A Walking Motion Morphing Method Based on Statistical Data of the Elderly

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1. Introduction

Technologies to create numerous motions from a motion data are sought for in order to increase a variety of motions of 3D characters in virtual space. A number of methods have been proposed to increase the variation of walking of people. They consider physical geometric attributes such as standing height and seating height, and motion attributes, but do not consider the postural changes with aging. This paper proposes the method to automatically generate variations of walking motion considering the postural changes with aging based on the medical statistical data.

2. Related Work

(1) Posture Modification with Aging
Iwaya et al. showed three types postures of elderly people in Fig.2: Flat back type, Round back type, Sway back type. Further, they measured the motion range of specific joint angles of 50 elderly people and showed the result in Table 1. CWA, LWA, and STA are the angles to describe the shape of spine as shown in Fig.3.

(2) Short Steps with Aging
According to Himann et al., aging degrades motion functions. That leads to slower walking speed with aging: male shows 12.4%, and female shows 16.1% of slower walking speed per decade after age of 63.

3. Proposed Method

According to the medical statistical data mentioned in the previous chapter, we propose the method to generate the walking movement of the elderly from the movement of the young. Our proposed method consists of following two steps.

In the first step, we modify the posture of the young into one of the three types described earlier. This can be implemented by restricting the motion range of joint angles from neck to lower back as shown in Table 1. Next, based on the measured data, step is narrowed to fall into the motion range of joint angles and we generate the walking motion data of the elderly from captured walking motion of the young.

These steps can convert the walking motion data of the young to the one of the elderly considering the posture changes, motion range of joint angles, and narrowed step.

4. Experimental Results

We generate new walking motion data by modifying a walking motion data based on the changes of posture, step, and walking speed due to aging. Fig.1(b)-(d) show stroboscope pictures of generated walking motion sequence. Our proposed method realized to generate various walking motion data including the ones of the elderly from a walking data.

5. Conclusions

We have proposed a method of generating various motion data including the ones of the elderly from single motion data. Our proposed method realized the changes of posture and step by using medical statistical data, and we expect that this method will contribute to add variety in generating motion of avatar in 3D virtual space.

References
