

QUALITY OF COMPUTER MUSIC USING MIDI LANGUAGE FOR DIGITAL MUSIC ARRANGEMENT

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ABSTRACT

The programming of MIDI language is a digital data which can be rebuilt and remodified to yield sound of musical instruments. In the arrangement of music, some concepts of the arrangements applied to get a better quality, not only good sound to be heard, but also less size of MIDI files. The criterion to get a quality of musical product can be developed some data. The questioner data from the expert people to asses the musical product with value range. The score then will be processed and converted into qualitatif data of Likert scale with Sturges approachment using average score.

Keywords: Data, Digital, MIDI.

1. INTRODUCTION

Usage of personal computer (PC) for musician is very useful when the known musical programming i.e. musical instrument digital interface (MIDI) has been named. This programming of MIDI is faced on the interfacing among digital musical devices for good audio qualities. The most significant problem due to the MIDI language is more wide sampling can lose the audio signal that can be reformed and modified. Digital data can reduce more storage data and more flexible when it does binary method. In addition the analog data which are stored in the storage media has some lacks and limitations like overdubbing or the capable of erased and restorage data and the high supplied cost.

Musical instrument digital interface (MIDI) has some advantages, i.e. MIDI file has size of 200 up to 1000 less than digital audio file, in some cases if the sound source of MIDI implemented has a high quality then the result will be heard more better than digital audio file, and length of MIDI file can be changed without changing musical pitch or tempo [e]. Observing of these problems using MIDI language, the musical arrangement can be done every time when the musical ideas occur while the arrangement planning is not raw enough. The first idea is how to interpret to ease musicians make musical creativities.

The research of [a] observed about the effect of computer on the music compose. In that research has shown that musician writes on the paper before implementing into computer programming because of digital media flexibility. Another research due to this paper done by [b]. He has shown that design and implementation of software sound synthesizer. From research of [f] also has been researched about the instrument of digital audio using microcontroller to get working of synthesizer. In this paper presents the usage of MIDI technology to control software synthesizer as sound provider. The difference of this paper with other researches mentioned previously is view point of the usage MIDI technology to produce a musical composition from the beginning plan until providing ready product.

2. THEORETICAL BACKGROUND

2.1. MIDI

Musical instrument digital interface (MIDI) is a language of communication and specification to process an interfacing between software and hardware of digital music. It means that the MIDI also controls computer performance and other equipments in order to get bidirectional communication in the network between a keyboard and another keyboard, keyboard and sound module or other MIDI instrument or interfacing with personal computer (PC) [d].

MIDI is a communication standard developed in the early 1980s for electronic musical instrument and computer interfacing. MIDI is a musical language known in the digital music world. Obviously MIDI is suite for communication between MIDI instruments and not suite for playing with personal computer only. But personal computer used to support musical editing and processing.

MIDI works on some basic commands, i.e. command to identify a notation, command to choose timbre, and command to control. The commands of general MIDI are note on, note off, velocity, aftertouch, pitch bend, program change, control change, and system exclusive. Tool or instrument told as MIDI instrument if the device can transmit, receive, or both of MIDI commands. Some instruments which are supporting MIDI this day are keyboard, piano, guitar, guitar effect, machine drum, electric drum, MIDI flute, sound module, and sound card. Some instruments including acoustic instrument can transmit MIDI commands using MIDI converter.

2.2. Computer Music

Computer music has a meaning on the usage of computer in the musical field. Computer can be applied on the musical field using a special software that is created to do a process known as a software sequencer. The software sequencer is a tool that has a capability to recording, editing, and replaying arranged song using multi-instruments. The sequencer has three types i.e. stand alone sequencer, software sequencer, and internal sequencer. The data of each musical instrument included using MIDI language, thus arranged sequential to create a synchronous musical composition. The software sequencer basically is a software that is capable receiving and processing MIDI data. The MIDI data contain of a set of commands that will instruct to generate sound at such tone level.

