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Accessing Accuracy of Structural Performance on Basic Steps in Recording Malay Zapin Dance Movement Using Motion Capture

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ABSTRACT

Traditional dances are deemed under the classification of intangible cultural heritage that could easily be threatened because of their fragility. The need to protect this valuable asset is imperative as it reflects the uniqueness of our generation's identity and portrays the human development of any community. Dance is arguably the most complex entity to decipher or captured in notation, in still or moving state, because of its kinaesthetic nature. Hence, this paper presents the study of several basic steps based on the structural performance in the Malay dance called Zapin besides accessing accuracy in recording the movement by using motion capture. Zapin is one of the oldest traditional dances fusing the Hadrahmaut Arab dance with Malay performance styles. The objective of the venture is to preserve Zapin focusing on the steps in correspondence with the dance motifs. The recording and simulation of the movement can be virtually re-enacted in 3 dimension (3D) using Motion Capture (MoCap) technology. This technology enables movements to be viewed and analyzed in 3D from 360 degrees, making it an easy reference for viewers to observe and learners to emulate the movements. The approach and technique of recording the dance movement in real time using MoCap technology will be illustrated in this paper.

KEYWORDS: Digital Heritage, Intangible, Zapin Dance, Structural Performance, Steps, Digital Technology, Motion Capture.

INTRODUCTION

Heritage is defined as a valuable and ancient legacy not only of each nation, but also of humanity as whole. This irreplaceable legacy is brought from the past, where people are living with today and what will be carried to the future generations [25-26]. In conjunction of classifying on both tangible and intangible heritage by [24], it reflects on the importance of preserving as well as restoring the valuable assets of our cultural heritage diversity. According to [13], preservation is the management step, which is related to the process of keeping something. Cultural heritage diversity can be reflected through dances, games, music and other practices that had been formed. It also can be seen by the beliefs, values and norms of the society [26].

Intangible cultural heritage is inferred as a traditional culture, process of learning and the progress of techniques that consists legends, performances, social customs, ceremonies and festivals and traditional arts. Meanwhile, tangible cultural heritage comprises of the material remains from human daily activities, works,development, expansion and achievement including such as cities and towns, palaces, villages, temples, mausoleums and manufacturing plants [20]. Focusing on the intangible cultural heritage, it had been defined by [23] as the practices that associated within communities as part of their cultural heritage which provides a sense of identity and continuity. For the purpose of the Convention, intangible cultural heritage undergo classification as shown in Figure 1.

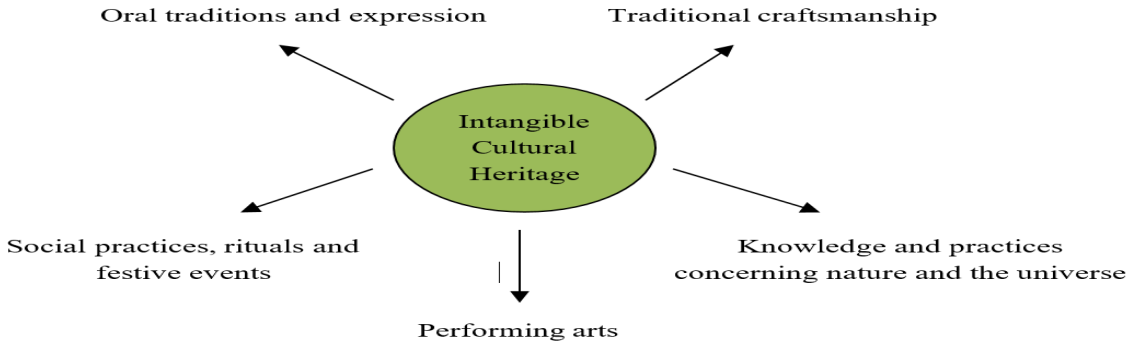

Figure 1: Classification of intangible cultural heritage from [23]

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The concern on intangible heritage as the cultural property that might extinct shows the need of protection. The evolution of international law reflects the major worries about all possibilities in losing our cultural traditions and local practices [3]. In [23] adopted the Convention for the Safeguarding of the Intangible Cultural Heritage as to solve the globalization effects on traditional cultures and to protect the world's cultural heritage diversity. Nowadays, the emergences of varieties digital technology are able to become one of the solutions to fulfil the important of preservation where the valuable resources are rapidly digitized into digital environment in the name of safeguarding. The cultural heritage is becoming digital heritage [7]. In [23] had clearly defined "digital heritage" as:

". . . unique resources of human knowledge and expression. It embraces cultural, scientific and administrative resources, as well as technical, legal, medical and others kinds of information created digitally, or converted into digital form from existing analogue resources.Where resources are "born digital," there is no format but the digital object".

