OPTIMIZATION OF MIDI SYNTHESIZER
ON THE ILLUSTRATION OF MOVIE MUSIC

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ABSTRACT

Optimalization of movie music is very needed nowadays in the movie production. One of the challenges is how to make a movie with a good quality of music background. In this paper presented a Musical instrument digital interface (MIDI) synthesizer as an interfacing process among digital music devices. The tools implemented to form MIDI for optimization of movie music are Cakewalk Sonar 6 Producer Edition, Steinberg WaveLab and Adobe Premiere Pro. The main methods used are: setting MIDI device and converting it into audio data; making dubbing and voice over; making audio mastering; and combining audio and video data.

Key words: *Digital, Movie, Music.*

1. INTRODUCTION

In the management of movie-making processes, a good movie can't be separated with a good music background. But, in this business model often turns out to be an expensive and time-consuming. So, a generative music protoptyping tool can support media producers (Rubish, 2001). In the music area whether on the stage or behind the scene needs, the usage of computer rarely can't be ignored. The computer as human's interfacing device is the most media usage for today and it had effected of human interesting for the exploration and for the simplicity in the better human efforts. The movie music periods in the film industry are separatable into 4 parts, i.e. music and the silent film (1894-1927), music and the early sound film (1894-1933), music in the classical-style hollywood film (1933-1960), and film music in the post-classic period (1958-2008) (Wierzbicki, 2009).

The musician, composer, music arranger and editor use the computer to function it well in their jobs to be more efficiently and less-cost. The musician using komputer to make effort on good quality of sound of music because the emerging of computer technology made the development of software especially in the world of music,

music programming language, known as musical instrument digital interface (MIDI) is more easily to produce a characteristic of music sound (Wibowo,-). Before the development of the computer is very rapidly using in the music, composing music whether for movie scoring (illustration of film music) or popular-recorded music (tape recording) has high-cost for the real music instrument, the music player and the large studio. In the other-side, recording into the analog media has functionality boundary, i.e. overdubbing problem or capability tape to be erased and to be re-recorded and the tape supplied is very high-cost. The musician must have a good quality and synthesis of sound instruments like piano or violin.

Performance musician on the stage needs a lot of tones and sounds that can be reached not only one instrument, but also a lot of big and heavy instruments. That's way, there is an era that people don't need to arrange or compose music easily without a huge instruments for popular music or film music. But not all of live music players can play all instruments on the stage.

The paper of (Duane, 2009) presented a new system of separating streams in musical pieces encoded as MIDI files that have methods to divide the music under analysis into short segments which analyzed using

constraint satisfaction optimization relating to sequence alignment algorithm. In the other-hand, feasibility errorness could be happened in the input, process, and output of systems due to harmony level of both hardware and software (Purwacanda, 2011). In this paper discussed how to design film music illustration efficiently and effectively; how to implement computerize system of the illustration of film music on the stage; and how to reach low-cost production of film music with a good quality and less tools or softwares.

2. THEORETICAL BACKGROUND

2.1. MIDI

A Musical Instrument Digital Interface (MIDI) is an interfacing process among digital music devices e.g. interfacing process between a keyboard with another, keyboard with sound module or MIDI instrument to interfacing with personal computer (PC).

In the early 1983 almost all of keyboards was completed with microprocessors. A microprocessor is used to translate key pressed that of producing sound of tone and timbre. The fabrications have own-standardization to program microprocessor implemented for MIDI. In that case, for being intercommunication of devices, the players should use the devices from the same fabrication. If the player use two device that aren't same fabrications, it could be happen the addresses MIDI is different. Example a keyboard A has MIDI address of 001 for piano and another keyboard B in its address for bass sound. This problem can make difficulty for musician to generate tones. Until 1990s, MIDI manufacturer association made a MIDI standardization known as GENERAL MIDI (GM). Nowadays the development of GENERAL MIDI is in level 2 known as GM2. The standardization is more easily for musicians to generate tones when the devices attached GM/GM2 standardization (Heckroth, 1995).

MIDI doesn't like audio compact disk (CD) or MPEG-1 or MPEG-2 Audio Layer III, also known as MP3. MIDI message contains of instruction to play a specific note on an instrument, so it could be changed one note at a time. The placing of instrument individually could ease to do solo or mute per channel. Another benefits of MIDI are written below as:

a. It could play complete music composition
   The musician can play alone with not only two instruments but also many instruments e.g. at the same time the player can play piano sound stacked or layered slow-string. Supporting of the files MIDI standard and many tones made in the extension format of SMF, the musician plays as a complete band or an orchestra e.g. bass, guitar, drummer, string and brass sections. If the music escorts a singer, it would be easier to change the tones steps and it is very helpful on the live performance of single organ player.

b. It could play a different music instrument
   MIDI is applicable on the various of instrument. General MIDI has been declared 128 sounds and 9 drum sets as standard of each MIDI instrument and development more specific sound types. Gamelan (javanese instruments) can also be played easily like latin percussion or chinese intruments.

