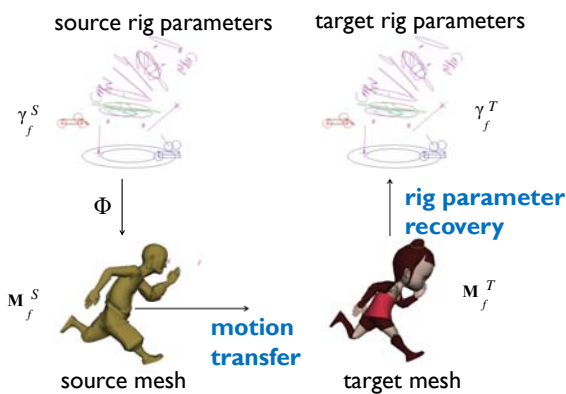
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Introduction

This paper proposes a motion retargeting system which generates editable rig parameters so that the retargeted animation can be further edited.

The rig structure showcased by the Nezha model. From the left to the right are the mesh, the skeleton, controllers and magnification for parts of the rig system. For the operation convenience of artists, controllers in rigs are often designed with different functions, shapes and manipulation methods, like cars (top right) and rings (bottom right).

Method

source rig parameters   target rig parameters

γ_f^S γ_f^T

Φ **rig parameter recovery**

$\mathbf{M}_f^S$ $\mathbf{M}_f^T$

source mesh   **motion transfer**   target mesh

Motion transfer

We transfer the motion of the source animation to the target model so that the target model performs the similar motion as specified in the source animation. We adopt the framework of mesh-based deformation transfer [1]. Because of the intricate hierarchical relationship of the model skeletons used in industry, we adapt the deformation transfer method for multi-component objects proposed by Zhou et al. [2]. Their method is for mesh deformation and we extend it with a temporal smoothness term since our problem deals with animations.

Rig parameter recovery

model at frame f   rig mapping   rig parameter at frame f

$$\mathbf{M}_f^T = \Phi(T, \gamma_f^T)$$

target model

undeformability of model structure
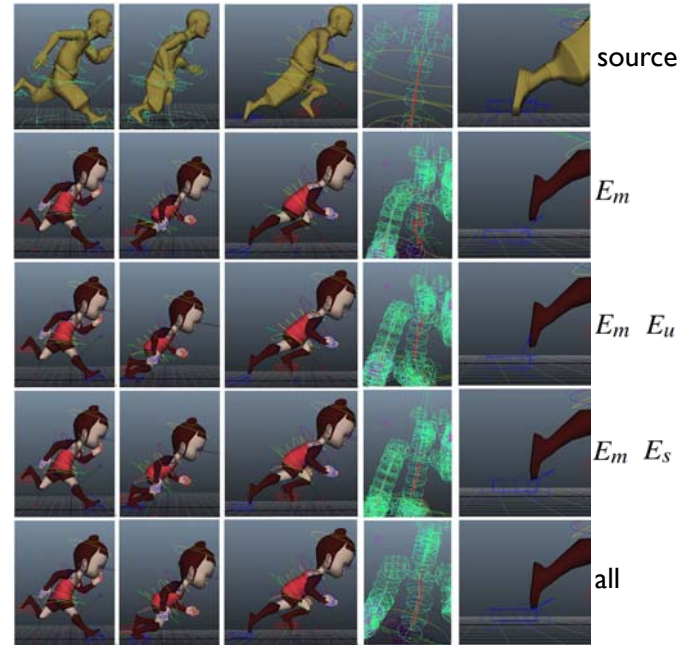
$$E_P(\gamma_f) = E_m(\gamma_f) + w_u\, E_u(\gamma_f) + w_s\, E_s(\gamma_f)$$

mesh similarity to the desired mesh   temporal coherence

Results

source

E_m

E_m E_u

E_m E_s

all

Impact of energy terms

A running sequence with refinement

A walking sequence

References

[1] Sumner R. W., Popovic J.: Deformation transfer for triangle meshes. ACM Trans. Graph. 23, 3 (2004), 399-405.
[2] Zhou K., Xu W., Tong Y., Desbrun M.: Deformation transfer to multi-component objects. Computer Graphics Forum 29, 2 (2010), 319-325.
[3] Hahn F., Martin S., Thomaszewski B., Sumner R. W., Coros S., Gross M. H.: Rig-space physics. ACM Trans. Graph. 31, 4 (2012), 72.