Computer Graphics -1

Literature review-1

---

# Primary Paper

Computer Graphics Animation for Objective Self- Evaluation

# Secondary Paper

Analysis and Evaluation of Dancing Movement Based on LMA

---

**Name: Tejaswini Gaddam**

**ID: 01672822**

## Introduction:

The primary article which I have chosen for literature review is “Computer Graphics Animation for Objective Self- Evaluation” written by Yoko Usui, K. Sato and Shinichi Watabe. The secondary article which is cited in the bibliography of the primary paper is “Analysis and Evaluation of Dancing Movement Based on LMA” by K.Hachimura, K. Takashina and Mitsu Yoshmuraz.

The primary article concentrates on helping the non-qualified dance instructors teach dance using motion capture and to allow the dancers to easily self-evaluate their own performances by comparing it to a standard example. This self-evaluation is done by using motion capture and developing the animations from the collected data by Xsens MVN, whereas the second paper do have same related information which is not fully advanced as the primary one. And the second paper focuses on extracting the characteristic poses as well as highlight parts from the data of dance movements obtained by a motion capturing technique. In this paper rather than the Xsens MVN another technique called LMA (Laban Movement Analysis) was used for quantifying the body motion and extracting feature values.

In the primary paper as discussed Xsens MVN is used for motion capture because the device’s accuracy is relatively high, and it is easy to calibrate before measurement, and it is also easy to use from preparation to measurement. One other advantage is that it can easily be carried. This type of measurement is used for the capturing their dance, which helps the dancers to easily evaluate their dance if needed within few minutes and correct themselves. Where as the in the secondary paper the type of measurement used is LMA. LMA is a methodology and it classifies the dynamic and geometrical features of body motion in detail. Laban Movement Analysis, for the motion of human body has four major components Body, Effort, Shape and Space and it systematically describes the motions with these components. Effort expresses the dynamic quality of motion i.e. tone, texture, or use of energy. Shape describes how a motion makes shape in the space by the body or how it relates to space. Furthermore, according to the LMA theory, LMA feature values for the motion data are obtained by a motion capture system. These two are different methods of comparisons but they do work for the same thing. Xsens is more advanced than the LMA.

## Experiments Conducted:

In the primary paper, the author considered 12 high school students studying hula dance (A Japanese dance form). These students practice hula every day with the aim of attending various events and winning a prize of in an annual nationwide high school hula competition. Each of the 12 students were measured using motion capture after each had practiced the choreography and could dance to a compulsory tune by themselves. Each student was taking 30 minutes to measure resulting in about 6 hours of dance measurements. A set of animations for practice were given to dancers based on the data measured by their motion captures. Total of 17 animations of three types were created: an animation of a solo dance for 12 people, an animation for group dance of four groups of three people, and an animation for dance of all 12 people. These animations were used by students for practice for 1 month. Students used FBX Re-view (Autodesk), an animation viewer for tablets, to view the animations.

In the second paper, experiments of extracting motions which correspond to the LMA component have been done. The motion data of the ballet performed by a skilled dancer is used for the experiment analysis. The capture was done by the frame rate of 30 frames per second. Different equations corresponding to weight motion, time motion, space motion, shaping motion and shape flow motions were developed and used for measuring the intensities of the factors in numerical terms. We do not compare the numerical values literally but, we have two extreme values for the lowest and highest values. The numerical value calculated can be in the range between the highest and lowest value. Later one of the two extreme values can be considered by comparing to which extreme value is the calculated value closest. For weight factor, the two extremes are powerful and light motion. Time can be represented as quick or sustained, shaping motion can be calculated by taking a table plane as reference and noticing the direction of focus with the movement of body. Shaping motion can be classified as spreading or enclosing or narrowing etc.

These two methods of measuring are mostly similar. In the primary paper numerical measures are not calculated, the dancers evaluate themselves practically where as in the LMA we need to calculate many numerical values to get the results of the motion captures. In the first paper Xsens MVN will give us accurate results, the evaluators can be only the individuals themselves, and sometimes other people also review the performances and estimate the results. LMA is a long

process of measuring everything, many factors are considered in measuring the movements of the dancer. We can also say that the author of the primary paper has taken the secondary paper as reference and has upgraded the type of capturing and improved it. LMA just used to capture the photos of the posture and sometimes the mathematical calculations can also be wrong, so the primary paper can be said as the advanced form of the self-evaluation of the dancers.

