

Comparing the Thai Dance Labanotation Recording Results with an Expert

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Abstract—Thai Dance is a unique performative form of art based on complex movements with rhythm. The performer requires expertise to move every part of the body, especially hands and fingers to harmonize and balance the body control. Thus, it is challenging to pass on such a tacit knowledge to the next generation. Currently, the drop in the number of experts is dramatic and the chance of archiving the dance knowledge as explicit knowledge is very low. To archive the Thai dance knowledge, the use of a system like the Labanotation System is necessary to record the complex movements as abstract symbols. This system allows to record dance movements, but it cannot provide their three-dimensional representation. Therefore, to automatically generate 3D animation from the Thai Laban Scores, the Thai Laban Drag & Drop system was developed. Nevertheless, the results of the Thai Laban Drag & Drop system development must be verified. This Paper focuses the autogenerated output of the Thai Laban Drag & Drop system, comparing Video Recoding and 3D Animation, the Thai Laban Scores from an expert and Thai Laban Scores from the system, the ThaiLabanXML and the regenerated ThaiLabanXML from the system.

Keywords—Thai Dance, Labanotation System, Thai Laban Scores, ThaiLabanXML, 3D Animation

I. INTRODUCTION

Thai Dance is a performative art that enhances the mental and emotional aesthetics of people in the society and influences people in such a way that they can reflect on their activities and the way of their living. UNESCO would like to preserve such cultural elements called “Intangible Cultural Heritage” also known as “ICH” for future generations. Knowledge archiving is the way to preserve the knowledge as explicit knowledge by transferring such knowledge in the form of writing, drawing or symbols. The lack of unity in such languages is a problem to be mentioned here [1]. Nowadays, Thai Dance knowledge is challenging to be passed on to the next generation. There are people who attempt to conserve this tradition, although there are many obstacles including complexity and the accuracy of recording the movements. One way of recording the movements is to use a camera to record as a video but then the video is not covering all the details and the complexity of the movement, especially the movements of the hand and fingers. Thus, making a video recording for teaching and learning is not sufficient. Previously, Labanotation System has been used to assist in recording the body movements by written abstract shapes representing commands and organs on the staff, representing the rhythm. Labanotation is a human-readable information system that can be converted to computer-readable information. Thus, Thai Dance can be recorded in

motion by the Labanotation System and can be converted into computer-readable data in the form of Extensible Markup Language (XML) files. However, the Extensible Markup Language Standard created to support the Labanotation System is incapable of recording specific details of the Thai dance movements such as hand, arm, foot and body gestures. According to our studies and findings, the Laban Thai Dance XML is a standard that has the advantages and disadvantages of each written standards [2].

The ThaiLabanXML standard was developed to support the Thai Laban scores in the Unity 3D program to display a three-dimensional animation. Moreover, the standard covers basic movements of the Thai Dance and includes specific rhythms. However, coding XML may cause errors at some point due to human errors and it is also time-consuming. Moreover, there may be further loopholes of the standard when recording more complex dance movements.

The Thai Laban Drag & Drop system is a Thai Dance Labanotation program which allows to store, edit and export the data as XML, .PDF and .JPEG. It provides the abstract symbols of Labanotation symbols and the Thai Laban scores created by Dr. Chommanard [3], who had great experience in Thai performing arts and Labanotation research. Finally, it can be displayed in three-dimensions so that the notator will be able to visualize the movements of the body through the characters within an environment. However, the results from this program, namely the Thai Laban Score, the ThaiLabanXML and the 3D Animation haven't been recognized as accurate by Thai dance experts. Therefore, this paper focuses on the comparison of 3 inputs: the Thai dance expert's demonstration, the Thai Laban Scores, and the ThaiLabanXML standard and the 3 outputs of Thai Laban Drag & Drop system.

II. LITERATURE REVIEW

A. Labanotation

Labanotation or Kinetography Laban is a notation system for recording and analyzing the human movement. The system by Rudolf von Laban, also first published in 1928, offers two innovation: 1. the vertical staff to present the body, which allows the correct representation of the right and left sides of the body as well as continuity in indicating movement flow; 2. Elongated movement symbols, by their length, indicating the exact duration of each action. His analysis of movement, based on spatial and dynamic principles, was flexible and can be applied to all forms of movement [4].

