Abstract of Main Thesis

Title of Thesis

Integrated Dance Body Motion Archiving Using Dance Notation and Motion Capture

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Abstract on the Content of the Applicant's Thesis

Archiving the classical Japanese dances and performing arts has been a challenging research topic for both preserving and passing them to the next generation. This research has been conducted in two different approaches for digital archiving, reproduction and data management of intangible cultural properties. Firstly, a system for description and reproduction of body movement with Labanotation (a form of dance notation) is developed and applied to a Japanese traditional Noh play. The other one is the development of a system for similarity retrieval of motion data obtained by motion capture systems and stored in motion data archives.

Labanotation is rich in symbols, and by using the full set of symbols; almost all of the movements can be described. Consequently, the resulting notation would become extremely complicated. For that reason, the fundamental symbols have usually been used. In this research a method of describing and reproducing CG animation of Noh play with Labanotation has been investigated. 'Shimai' is a short but principal performance extracted from the whole Noh play. The structure of Shimai is composed of a number of movement units known as 'Kata'. A method of composing Shimai is proposed by sequencing Kata which is described with Labanotation. The system was evaluated by professional Noh experts, and they all agreed that the quality of 3D animation is impressive as well as this system is useful for teaching traditional dances.

The search query tool is required to utilize a database of motion capture sequences, which are very precise and accurate transcriptions of dance performance. A new feature extraction method is introduced and examined for searching and comparing motion sequences in a database of motion. For similarity search, joint speed has been mainly used as features of a particular motion. The proposed method differs from others in that the features of not only the magnitude of speed but also the pattern of speed change are used. The experiments showed that the proposed feature extraction can increase search precision compared to the retrieval method without using this feature. The average precision was greater than 90% and computation time was 10 seconds on a dataset of 225 motion clips including 81,851 frames obtained from CMU's database.