A Survey On Motion Analysis In Dance Recognition

[1]Mrs.Bhavana.R.Maale, [2]Dr.Suvarna.Nandyal
[1]Research Scholar, [2]Professor
PDA College of Engineering

_____

Abstract: **A dance motion is represented as a series of poses, evaluation of motion data is reduced to the contrast of individual poses .The intention of this paper is to recognize human movement steps as well as important parts from video data of dancing moves acquired by motion capturing methods. The human movements are acquired from a motion capture system. It also discusses a framework of dance motion recognition, and the details of every of its segmentation techniques. The dancing performance as determined in a video is analyzed and segmented into motion intervals delimited by means of movements-beats or poses. The aim of this survey is confined to work on complete-body and hand motion; it does not encompass work on human faces.**

Index Terms: **Dance motion analysis, Segmentation Techniques ,and Motion Recognition Methods**

_____

I.INTRODUCTION

Motion based recognition deals with the identification of an object or its movements based on motion in a series of images. Movement plays a crucial role in human visual devices. It has the ability to apprehend specific dance steps which are made up of complicated collection of moves. Dance includes fully body movements and composed of a large number of flexible movements. Dance movement identification is a challenging task that has acquired immense recognition from the computer vision community in present years. Motion analysis can also used for identification of moves in various games like walking, jumping etc. On the other hand, movement information can be captured without difficulty using modern technology and dance motion analysis using motion facts is beneficial for preservation, description, training and choreography. Dance is one of the largest areas as dance steps can be extraordinarily dynamic and complex.

2. Previous Work

The survey of Movement recognition has acquired large attraction in the current years. In the moves, style is entirely distinctive feature that symbolizes and illustrates the identical expression of each dancer. In [1] Atsushi Nakazaw proposed the fusion of movement's method that can obtain realistic human movements based on the evaluation of the acquired human steps. In the study of movement recognition step, the real motion sequences is divided into the movement fragments, and the essential moves are retrieved consistent with that method, feature poses and frame moves are retrieved. The dance movements includes "Primitive motions" that is required to identify these elements.

Dance Motion Sequence = PrimitiveMotionA+PrimitiveMotionB + ...
 Primitive motion is a combination of motion location and a motion style:
Primitive Motion = Motion location + Motion style

[2] Automated movement shape analysis method automatically detects the movement primarily based on music and divides the real moves, and categorize them as to the primitive motions. In [3] Body motions are extracted and evaluated by means of making use of LMA as a method for checking the quality of body movements and retrieving parameter values from the frame movement records. [4] A unique method to recognizing movement expression and looking out dancer using the Multi Factor Tensor (MFT) model and segment it using the musical evaluation approach.[5] The principal component analysis (PCA) and the closest nearby categorizing techniques are applied for the identification of the dance motions of the person by using the usage of a motion capture device.[6] segmental singular value decomposition (Seg SVD) is proposed to symbolize a movement sequences with a tree structure shape shape.[7] For dance steps identification a machine learning model based totally on the Hidden Markov Method is used.[8] syntactic pattern recognition technique is used to understand dance basic movements and body part moves such as left, right, up, and down.[9]Syntactic pattern recognition approach is used to understand dance motions.CRF model plays good than HMM and sliding window for video segmentation and labeling.[10]Motions are diagnosed by means of a frame collection and there should be same or equal moves within the repository then records is transformed into world coordinate and offset records.[11]Motion sample approach between the steps works on the capacity of machine to attain zero movement location, and additionally the device to occur at the same time for dance motion is constructed. This paper surveys the work on movement analysis of gestures which includes hands, arms, legs, toes and whole-body movement, those are mentioned collectively due to the fact both contain articulated shapes.

3.Movement Analysis

Human motion evaluation in dance is a hard task, in particular when motion qualities and stylistic traits are of excessive importance. The issue is even more motioned while its purpose is to make easy transitions in motion composition using incredibly stylistic motions, which includes dance movements. Motion may be measured by means of taking the distinction among two consecutive frames.

3.1 Dance Analysis:
Dance movement may be evaluated in human moves. The motive of this paper is to extract the components in dance along with the person dance movement. Information process via the sampling for person moves evaluation and identification from the song. The system between these factors can generate movement re sampling, and the remaining end output from a series of action is beat synchronization of dance animation.