## Results and analysis of experiments:

Now we can compare the results of the experiments conducted in both the papers. Eventually at the end these two experiments indicate the same result that is how the capturing of images or video will be useful to the dancers or anyone in general. In the primary paper, the students checked their own animation and once to see the motion that they need to fix before daily practice. Some students even checked other animations and gave advice to help other dancers to improve as well. Students used to watch the animation least one time almost every day before they practice the hula dance. One of the student when interviewed has commented that "I recognized not only difference in my own motions, but also differences in the motion of others for the first time". And helped some of the students to improve their waist angles and position, and they also have noticed that their hands are too low. Later an advisor was asked to give a review of this experiment and he said, "Students were able to point out to each other's differences in the width between the legs and arm raising and many other things which need to be modified". Some of the students were surprised by the results and became more aware of the challenges of dancing in harmony. The author has depicted the changes in the waist heights of the 3 dancers before and after the practice for about one month in a graph. The result after watching the animation was that all the 3 dancers lowered their waist position one by 10 cm.

Now let's examine the results of the experiment in the second paper. The motion corresponding to the Effort component extracted by the proposed method was compared with the result of analysis by a specialist who had the official qualification of analysis of LMA. Author has depicted the results in the form of graphs, each for weight factor, time factor and Space factor. The results given by the LMA and the specialist was compared for some interval of time for the weight factor and it was the same. This showed that the weight factor calculated by LMA formulas was appropriate. Then the time factor was also compared as same. For one extreme "Quick" the results

were matching with the specialist report but the other extreme “sustained” was not correct. Author gave an explanation that the difference in the analysis might be because of threshold value was not appropriate. Apart from these two when the results of space factor were compared, it was completely wrong.

I can say that the purpose of the experiments done was the same in the first paper and second paper. Same factors were compared in the first and second papers. In the first paper rather than the measuring only weight, shape, and space factors specifically, overall body was compared and evaluated. The mistakes or the drawbacks of the second paper were overcome in the first paper. In the second paper there were some mistakes regarding the space factor values. The author of primary paper has corrected all the mistakes from the second paper and framed a new idea of “capturing the animations” rather than capturing images.

Furthermore, by capturing the animations the students were able to recognize the difference between their perceptions and their actual body movements. In other words, students have recognized their feelings were wrong. It was explained in the paper that one of the 12 dancers could not correct her movement even though another learner continuously indicated problem. Later after watching the animation, she recognized that the way she was bending her knee and her waist was different from others. Sometimes, even the coach had used mirrors and shown their own videos to students in the past, other elements such as face attract students’ attention in videos and mirrors. This shows that the elements that students should notice are overlooked. After looking at the animations students have realized their mistakes and implemented the information they were viewing. This approach seems to be effective in making body movements more objective. Author has also explained that animation is not the dancer but a reproduction of the dancer’s body movement. Students were able to compare their imagined dancing posture and their dance in the animation to identify the areas of improvement.

## Conclusion:

Thereby, I can conclude clearly that the author of the primary paper has taken many considerations from the referenced paper improved, corrected the mistakes, and implemented in a better and sophisticated way. The secondary paper proves that the numerical formulations of LMA is possible

to some degree but is quite insufficient for formulation in space. The author of second paper has portrayed an idea of using these LMA features combined for extracting characteristic poses and motions from dancing movement, after making the method of Quantification of LMA factors more definite. This can be noted as the staring point for the author of primary paper to implement his idea of creating the animations for the self-evaluation of the dancers. Not only that, the results from the experiment conducted by animations show that the students using the motion capture and having them use the animations to support their practice was beneficial. Dancers were able to observe themselves from a third-party point of view and identify the difference between their perception and actual body movements. The author of primary paper has an idea to conduct experiments to see if there is any difference between the cases when motion capture is used and not used. This might give us a detail understanding of the animations and everything. In addition, author of primary paper also cited that experiments are needed to be conducted if long-term practice was introduced. At the end I can also say that the primary paper is the improved and advanced form of the secondary paper. All the mistakes were corrected, and a newer version was published by the in primary paper.