Zapin

According to [11], Zapin is one of the few identification of an intellectual and creative tradition of the Malay Muslim community. Zapin is one of the traditional dances that had been formed fusing between Malay-Arabs people, which involved dance and music. Then, Zapin develop through the structural performances style including step patterns and dance motifs. It is an inventive idea where it has been influenced from the Indigenous population from Southeast Asian Islamic communities, in which various music and dances are created [17].In the old days, only males were allowed to perform the dance. As time passed by, female dancers are able to participate. Zapin used to be performed only for the religious ceremonies but through the years it has become a way of traditional entertainment within the society.

Figure 2: Zapin perform by male dancer

Figure 3: Zapin perform by male and female dancer

Since the coming of the Hadrahmi-Arab traders, Zapin had taken roots amongst Malay Islamic communities within the region and becoming the oldest traditional performance in the region of the Straits of Malacca. Zapin itself had been known with various names such as Dana, Zafin, Jipin and Jepin [1, 4-6, 10, 22, 27] in Malaysia, Brunei, Indonesia, Singapore and Southern Thailand. According to [16], Zapin had already become one of the most widely spread Malay-Islamic folk dance in insular Southeast Asia. In Malaysia, specifically there are two

types of Zapin, namely Malay Zapin and Arab Zapin (also known as Samrah). The main difference between these two types of Zapin is related to its dance and music.

There is three main structural parts of Zapin comprises of the opening part or known as *taksim*; the second part *kopak* which involve steps and varieties of dance motifs and lastly the closure part or *tahtim*. Dance in Zapin are divided into two positions, which are legs and hands. Legs in Zapin means footsteps movement with your feet and lower legs slightly closed. Most body position will move like waves. On the other hand, for the position of the hands of the dancers, the dance moves were motivated by the work done in everyday life such as motives to paddle, picking flowers meanwhile the right or left hand rests on the shoulders [9].

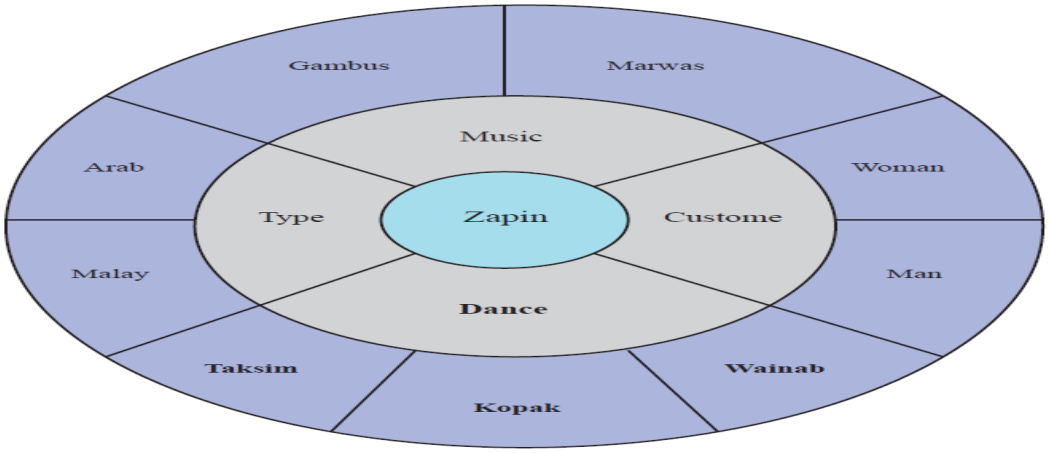


Figure 4: Zapin according to four main classifications

Zapin dancers have to master the basic steps of dance comprising of eight beat dance basic steps. Each of the dance basic steps and its correspond arm and hand movements is the most basic unit of movements. After the fourth count combined from both feet to become an eighth beat phrase forming step patterns, which are recognized as *langkah*in Malay [8, 17]. Step patterns build up dance motifs which are known as ragam in Malay [21]. There can be up to 23 dance motifs such as in the original Zapin Lancang Kuning, which still follows the dance rules accordance to the structural step patterns.

