Cage-Based Deformation Transfer Using Mass Spring System

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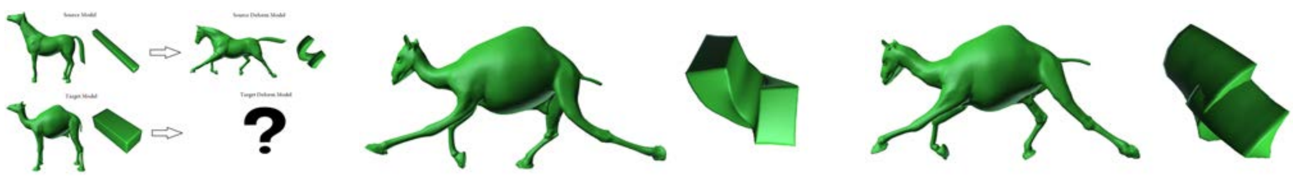

(a) (b) (c)

Figure 1: *Deformation transfer on the case "horse-camel"and "twisted cuboids". (a) Input: the source reference models, source-deformed models, and target reference models. (b) The target-deformed models by our method. (c)The target-deformed models by [Sumner and Popović 2004]. In these cases, the process time by our system is half of that by [Sumner and Popović 2004]*

1 Introduction

Most previous works transfer mesh deformation by solving affine transformations of triangles [Sumner and Popović 2004]. Although the quality is promising, some methods instead try to transfer physical models. Such physical-based methods which generate target deformed models allow plausible physical interaction during deformation process and post-mesh editing. The system [Yang et al. 2013] automatically construct a mass spring system for source and target models. Then it transfers spring stretchiness ratio of source reference model and source-deformed model to the target reference model. The target model is deformed after solving the force equilibrium. A similar idea works pretty well on mesh interpolation [Ma et al. 2012], where each blend shape model is associated with a mass spring system. However, there are severe collapse problem on the result of [Yang et al. 2013], as shown in Figure 2.

Given target-deformed models edited by artists, we compute the difference between spring stretchiness ratios of the source models and that of the target models. From the error visualization of the case "horse-camel"in Figure 2, it is clear that the spring ratios are quite different in several parts, e.g., the backside, belly, and joints on limbs. We propose an effective method to tackle the problem. The idea is to perform spring stretchiness ratio transfer on the models of abstraction levels, where the mass spring configurations are more consistent. The fine-level target model is reconstructed by Green Coordinate [Lipman et al. 2008] from coarse-level model, thus completing deformation transfer.

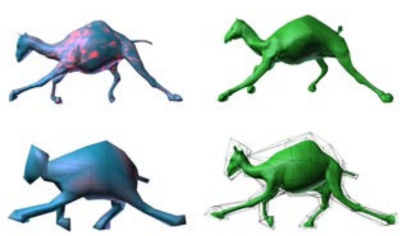

Figure 2: *First column: the ratio difference visualization on the target reference model and cage. Second column: target deformed models by [Yang et al. 2013] and our system.*

2 Experimental Result

Our method can resolve the collapse problem of [Yang et al. 2013], and the computation is several times faster than that of [Yang et al. 2013]. Figure 1 shows two experimental results of our method and those of [Sumner and Popović 2004]. In the result of case horse-camel, both retain the surface smoothness, but our result of is overbended on the regions near limb joints, which will be addressed in the future work. In the result of case "twisted cuboids", our method prevent the self-intersection problem.

Acknowledgements

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References

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