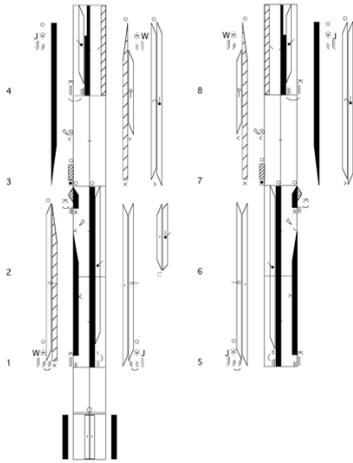


Fig. 1. Example of a Labanotation Score for Kaii-Mue (Thai Dance)

B. Thai Laban XML Standard

The Labanotation system uses the Thai dance movement as human-readable information and makes it convertible to computer-readable information. Thereby, the ThaiLabanXML standard is used for transferring Laban notation scores as human-readable information into Extensible Markup Language as machine-readable information. ThaiLabanXML is a standard that has advantages and disadvantages when creating the appropriate movements. LabanXML allows the creation of the sematic representation of human movements [5] and MovementXML is a semantic representation of the human movement which is also more flexible and more extensible [6]. Moreover, the ThaiLabanXML includes Thai dance gestures such as Jeeb and Wong in order to be able to support the Thai dance properly.

The Recording of the Thai Laban XML starts with recording from the bottom then moving up through the Labanotation scores and starts from the inside of staff to the outside, left side first and switching to the right. This standard starts off with the root <Laban> element including the <Notation> and <attribute> elements. The <attribute> element collects the beat count of measure and includes the <Measure> element inside. The <Measure> element collects the parameter, <Beat-Type> and the element that collects the body parts. Each element of the body parts comprises a <Level>, <Direction>, <Speed> and other elements.

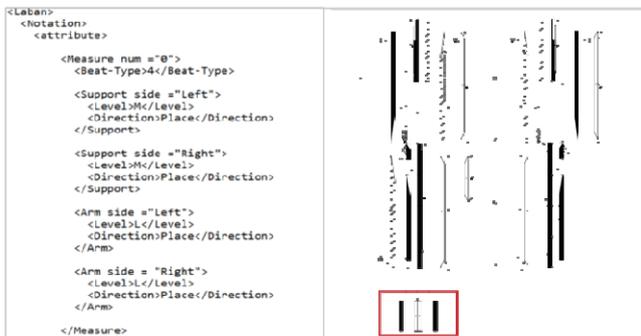


Fig. 2. ThaiDanceXML for Kaii-Mue in the initial part of the Thai Dance Score

C. Thai Laban XML Standard

In 2002, Kojima Kazuya et al. have researched the way to improve 3D CG animation for the Labanotation system in the LabanEditor program. LabanEditor is an interactive graphic editor program for editing Labanotation scores and rendering the 3D CG character animation [7]. They added features to allow users give input, edit, describe and reproduce scores. The score can be rendered in animation immediately and naturally. Moreover, when rendering in a 3D Animation window, users can change the perspective in the 3D scene against all three axes. Finally, this research group achieved to show the description and reproduction of Noh which is the most well-known and characteristic traditional Japanese performance.

In 2018, Yoothapong et al. researched on the process of transferring the ThaiDanceXML into the Unity3D program in order to display the movement as a 3D Animation [8]. They have developed a system of five processes that results in creating an animation. The process steps are: ThaiLabanXML file transferred into Unity 3D, Model preparation, 3D character transformation and 3D animation presentation.



Fig. 3. Translating Process from ThaiDanceXML to 3D Animation

XML and Thai Dance Techniques have been adopted to generate a ThaiDanceXML standard. After that C# language was used to connect the data of XML files with the Unity 3D program. The preparation of the 3D character model is based on a 3D mesh using Autodesk Maya. The polygon must be cleaned, and the name of the joints should be defined to get the structure of the human body as defined in the ThaiDanceXML standard to make the 3D transformation possible. Finally, the Unity 3D Program can interpret and collect the data from the ThaiLabanXML file. Most of all, the Thai dance knowledge could transfer knowledge using game-based learning method which provide an interesting and exciting learning environment [9].

D. Comparison

In 2018, Yoothapong et al. researched the creation of a tool to check the accuracy of a Thai Dance expert compared to the Real-Time Dance movement by Microsoft Kinect. The first step was to obtain the data of the Thai dance movements that were recorded by an expert using the Motion capture system applied to the skeleton of a 3D character model and also the dance movements from a user were collected by the Microsoft Kinect sensors to be applied to another 3D skeleton model. Then these were compared using the joints of the skeleton. Finally, this research shows that the two models were quite different as regards the joints because of the limitations of the Kinect sensor, as it couldn't capture all the complex Thai Dance movements clearly [10].