As a tone generator or sound generator, MIDI can be formed as a hardware or a software in the form of plugins that contains of audio data from original instrument recorded in the sampling method or from sound synthesis that manipulated such a way to be same as desired musical

instruments. In nowadays, familiar sound generator in the form of software is cheaper and more practice and some of has a better quality from sound generator than hardware. Sound generator in the form of software being favourite choosing because editing facilities used widely and more flexible than using hardware-based. Capacity of hardisk is bigger and computer specification used to running sound generator software has to be highly specification, especially in the side of processor and memory.

2.3. Musical Arrangement

Musical arrangement is a step done by musician to create felling situation of musical creativity. Developing a music in the beginning is a melody notations being music with rhythm of pop, jazz until orchestra following available musical theory. Musical arrangement aims to express esthetics creativity (absolute music); illustrate art science for movie illustrating, dance accompaniment, and poem illustrating; callisthenics accompaniment; ceremony accompaniment; therapy accompaniment; education media and so on. Each function has consequence due to the elements of music i.e. rhythm, tone, harmonization, tempo, dynamic, timbre, form, and expression.

Each musical instrument has different sound characterization of each musical instrument, ambitus or tone range of each instrument is also difference. This can effect on the playing method and style. Capability of note precision valued by notation placement and note duration. The notation placement based on ambitus or tone range of each musical instrument. The note duration due to the quantize or notation tidiness. Notation has such value, i.e. full note, half note, quarter note, eighth note, and sixteenth note. From the side of rhythm or beat, usually produced by drum instruments and bass, so it emerges groove, spirit, or soul of music song.

The good music is appeared from the composition side and arrangement supported by good quality of sound. A good quality based on some factors, i.e. output power, signal-to-noise ratio (SNR), frequency and stereo. Output power measured by unit of decibel (dB). A good sound loudness is when the sound not reach

at the peak level or cracked sound. A signal-to-noise ratio measures noise value that occur on the audio recording at value of -90 dB. Frequency needed to measure sound quality based on the human hearing at three categories of low, mid, and high [c]. Range of low sound level is about 50 Hz upto 310 Hz, range of mid sound level is about 310 Hz upto 12 kHz, and range of high sound level is higher than 12 kHz. Stereo could be produced by difference two speakers with panorama position setting.

3. RESEARCH METHOD

In this paper observes development of music arrangement using MIDI. The research method in this paper is research and development (R&D). Research and development is a process or method to develop a novel product or completed available product, so it has a valuable meaning on the productivity. The basic of development model concerned on some factors, i.e.:

- Musiciant can consume much time to get a better musical arrangement
- Consumed cost of musiciant more efficient due to the usage of instruments
- Quality of product can be useful for the audiences and can be a good quality standard
- Less production cost for huge scale and more significant

In the arrangement of music, some concepts of the arrangements can be done to get a better quality, not only a good sound to be heard, but also less size of a digital audio files of MIDI. Some steps that can effect on the quality of music product is written on below :

- Determining arrangement goal to get a suite object to be implemented with concerning on condition, age, and other parameters
- Determining used instrument to produce a best sound
- Writting a notation to memorize steps of idea, so it can be traced back
- Developing sound and audio
- Synchronizing harmonisation of sound and audio instruments
- Finishing detailed arrangement
- Hearing arrangement product

- Feeling and taste a rhythm of music sound

From these steps need a validation evaluated by the men expertising on a musical and multimedia.

In this paper, the assesment for music arrangement quality data using MIDI is a view side of the quality component in the harmonization, notation, sound quality aspects. Each quality component is figure out of the description below, i.e.:

1. sound quality consists of sound and stereo qualities; noise reduction; bass, drum, electric guitar, piano, string sound, and electric piano characters; and over all of natural sound.
2. Notation tidiness consists of suited rhythm sounded from bass, electric guitar, acoustic piano, string, and electric piano instruments.
3. Harmonization consists of suited bass, drum, string, acoustic piano, electric piano and electric guitar instruments.