c. It could record and edit musician playing
   MIDI is recordable with sequencer supporting and then the recording replayed to listen as evaluation and editing. The result of editing could be perfect, but for specific cases, do not edit the result of MIDI until suite because it sounds awkward and no human feel. It isn't like sampling, when a tempo is slow or fast, it will cause strident followed pitch changing. So, if the music need fast and hard, it is more easier to slow the tempo. After recorded, the tempo could be normalized.

d. It could arrange and compose music
   A music arrangement is not always done the real musician to talk about the music arranging in the studio or practice room, but music arranging is more easier done MIDI technology. Making of music guide for recording also can be done MIDI that has less file size to be sent via e-mail. The song is recordable easily and added with sequencer and some filters or music instrument ornaments might be applicated to reach a good quality compositions.

e. It could form musical score

After musical arrangement and composition-making processes, the next step is to form musical score using notation printing software that will translate MIDI commands from musical arrangement composition of MIDI files into notations.

2.2. Movie Music

Nowadays the growth of digital music is very rapidly. The recommendation of music has been investigated and analyzed due to the emotion (Kuo, 2005). Music was a vital part of the exhibition, performance, and experience from the beginning. Movie music literature is a strange hybrid, whether movie studies or musicology gives attention to movie music. Movie music studies have continued to protest loudly the neglect, while movie music and musicology have been largely uninterested in movie music. It might be the greatest challenge to the study of film music is finding a harmony between technical analysis and meaningful interpretation. Analysis without interpretation is fairly sterile exercise, in the other-side, interpretation without proper analysis easily becomes an exercise in self-indulgence (Stilwell, 2005).

The contribution music to a movie is to realize and to deliver the message of a movie to the spectator. Music can create more convincing situations of the time, place, feeling, and plot of a story. The study of film music has growth rapidly in the last three decades followed by strong discipline informed by film and cultural as well as musicological studies. The description of the gap between aural and visual sections of film perhaps cause of its rapid-growth, so both film music and film studies have revealed one overlapping area of interest and research as film sound. The limitation between music and sound design is becoming increasingly fuzzied in modern film (Kulezic, 2012).

3. RESEARCH METHOD

3.1. Application Tools

In this paper presented tools implemented on the optimizing of MIDI synthesizer that are cakewalk sonar 6 producer edition,

Steinberg Wavelab, and Adobe Premiere Pro. Cakewalk sonar 6 producer edition is a software developed Twelve Tone System, it was known as cakewalk pro audio. At that time, variant of last cakewalk pro audio is at version 9, thus stopped and renamed into cakewalk sonar. Sonar is usually used as software synthesizer and multitracker also. Steinberg Wavelab is a software developed Germany and used as mastering software. Adobe premiere pro is a software developed Adobe System to merge audio and video data. At the beginning called adobe premiere until version 7, thus released adobe premiere pro and started from version 1. Although adobe premiere pro version 1 was called adobe premiere version 8.

3.2. Methodology

In this paper presented an implementation of an illustration of music that the application software used is cakewalk sonar 6 producer edition as software of synthesizer and multitracker. The main steps are written below:

1. Check "store project audio in its own folder" to save project on chosen location,
2. Import video to be illustrated,
3. Open synth rack as synthesizer software, cakewalk TTS-1, but in this paper the soft synth also used from third party i.e. Edirol Orchestral and Super Quartet. Soft synth uses capabilities of processor, so many soft synths used, the processor must work hardly.
4. Setting track used is track MIDI that owned sonar 6 are audio and MIDI tracks. The system setting contains of tune master, key-shift, and maximum polyphony. The setting of master tune standard is 440.0 Hz, key-shift is 0, and the maximum polyphony standard is 48 to 128 voices. Polyphony is capability to generate multi-sounds at a time.
5. Set MIDI device and convert into data audio. For being connected among MIDI devices, the MIDI devices has to be synchronoused on the each setting. The settings of MIDI contains of MIDI inputs and outputs.
6. Make dubbing and voice over
7. Make mastering audio
8. Combine, mix and filter an audio and a video data

The most important in this methodology aspects is how to involve in tones and know about the terms of music, beside of knowing the application softwares.

4. RESULT AND DISCUSSION

The result of making an illustration of movie music is MIDI files produced Sonar 6 software that gives commands to the software synthesizer as sound generator. The result is displayed on the event list that shows events on the MIDI data, e.g. the events of key pressed, when have to press pedal sustain, use pitch bend or modulation. The event list shows what the track does and each row shows one event. Some parameters used are Trk, to show track number; HMSF, to show event position in the format hour:minute:second:frame; and MBT, to show event position in bar:knock:tick. The control number resulted is shown table 1.

