

ALGORITHMIC ORCHESTRATION WITH CONTIMBRE

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1. INTRODUCTION

conTimbre [1] is a database project for the sound of the contemporary orchestra. It has been published in 2012 and comprises recordings and documentation of more than 86.000 sounds for 158 orchestra instruments and more than 4.000 playing techniques. Within this, more than 20.000 woodwind multiphonics are recorded and documented. The aim is manifold.

It offers a web browser based software called „conTimbre learn“, which allows the student of composition or instrumental musicians to learn about the playing possibilities of the contemporary orchestra. It includes a search function to search sounds by a series of parameters.

The "conTimbre Orchestrator" is a MAX [2] based software which allows to simulate orchestral chord situations. The user can edit a virtual orchestra, select instruments, playing techniques and pitches (including microtones) or versions for a certain playing technique. Notation graphics including fingering schemes or special notations are presented. The user can ask for detailed text and photo documentation.

The conTimbre orchestrator can load orchestrations from disk which may be calculated through a CommonLisp interface.

The „conTimbre ePlayer“ is a MAX based sampler with which it is possible to play contemporary scores from commercial score editors by MIDI. It is also possible to play on the ePlayer by MAX messages or through OSC from controllers like Supercollider.

2. ALGORITHMIC ORCHESTRATION

The conTimbre database includes a CommonLisp library which creates orchestrations. The orchestrations can be loaded into the „conTimbre Orchestrator“.

The library runs on Mac and needs the installation of the freeware Steel Bank Common Lisp [3]. On startup,

the whole conTimbre database metadata are loaded into RAM. These metadata include

- file names,
- instruments,
- playing techniques,
- comments,
- pitch information,
- spectral envelopes,
- attack times,
- partial series,
- and others.

3. ORCHESTRATION RULES

An important application for this library is the simulation of real orchestral situations. In real orchestral situation, orchestration rules have to be considered. Some orchestra instruments can play several notes at a time, some others not. Real musicians can change their playing technique within a performance only within limits.

For this reason, an orchestration rules module was developed. It divides orchestration rules into two different types.

3.1. Vertical rules

Vertical rules deal on restrictions or possibilities of real instruments within a static chord.

Empirically, the behaviour of instruments was analysed, and groups of instruments were built which obey the same rules.

3.1.1. The one-sound rule

This is the most simple rule and means, that an instrument can just play one sound at a time of this kind. This rule applies generally to woodwind and brass instruments.

3.1.2. *The glockenspiel rule*

This rule applies typically to the glockenspiel, but also to other instruments like piano and marimbaphone. It means, that the instrument can play a certain number of sounds at same time, but they should be of the same playing mode. The number of sounds to be played in parallel depends on the instrument, and also the pitch ambitus of the chord to be played. E.g., a marimbaphone can play up to 4 pitches at same time using a set of 4 beaters in two hands.

3.1.3. *The strings rule*

A special case is the rule for string instruments. String instruments playing *ordinario* or techniques similar to *ordinario* can realise two sounds on adjacent strings (double stops). When playing double stops, there is a restriction on the pitch choice. Stops positions should not be too different as the hand span may not be sufficient.

3.1.4. *Detailed rules*

For some instruments, more detailed rules are required. The glockenspiel rule needs to be precise on the pitch ambitus, as for example the piano chord cannot exceed a certain ambitus because of the size of the hand. In the case of the piano, this rule only applies to *ordinario* too. In the case of special playing techniques like guiro effects, only one guiro sound can be realised on the piano at same time.

3.2. Horizontal rules

Horizontal rules deal on restrictions within a temporal sequence. Generally, there is only one kind of this rule, ie. the mutual exclusion of two different playing technique without any time interval.

This kind of rule has to be examined for each instrument family individually. In the following, some examples are given.

3.2.1. *brass instruments.*

Different kinds of mutes in a sequence need a certain time interval to change the mute.

3.2.2. *Percussion instrumentas*

Different beaters cannot be changed without a pause. An exception is that different beaters can be hold in the hands.

3.2.3. *Piano*

playing modes with preparations on strings may not be mixed with playing modes without any preparation - at least for the same string.

3.2.4. *All instruments*

Playing techniques with a dismembered instrument cannot not be mixed with playing techniques using the normal instrument.

4. REFERENCES

- [1] conTimbre database project.
www.contimbre.com
- [2] MAX/msp. www.cycling74.com
- [3] Steel Bank CommonLisp. www.sbcl.org