3.2 Dance Motion Detection
A dance movement is always changing and also there is a technique to change dance steps to expressions tune scores in symbols. It uses space time constraint. Primitive moves of the dance are important when generating one of these primitive steps, because of their hypothesis the dance is interval of segmentation are the same, and most of steps in dance movements are same .

4. Analysis in dance motion segmentation
Movement segmentation in dance video sequences is thought to be a tremendous problem, which goals at detecting moves similar to distinctive positions of a shifting body .The intention of dividing the movements, is to identify the begin and check body of the person moves. The upper body of the evaluation, it defines the middle of the body synchronize at every frame, further to movement of the hands and feet, leg it applies the movement of the body's centre of mass. The movement of centre of mass illustrates the movement of the complete body; hence the consequences of missed steps are much less. Primitive motions can be retrieved. It specializes on two features of dance performance: (1) dancers generally perform dance primarily based on the music, and (2) a stop moves, called as key pose, often comes at a time in music rhythm. It is particularly beneficial to segment diverse body parts of human in a picture, music the movement of joints over an picture sequence.

Table 1: *Recognition of motion analysis in dance from body movements.*

Sl. NO	Author	Title	Year	Movement	Segmentation	Feature Extraction	Method/Classifier	Recognition Rate
1	Atsushi Nakazawa, Shinichiro Nakaoka, Takaaki Shiratori and Katsushi Ikeuchi	Analysis and Synthesis of Human Dance Motions	2003	Human motions	Gaussian filter	19 measurement points and 15 coordinates	Motion synthesis method	50%
2	Takaaki Shiratori⬜ Atsushi Nakazawa_ Katsushi Ikeuchi⬜	Detecting Dance Motion Structure through Music Analysis	2004	Hand, feet, centre of mass	Speed calculation, candidate extraction and musical rhythm	Speed,time	Automatic motion structure analysis	82%
3	Kozaburo Hachimura1, Katsumi Takashina1∗, and Mitsu Yoshimura2	Analysis and Evaluation of Dancing Movement Based on LMA	2005	Whole body		Weight,space,time and shape	Laban movement analysis	
4	Manoj Perera† Takaaki Shiratori† Shunsuke Kudoh† Atsushi Nakazawa‡ Katsushi Ikeuchi	Task Recognition and Style Analysis in Dance Sequences	2006	Whole body movement(hand feet centre of mass) and Human identification	Musical analysis method, Task model	Speed,time	Multi Factor Tensor model	

5	Seiya Tsuruta Yamato Kawauchi	Real-Time Recognition of Body Motion for Virtual Dance Collaboration System	2007	7 basic movements(Bow,wave one hand,wave both hand,twist a waist,jump,skip (slide foot)	Thresholding Streaming motion data (average magnitude of velocity)	14 features , mean and standard deviation, magnitude and velocity	Principal component analysis	Recog rate 76.9% False error rate 15.0% Segmentation error rate 8.2%
6	Liqun Deng1,Howard Leung, Naijie Gu1, Yang Yang	Recognizing Dance Motions with Segmental SVD	2010	Squat down and stand up	Similarity measurement		Segmental SVD	0.991%
7	Bernhard Kohn, Aneta Nowakowska, Ahmed Nabil	Real-time Body Motion Analysis For Dance Pattern Recognition	2012	Eight activity of body movements of Arms	Dynamic stereo vision sensor	Spatio temporal space,Time	HMM	94%
8	Yaya Heryadi,Mohamad Ivan Fanany, Aniati Murni Arymurthy	Stochastic Regular Grammar-based Learning for Basic Dance Motion Recognition	2013	Left,right,up and down	Key body poses	Eight joints Heuristic sequential feature selection	Stochastic regular grammer	90%
9	Yaya Heryadi , Mohamad Ivan Fanany and Aniati Murni Arymurthy Mohamad Ivan Fanany and Aniati Murni Arymurthy	A Method for Dance Motion Recognition and Scoring Using Two-Layer Classifier Based on Conditional Random Field and Stochastic Error-Correctin	2014	left/right elbow, left/right hand, left/right knee, and left/right foot joints.	Conditional Random Field (CRF) Model	8 skeleton joint positions, spherical coordinate	syntactic pattern recognition approach	86.4%