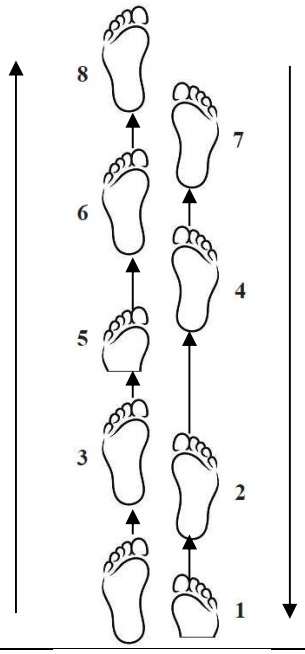
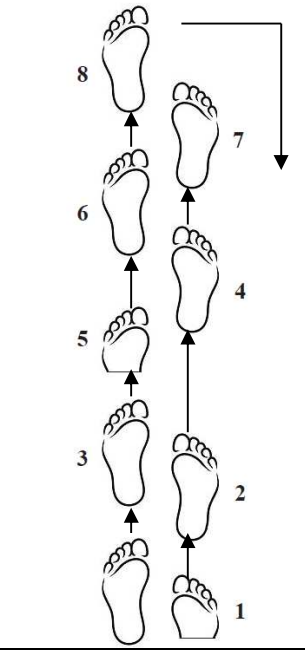
The basic movements in Zapin rely on how the dancer moves their legs and follow the steps according to the rhythm of the music. The time consumed to learn each *langkah*or step patterns may differ between individuals because it requires the capability and understanding to master the structural performance on basic steps of the dance that create each *langkah*. Hence, a zapin dancer must be able to master the grammatical units of each Zapin dance from the structural performance on basic steps to the varieties step patterns. Once the dancers are able to master the basic step patterns, hence they can dance according to the dance motifs within certain types of Zapin. There are many types of Zapin where each of it has their own story behind the dance motifs. Initiation of the dance motifs within each Zapin usually is based on daily activities that take place within communities.

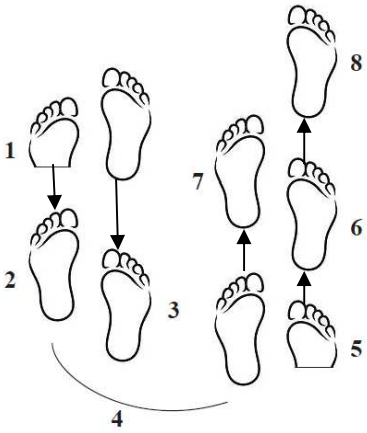
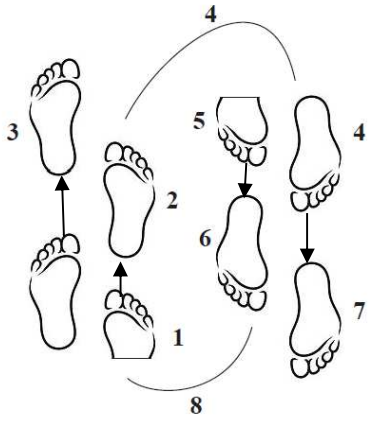
While the steps in each dance may only require the capacity of leg movement and coordination, it is totally a different situation for the arm movement and hand coordination where skills, knowledge and talent play a very important role in blending the whole gestures. In Johor, there are approximately fifteen Zapin that had been recognized such as Zapin Pekajang from Gelang Patah, Zapin Tenglu and Zapin Pulau from Mersing, Zapin Tanjung Labuh and Zapin Kores from Batu Pahat, Zapin Sri Bunia and Zapin Parit Mastar from Pontian, Zapin Dayung from Ayer Hitam, Zapin Lenga, Zapin Parit Bagan, Zapin Muar and Zapin Putar Alam from Muar (Noorariza, 2013).