III. METHODOLOGY

Thai Laban Drag & Drop system generates the output according to the Laban scores as input such as direction, and degree of the abstract symbols. First of all, archiving data from an expert is quite essential. Therefore, it has been collected through video recording from a Thai dance expert, the movement was

A. Expert: Thai Laban Score and System: Thai Laban Score

After comparing both Thai Laban Scores according to Fig.5, it demonstrated clear differences. The Thai Laban Score created by an expert has 144 symbols and the Thai Laban Score from the Thai Laban Drag & Drop system has 100 symbols due to the limitation of the system, the Thai Laban Score from the system isn't as comprehensive as the Thai Laban Score from an expert. The Thai Laban Drag & Drop system can record an average score of 69.4% based on an expert comparison because the system is unable to record many complexities such as organ rotation, symbols of continuity of movement and organs, etc.

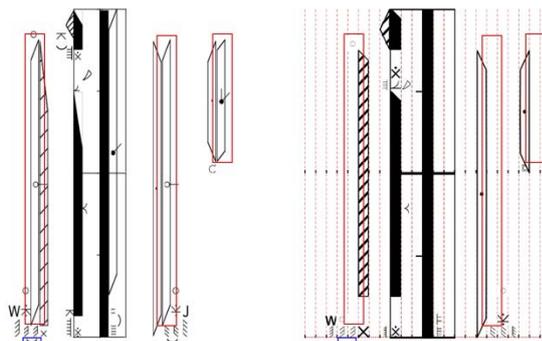


Fig. 8. The symbol of organ rotation in red boxes and the symbol of continuity of organs in blue box

B. Manual: ThaiLabanXML and System: ThaiLabanXML

Fig.6, shows that both ThaiLabanXMLs contain the same structure which starts off with the root <ThaiDance> element and includes the <Attribute> elements. The <Attribute> element contains the <Measure> element inside and the <Measure> element contains the <Body> element listing the parts of the body.

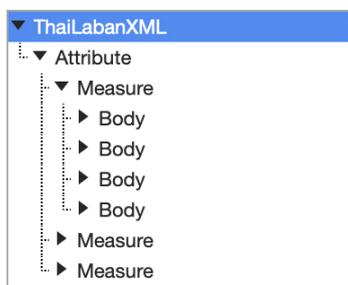


Fig. 9. The Structure of ThaiLabanXML from the Thai Laban Drag&Drop system

Currently, both ThaiLabanXML results are still disparate due to the limitations of the Thai Laban Drag & Drop system, that only shows the <Level> and <Direction> elements. As a result, the system is not able to display the value covering all the movements following Fig.10. Moreover, the system is not able to identify the organ directly with the Thai Laban Score because the Thai Laban Drag & Drop system uses the numbers instead of each column. In fact, some organs are able to move the column, so the parameter named index in the <Body> element is unable to identify an organ.

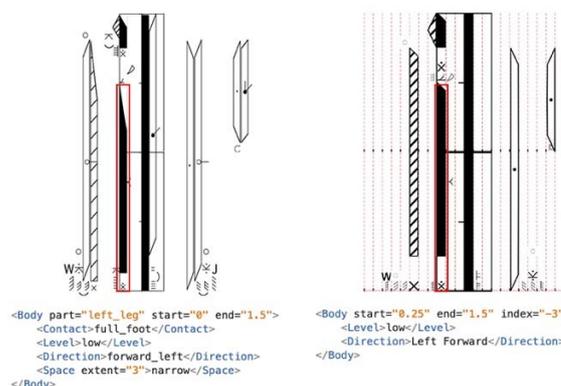


Fig. 10. The comparison of ThaiLabanXMLs - manual ThaiLabanXML and output of the Thai Laban Drag&Drop system - <Body> element of left leg from Kraai Thai dance

C. Video Recording and 3D Animation

With the limitations of the system, 3D animation exported from the Thai Laban Drag & Drop system can be played, yet the movement is different compared to the video recording from the expert. The timing of the Thai Laban Scores is still different from the timing of the system. Also, the continuity of the movements is not currently compatible with the Thai Laban Drag & Drop system. This can be improved by changing the beats per minute (bpm) according to the Thai dance movement, which is 60 bpm.

V. CONCLUSION

In conclusion, the result of the comparison of 3 inputs and 3 outputs provides us a new perspective to improve the Thai Laban Drag & Drop system. Regarding expert: Thai Laban Score and system: for the Thai Laban Score, more symbol is needed to be added to the system in order to be able to interpret more XML files. Regarding manual: ThaiLabanXML and system: ThaiLabanXML, the ThaiLabanXML standard should be made compatible with the system, more symbols are needed to translate more movement. Regarding video recording and 3D animation, timing must be in the same track, to move each part of the character together with the Thai dance expert. As regards the future works, the ThaiLabanXML standard needs to be improved and coding needs to be simultaneously developed to represent the Thai dance movement in the Thai Laban Drag & Drop system.

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