Child2adult: Revisiting dynamic scaling laws to age motion

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ABSTRACT

We report the results of a perceptual study that evaluates the effectiveness of dynamic scaling laws in scaling motion capture data. Previous work has shown that this method is successful in making adult motion capture data appear child-like. Our contribution is to evaluate if the method works in the other direction too.

CCS CONCEPTS

•Computing methodologies →Animation, Motion capture, Perception;

KEYWORDS

Perception of motion, Point light displays, Biological motion, Child motion, Markerless motion capture

1 INTRODUCTION

There is a large body of work on aging the appearance of photographs motivated by applications such as entertainment and missing persons search[2]. Though there is a large body of work on motion generation and motion stylization, there is a gap in the literature on aging the motion of a given person (as distinct from style transfer).

Previous work has shown via perceptual experiments that scaling motion capture data according to dynamic scaling laws can cause adult motion to appear child-like to naive viewers [1]. In this work, we evaluated if this method works in the other direction too. In other words, how effective is dynamic scaling in making child motion capture data appear adult-like?

2 METHOD

We select a subset of motions that are used in [1]. The motions include: "Jumping Jacks", "Jump high" and "Run Fast". We selected these three motions as being whole body motions where the scaled result was judged more often as belonging to a child than the original motion.

We generated dynamically scaled motions (Condition DS) from this data by following the same procedure as reported by Dong and colleagues. We assumed the adult height to be 1.75 meters (rationale). Then we generated 36 point light display (3 actor types (Child, DS, Adult) × 4 actors × 3 actions). The stimulus presentation and question format was kept the same. Participants saw a point light display against a black background and were asked "Does this motion belong to a child or an adult?". We conducted the study on Amazon Mechanical Turk. We paid 40 participants 1.5 dollar for approximately 15 minutes of their time.

We first checked that participants were judging child motions as belonging to a child and adult motions as belonging to an adult. We discarded participants whose overall accuracy on this task was below 50%. The mean overall accuracy for the rest of the participants is 65.83% (SD = 27.93%).

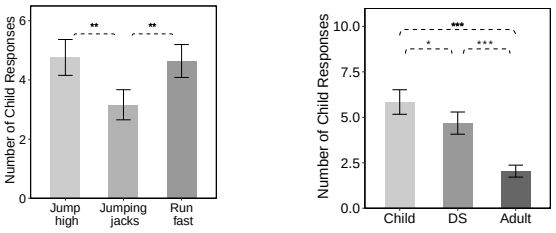

Figure 1: (a) Mean and standard error of number of child responses for all three action types. (b) Mean and standard error of number of child responses for all three actor types. All groups are significantly different.

Our dependent variable was the percentage of responses where the motion was marked as belonging to a child (Percent Child Responses). Shapiro-Wilk test shows that the percentage child responses for child motions belongs to a normal distribution (W = 0.9325, p = 0.10). However, the distribution for adult motion is not normal (W = 0.90, p-value = 0.02). For DS videos, the percentage child responses follows a normal distribution (W = 0.96, p = 0.49).

We computed the mean and standard deviation for number of child responses for each actor type. We found a significant main effect of actor type in a two-way repeated measures ANOVA. Tukey HSD post-hoc testing showed significant differences between all groups (Adult vs. Child ($p < 0.001$), Child vs. DS ($p = 0.0301$) and Adult vs. DS ($p < 0.001$)). We also found a significant main effect of action type ($p = 0.0014$). "Jumping Jacks" (mean = 3.16, SD = 1.42) received least number of child responses. "Jump High" received most number of child responses (mean = 4.76, SD = 3.03). Child responses for action "Run fast" is: mean = 4.64, SD = 2.27. Tukey HSD post hoc test found that number of child responses in following action pairs were significantly different: "Jumping jacks" and "Jump high"($p = 0.0013$); "Run Fast" and "Jumping Jacks" ($p = 0.003$) (Figure 1).

2.1 Discussion

We found that dynamic scaling worked caused child motion to start appearing adult-like to viewers. Dong and colleagues [1] found that dynamic scaling caused adult motion to start appearing child-like. Taken together, this suggests that dynamic scaling laws work in both directions: adult2child and child2adult.

REFERENCES

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