The criteria to get quality of musical product can be developed some data. The quesjoner data from the expert people to asses the musical product with value range from 1 to 4 with category of less, good, better, and best respectively. The score then will be processed and converted into qualitatif data of Likert scale with Sturges approachment using average score. The interval of each category, γ , shown by equation 1.

$$g = \frac{Range}{Category} \tag{1}$$

The example of the interval of equation 1 can be implemented from the case as follows, if the maximum score is 4, the minimum score is 1, so the range is 4-1 = 3 and the number of category is 4. Thus the interval yields 0.75. The conversion of quantitative data into qualitative data shown by tabel 1.

Table 1. Conversion of quantitative data into qualitative data

Score	Value	Score Interval	Category
4	A	3.25 - 4.00	Best
3	B	2.50 - 3.25	Better
2	C	1.75 - 2.50	Good

1	D	1.00 - 1.75	Less
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The product value in this paper is enforced in the value of 'B' as minimum category, so the product of musical can be marked as feasible.

4. RESULT AND DISCUSSION

The suggestions of the expert of multimedia for revising a musical product have some meaning that the assesment can be used as expert judgement due to the sound quality of musical product. The data of expert judgement about the sound product quality can be known by average score shown on table 2.

Table 2. Sound Quality Aspects

Criterion	Frequency	%
Best	1	10
Better	5	50
Good	4	40
Less	0	0
Total	10	100

The assesments of musical done by musical expert are notation tidiness and harmonization. The validation data of musical expert done using Likert scale questionnaire. In addition, the implementation, musical expert has tried to use and observe product to give suggestions and comments relating to the notation tidiness and harmonization. In the validation of implementation process, musical expert asked directly about the musical product that is being development process. The questionnaire data that was assesing by the musical expert due to the notation tidiness are how the sound of tone from the bass, electric guitar, accoustic piano, string, electric piano, and playing natural instruments. The result of this data can be shown on the table 3.

Table 3. Notation tidiness (NT) assesment

Number	Indicator	Score	Criterion
1	Bass	3	Better
2	Electric guitar	3	Better
3	Accoustic piano	3	Better
4	String	2	Good

5	Electric piano	2	Good
6	Playing natural	3	Better
Score Total		16	
Score Average		2.67	
NT quality		Better	

From the table 3 shows that the sound quality of notation tidiness has score average of 2.67 that is in range of 2.50 until 3.25, so the category is better. For the result data of harmonization aspect from the expert musical shown on table 4.

Table 4. Harmonization assesment

Number	Indicator	Score	Criterion
1	Bass and drum	3	Better
2	Electric guitar	3	Better
3	Accoustic piano	3	Better
4	String	3	Better
5	Electric piano	3	Better
Score Total		15	
Score Average		3	
Harmonization quality		Better	

From the table 4 shows that the sound quality of harmonization has score average of 3 that is in range of 2.50 until 3.25, so the category is better. Beside giving an assesment of musical quality, the musical expert also giving a suggestion to properness due to the result assesment to be used as product trial. The results of assesment of both notation tidiness and harmonization can be determined the average criterion. The conversion table of quantitative data into qualitative data using scale 4. In addition detailed, from the notation tidiness of 6 categories presents quality indicator of better 66.67% and good 33.33%. From the harmonization of 5 categories presents quality indicator of better 100%. The trial product used to get empirical proofs about limited product, mistaken identification, and product revision. The trial data result analyzed, thus used as revision to be developed. Some comments of the musical product that have been created are good sound quality, no noise, low horn sound, and less bass sound character.

5. CONCLUSION

In this paper, musical product or development that used MIDI technology has 11 steps, i.e. determining arrangement goal, instruments identification, writing notation, recording each instrument to the software sequencer, developing fillings, harmonization synchronous, editing each instrument, hearing arrangement, giving special effect, mixing, and finalization for CD audio standard. For computer music, the sampling factor must be considered to get a better sound quality, but it can make a large file size in the storage.

6. REFERENCES

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