An Approach to Spatio-temporal Computer Music

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Contents

1. Introduction 2

2. Background Discussion
2.1 The Limitations of Loudspeakers 2
2.2 The Stereo Sound Image 4
2.3 The Spatial Illusion and Listening Culture 4
2.4 Alternative Loudspeaker Configurations 6

3. Spatio-temporal Possibilities
3.1 Space as a Musical Parameter 8
3.2 Rationale for the SNet project 8
3.3 Spatio-temporal Models 8

4. Biological Neural Networks
4.1 Spatio-temporal Behaviour in the Brain 9
4.2 Neurone Function 9
4.3 Neural Networks as Complex Systems 10

5. The Adaptation of a Neural Network in SNet
5.1 Connectionist Networks 10
5.2 Node Function 11
5.3 The Network Structure 12
5.4 Operational Overview of the Software 13
5.5 The Software Architecture 14

6. Design Details of the Nodal Network
6.1 The Nodal Network Design 14
6.2 Weighting Modification 15
6.3 Triggering and Non-triggering Inputs 17
6.4 Response to Global Activity 17
6.5 The Operation of the Three Modification Functions 18
6.6 Initial Weighting Modification 19

7. Design Details of the Note Generator
7.1 The Operations of the Note Generator Module 19
7.2 A Flocking Model 20

7.3 The Flocking Algorithm 21
7.4 The Behaviour of the Flocking Algorithm 22

8. Conclusion 23

9.1 Equipment and System Requirements 26
9.2 Overview 26
9.3 Number Boxes and Sub-menus 26
9.4 Trialing the Program 26
9.5 Setting the Starting State 27
9.6 Input Section 27
9.7 Network Section 28
9.8 Note Generator 30
9.9 Output Section 31

10. Appendix 2 – Examples
10.1 Preset 1 33
10.2 Preset 2 33
10.3 Preset 3 33
10.4 Preset 4 33
10.5 Preset 5 33
10.6 Preset 6 34
10.7 Preset 7 34

11. Appendix 3 – Max Patch Examples
11.1 Cycle 1 35
11.2 Cycle 2 38
11.3 Clock 39
11.4 Flocking Algorithm 39

Acknowledgments 43

References 43
1. Introduction

There is now a vast array of electronic devices available for the creation and organisation of sound. However, no matter what equipment is used, electronic music has, in the large majority of cases, only one actual instrument - the loudspeaker. This instrument is remarkable in its ability to create an enormous range of sounds. In fact so much so, that loudspeakers are often wrongly assumed to be able to create, or reproduce, any sound at all. For musicians and composers, loudspeakers tend to become conceptually invisible in the creative chain. This is despite the fact that loudspeakers do have limitations and these limitations strongly influence the type of music created for them.

For composers in the early days of electronic music, loudspeaker technology might have been seen as a means of liberation from the restrictions of acoustic instruments. They could produce sounds with dynamic, and frequency ranges far greater that what was possible with acoustic instruments. However while loudspeakers have many advantages, it became apparent, during the development of electronic music, that they are inferior to acoustic instruments in the way that they render sound as a spatial event. To many listeners, sound heard via loudspeakers does not seem real. It does not seem to live in acoustic space in the way that sound from an acoustic instrument does. This may be one reason why many musicians in the academies and elsewhere limit their musical practice to traditional acoustic instruments despite the enormous popularity of electronic music.

By way of a background discussion, this paper will cover the issues raised above, and outline some approaches to sound spatialisation using loudspeakers. This discussion will provide the rationale for the SNet software project that is the main focus of the paper. SNet is a program, designed using the "Max" programming environment, to generate spatio-temporal music. In this context, spatio-temporal music refers to music in which the spatial position of sound, in a multi-speaker sound system, is considered as one of the primary compositional parameters. The software consists of a connectionist style network of nodes. This network has been designed to mimic some aspects of the behaviour of biological neural networks, in order to create spatio-temporal coordinates in real time. The discussion of the software will include the function and design of the software, and a discussion of its behaviour.

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1 Loudspeakers are also acoustic instruments, however in common practice they are considered differently, possibly because the generative facility is electronic.