Table 1. Types of Known Control Number

Control Number	Control Name
1	Modulation
5	Portamento Time
6, 38	Data Entry
7	Volume
10	Pan
11	Expression
64	Hold 1
65	Portamento
66	Sostenuto
67	Soft
69	Hold 2

In this paper presented a MIDI data displayed on piano roll is functioned to perform one track only. The performance of piano roll is shown figure 1.
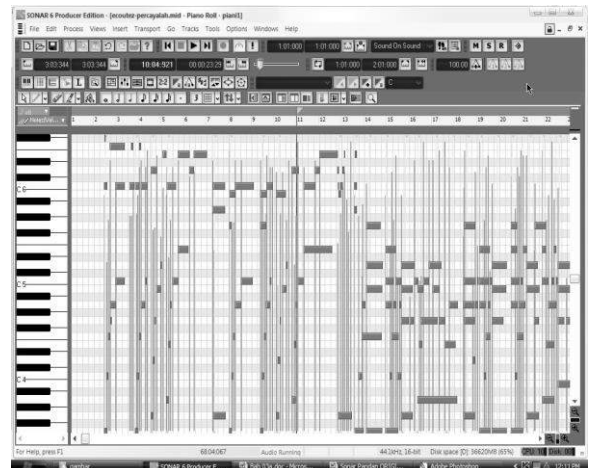

Figure 1. Piano Roll

In the figure 1 shows low-high and position tones. The vertical lines are signs to know controller and velocity values, so easily to switch notations by shifting nodes up-down based-on piano keys.

Testing of illustration result of movie music is used audio data. Sound of illustration of MIDI data is still jumping but it isn't too significant, because jumping could be happened when processor is overload. The file size of MIDI is small only 17Kb, but the result of illustration is more realistic when it uses synthesizer hardware professional and has size of the audio file is about 128Mb.

The edirol orchestral has seven classifications of sounds, i.e. string section, solo string, brass section, solo brass, woodwinds, key and percussion, and rhythm sets. It also has an user-desired menu style of orchestra composition as shown figure 2.
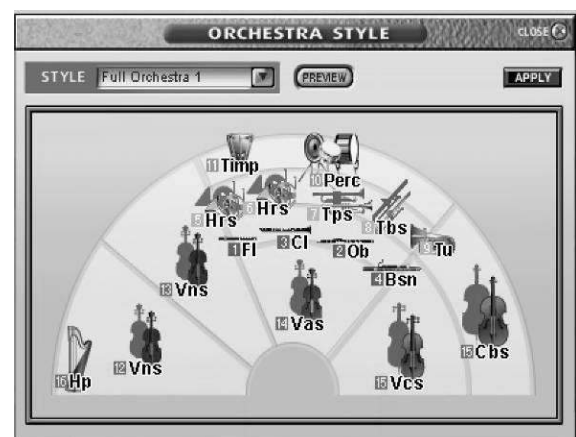

Figure 2. Orchestra Composition Style

The features of edirol orchestral have fourteen orchestra styles from full orchestra, piano quintet, and marching band. For the track settings are more completely than others, because there are .settings of velocity and pitch bend ranges. The velocity feature is used for loud sensitivity or weak key-pressed, while the pitch bend feature is a controller to change pitchs.

After yield of MIDI music illustration, it has to export into audio data. Note that sound is produced soft synth that receive a MIDI commands. In this paper the audio data are exported into broadcast wave that has channel format of stereo, sample rate of 44.100 Hz and 16-bit.

For some movies uses dubbing or voice over. Sonar 6 as a multitracker software supports recording of MIDI and audio. There is a different between dubbing and voice over. Dubbing is process of re-recording of actor/actress talks because some factor e.g. shooting situation is too noisy and not clearly of actor/actress dialog or there is a different language or dialog changing. Mean-while voice over is process of recording a dialog e.g. as a third party telling about actor's/actress' minds.

An audio mastering is done to same a level of each illustration. The master effects need to do and also frequency and fading settings. An audio mastering is done by WaveLab made of Steinberg. The first mastering is to load music illustration audio or dubbing data. WaveLab opens one stereo audio data only, because it doesn't support multi-track. A global analysis is used to know higher level of audio data. The ideal measuring uses a root-mean square (RMS) in unit of decibel that has maximum standard about -6dB. If not reaching -6dB, must be increased its Gain. Master effects used compressor, magneto, and gate. After set all parameters of each effect, next process is rendering audio data. Thus, when audio level is same, the mixing of audio and video data can be done by adobe premiere software.

5. CONCLUSION

MIDI has a small file size than original sound file, because MIDI is saved in the format of instructions. The bigger and the complex one is only 56Kb of music composition with duration up to 3 minutes. An editing of MIDI is more simple to erase parts that aren't used and more precisely to erase based-on data types on the event list. Sound quality resulted depends on sound generator. In the other side, not all of music instrument sounds are same as original instrument sounds, because sound modules are result of sampling and not all of music instruments is sampled perfectly.

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