In Zapin, the very first structural basic step patterns is known as *Langkah dasar dan mundur*. This type of steps involves the leg movement coordination either stepping forwards or backwards comprising of eight beat dance basic steps for each round. Then, the basic step patterns emerge and form another four structural basic step patterns known as *Langkah Maju Balik Kanan*, *Langkah Sut*, *Langkah Menyambar* and *Langkah Siku Keluang*. These four basic step patterns are by the expansion from *Langkah dasar dan mundur* as the leg starts to rotate 180 degree in order to create varieties dance motifs. In Zapin, usually on the first and fifth step, half of the feet are lift a little bit by the dancer. Meanwhile on the fourth and eighth step, bigger step movements will take place during the dance. Table 1 shows the description of each five structural basic steps patterns.

Table 1: Types of structural performance on basic step patterns [21]

Types of Structural Basic Step Patterns		Description

Langkah dasar dan mundur		- The leg movement coordination either stepping forwards or backwards comprising of eight step each.
Langkah Maju Balik Kanan		- The leg movement coordination comprising of eight step each. - The leg has to rotate 180 degree when stepping forwards or backwards on the eighth step.

Langkah Sut		- The leg movement coordination either stepping forwards or backwards comprising of eight step each. - The leg rotates 180 degree when stepping forwards or backwards on the fourth step.
Langkah Menyambar		- The leg movement coordination only stepping forwards comprising of eight steps each. - The leg rotates 180 degree when stepping forwards on the fourth and eighth step.
Langkah Siku Keluang		- *Langkah Siku Keluang* steps happen when the entire eighth step is been repeated for four times. - *Siku Keluang* been done three times when the repeated four times eight steps completely done by the dancer.

The Process of Recording Structural Performance Using Motion Capture

Accessing accuracy in the process of recording structural performance using motion capture (MoCap) means to record and digitize the movements of Zapin dance based on basic steps, while finding the important criteria in determining the accuracy of recorded movement. The recorded movement will be analysed as to observe how far the accuracy of the recorded movement can resemble the original Zapin basic step patterns. This process involves three main stages of workflow that follow sequentially from the pre-production, production and post-production process. Table 2 shows the descriptions on the stages of workflow involved.

Table 2: Stages of workflow in recording movement

Stages of Workflow	Categories of Technique	Process Involved
Pre-Production	Database Preparation and Organisation	- Data Archiving - Selecting Talents
Production	Recording and Digitising Movement	- MoCap Computation Process - MoCap Workflow
Post-Production	Matching, Synthesising and Synchronising Motion and Dance	- Data Clean Up - Developing 3D Character - Merging Character in Motion Builder - Video Editing - Sound Recording and Editing - Instrument and Costume Digitisation

The technique used in recording the structural performance on basic steps is one of the ways in accessing accuracy. According to [15], there are three techniques been used in the domain of computer graphics and robotics in order to blend between motion and music: (ii.) Matching music and dance, (ii.) Synthesising dance motions

given music, (iii.) Synchronising dance motion to music. Each technique comprises of their own features that can be extracted in order to compare the criteria that suit to be used in finding and gathering data. In the end, dance motion generation can be obtained based on the extraction on music features and motions features.

During dynamic body movement's activities, recording the human body movement using MoCap involve the capturing of subtle movement but visually significant ways such as bending, bulging, jiggling and stretching [19]. Special cases for the hands and face, cases for problem in animating hands because of their bony anatomical structure [2, 12] and face because the motion of a face cannot be reasonably approximated by rigid body motion (Guenter et al, 1998; Lin & Ouhyoung, 2005). In this research, Zapin structural basic steps movement focuses on capturing the accuracy movement, especially of the legs and hands.

RESULTS AND DISCUSSION

In this research, the researcher used passive optical MoCap system as the main tool in recording movement. This type of MoCap use markers coated with a reflective material in order to reflect light that is produced near the cameras lens. The camera's threshold can be adjusted so only the bright reflective markers will be sampled, ignoring the fabric and skin. Optical MoCap system is a very accurate method of capturing certain motions. A minimal optical motion capture system is based on a single computer that controls the input of several digital CCD (charge-couple device) cameras [18]. The advantage of the optical MoCap system is it can be extremely accurate. Plus, it is able to capture and produce more measurement per second [14]. The result of capturing a take on Zapin dance movement using MoCap is shown as follows.

