

Temporal Scaling of Upper Body Motion for Sound Feedback System of a Dancing Humanoid Robot

Takaaki Shiratori Shunsuke Kudoh Shin'ichiro Nakaoka Katsushi Ikeuchi

This project proposes a method to model modification upper body motion of dance performance based on the speed of played music, and the goal of this research is to realize Sound Feedback System of a dancing humanoid robot. When we observed structured dance motion performed at a normal music playback speed and motion performed at a faster music playback speed, we found that the detail of each motion is slightly different while the whole of the dance motion is similar in both cases. This phenomenon is derived from the fact that dancers omit the details and perform the essential part of the dance in order to follow the faster speed of the music. To clarify this phenomenon, we analyzed the motion differences in the frequency domain, and obtained two insights on the omission of motion details:

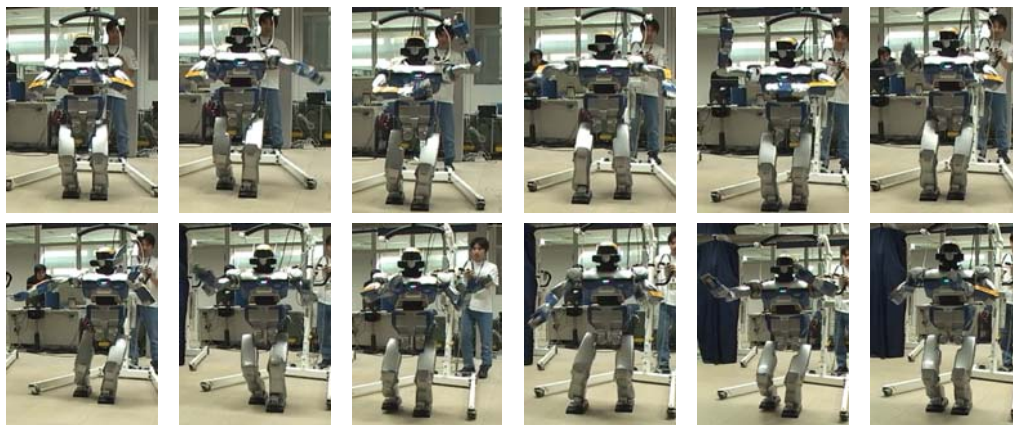
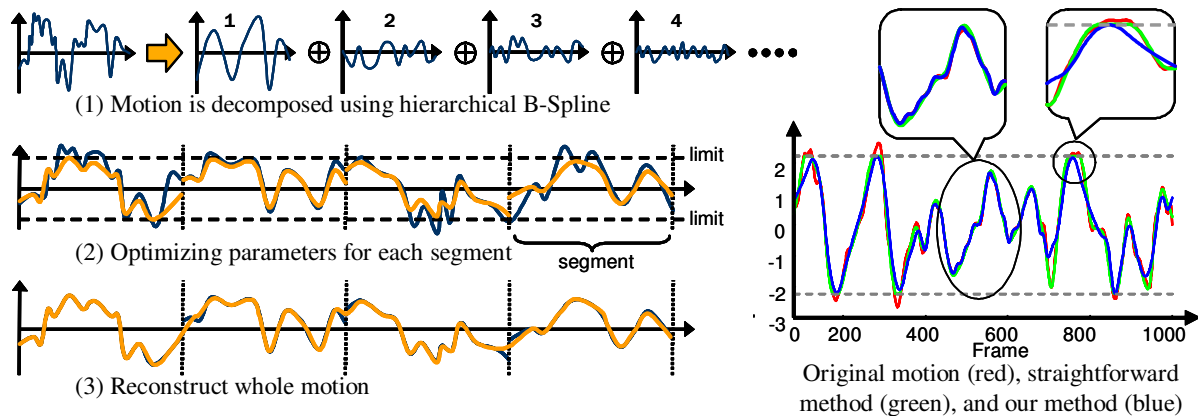
1. High frequency components are gradually attenuated depending on the musical speed.
2. Important stop motions are preserved even when high frequency components are attenuated.

Based on these insights, we modeled our motion modification considering musical speed and mechanical constraints that a humanoid robot has. We show the effectiveness of our method via some applications for humanoid robot motion generation.

Publication:

T. Shiratori, "Synthesis of Dance Performance Based on Analyses of Human Motion and Music," Ph.D. dissertation, the University of Tokyo, Tokyo, Japan, March 2007

T. Shiratori, S. Kudoh, and K. Ikeuchi, "Temporal Scaling of Human Motion Based on Observation of Dance Performance," In Proc. Meeting on Image Recognition and Understanding (MIRU), 2007 (to appear)



Dance performance by a humanoid robot: motion is generated using our proposed method.