		g Context-free Grammar						
10	Ziming Zhou, Zhenjiang Miao, Jiaji Wang	A System for Automatic Generation of Labanotation from Motion Capture Data	2016	Gaints & poses	Thresholding method	6 subsets of body parts	key frame sequence similarity matching	
11	Barorotul Abror and Dadet Pramadihanto	Dance Motion Pattern Planning for K.Mei as Dancing Humanoid Robot	2017	Human gesture(head,hand,leg)	Speed calculation, candidate extraction and musical rhythm	Key poses	Zero movement point,kinematics	
12	Minsu Jang, Dohyung Kim, Yeonho Kim, Jaehong Kim	Automated Dance Motion Evaluation using Dynamic Time Warping and Laban Movement analysis	2017	Dance poses		15 joints. effort, shape, and space.	dynamic time warping, LMA	97%

5. Conclusion

The recognition of dance movements from motion evaluation is a great area of research in computer vision. This paper mentioned various motion recognition strategies, feature extraction and segmentation of frame movements based totally on movement analysis, song, rhythm and tunes. It additionally extracts the traits of the human motion which includes the steps, motion location and the motion expression.

6. References

1.Atsushi Nakazawa, Shinichiro Nakaoka, Takaaki Shiratori and Katsushi Ikeuchi ," Analysis and Synthesis of Human Dance Motions" IEEE Conference on Multisensor Fusion and Integration for Intelligent Systems,pp.83-88. 2003.

2.Takaaki Shiratori Atsushi Nakazawa_ Katsushi Ikeuchi,"Detecting Dance Motion Structure through Music Analysis" Proceedings of the Sixth IEEE International Conference on Automatic Face and Gesture Recognition (FGR'04),IEEE,pp.1-6, 2004.

3.Kozaburo Hachimura, Katsumi Takashina, and Mitsu Yoshimura, "Analysis and Evaluation of Dancing Movement Based on LMA", IEEE International Workshop on Robots and Human Interactive Communication, pp.294-299,2005.

4.Manoj Perera, Takaaki Shiratori, Shunsuke Kudoh, Atsushi Nakazawa, Katsushi Ikeuchi, "Task Recognition and Style Analysis in Dance Sequences" IEEE International Conference on Multi sensor Fusion and Integration for Intelligent Systems September 3-6, Heidelberg, Germany,pp.329-334,2006.

5.Seiya Tsuruta Yamato Kawauchi, "17th International Conference on Artificial Reality and Telexistence",pp.23-30,2007.

6.Liqun Deng, Howard Leung, Naijie Gu, Yang Yang, "Recognizing Dance Motions with Segmental SVD" International Conference on Pattern Recognition,pp.1538-1540, 2010.

7.Bernhard Kohn, Aneta Nowakowska, Ahmed Nabil Belbachir, "Real-time Body Motion Analysis For Dance Pattern Recognition"IEEE,pp.48-53, 2012.

8.Yaya Heryadi, Mohamad Ivan Fanany, Aniati Murni Arymurthy,"Stochastic Regular Grammar-based Learning for Basic Dance Motion Recognition", IEEE,PP.420-424,2013.

9. Yaya Heryadi, "A Method for Dance Motion Recognition and Scoring Using Two-Layer Classifier Based on Conditional Random Field and Stochastic Error-Correcting Context-free Grammar",Global conferences on consumer electronics,IEEE,pp.771-775,2014.

10.Ziming Zhou, Zhenjiang Miao, Jiaji Wang, "A System for Automatic Generation of Labanotation from Motion Capture Data", IEEE, PP.1031-1034,2016.

11.Barorotul Abror and Dadet Pramadihanto, "Dance Motion Pattern Planning for K.Mei as Dancing Humanoid Robot", 2017 International Conference on Robotics, Biomimetics, and Intelligent Computational Systems (Robionetics),PP..6-11,August 23-25, 2017.

12.Minsu Jang, Dohyung Kim, Yeonho Kim, Jaehong Kim, "Automated Dance Motion Evaluation using Dynamic Time Warping and Laban Movement Analysis" IEEE International Conference on Consumer Electronics (ICCE), 2017 .