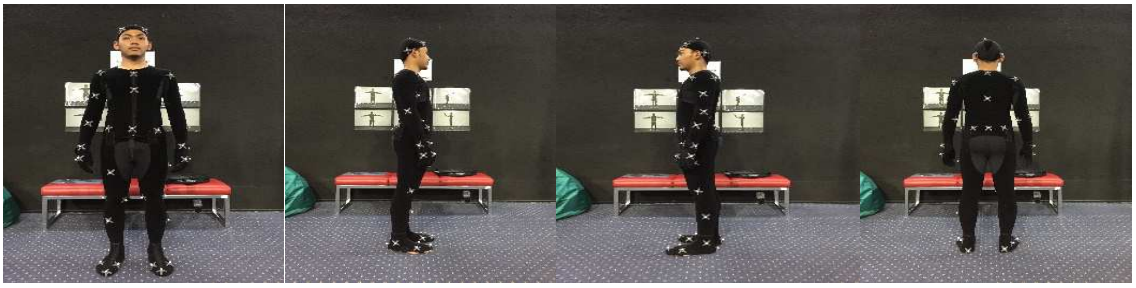


Figure 5: Suit wearing and marker placing

Figure 6: Real performance area

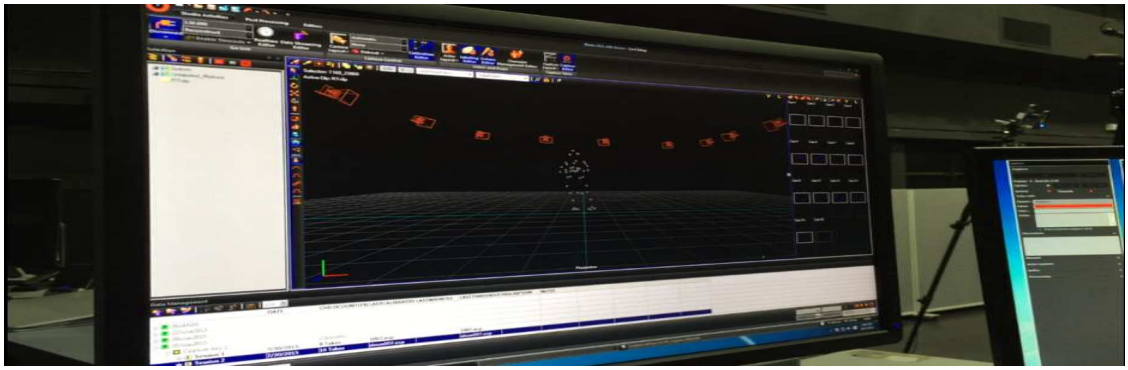


Figure 7: Production process

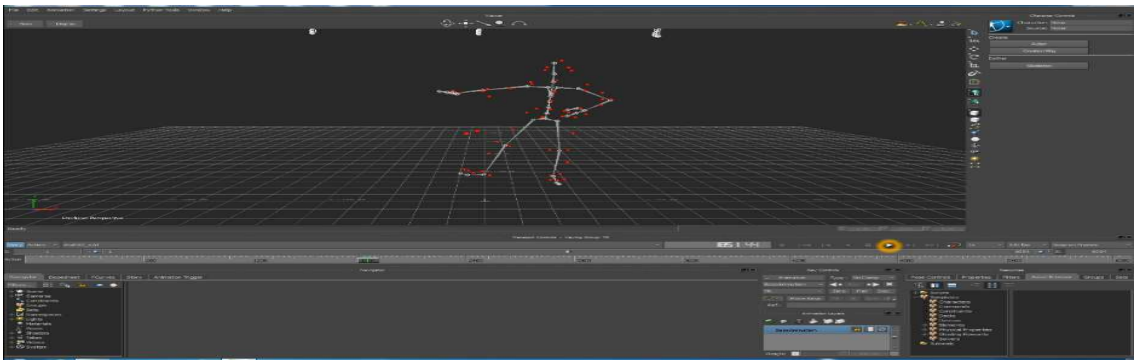


Figure 8: Post-production process

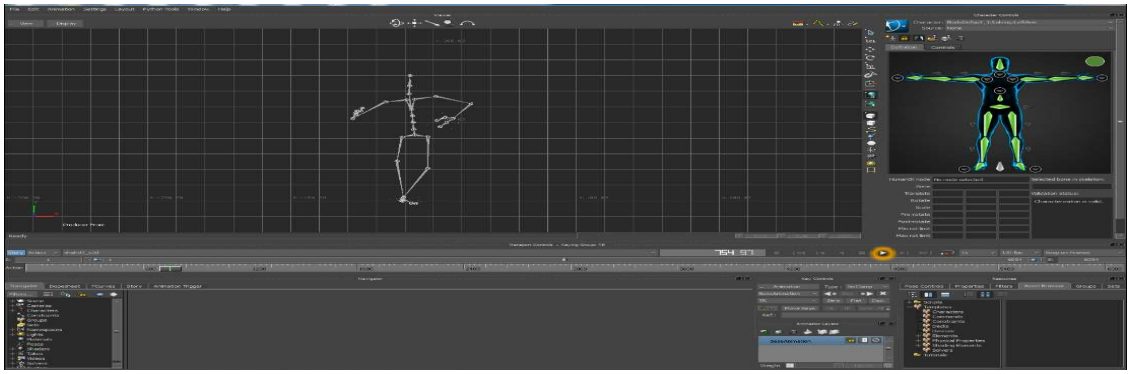


Figure 9: Data clean up

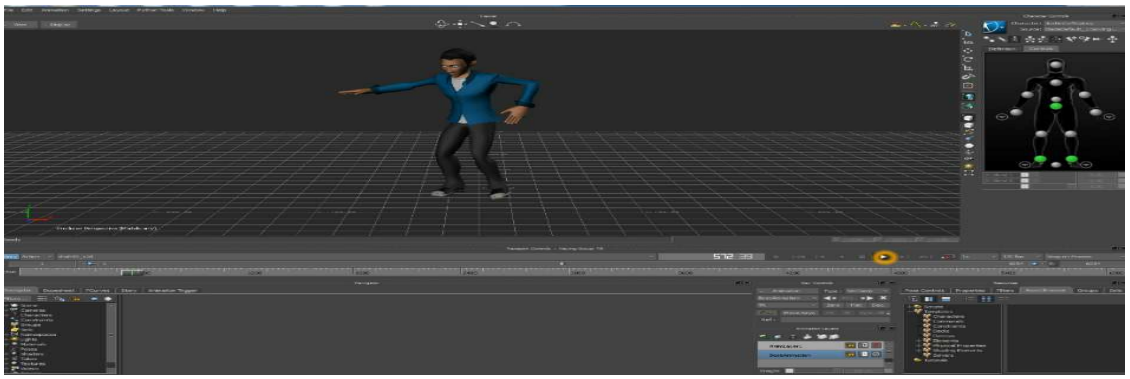


Figure 10: Merging character in motion builder

Pre-production is collecting of all required initial information. Stage of workflow that involves production process is the main steps in recording and digitising movement. MoCap computation process is where the capturing, extraction, reconstruction, labelling and computing take place [14]. The process that takes part after the computation process is the MoCap workflow. At this point, the major concern is related to the management of the whole system until the data can be exported to the post-production stage.

CONCLUSION

This research is to preserve Zapin dance through the advancement of digital technology via MoCap with the inclusion of three main processes of production including pre-production, production and post-production. Three main techniques are adopt as guidelines in accessing accuracy to record and digitise movement. As Zapin dance has its own unique structural gestures, the processes of production involved and techniques used could overcome the difficulties in accessing accuracy and help in recording movement.

It is important to know that the usage of digital technology in preserving our cultural heritage is one of the ways in keeping our legacy through the generation. Nowadays, digital cultural heritage itself is able to be comprehensive and effective to assist people in having awareness on the important to preserve our valuable belongings. On the other way round, digital cultural heritage do best in offering the opportunity for the learners to explore and experience themselves on how the advancement of digital technology can help in preserving our cultural heritage.

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