Musical Games: Exploring Music Improvisational Composition Through Game Theory

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1 Introduction

In *A Model of Performance, Interaction, and Improvisation*, Paul Hudak outlines a formal model of music performance and improvisation based on the idea of *mutually recursive processes*. This model lends itself to an form of algorithmic composition by an application of game theory - treating engaged processes as players in a game where the currency is manifested as musical aesthetic, the rules of the game specify the allowable moves of a player given all possible game situations, and a player's strategy is a (non-deterministic) algorithm for playing the game.

We plan to implement a simple, two-player musical game using the embedded language Hagl, a domain-specific language for defining and exploring game theoretic experiments.

2 One-sentence description

Model and implement interactive music composition as a two-player cooperative game.

3 Project Type

Originality + Technical depth

4 Approach

What is your approach and why do you think it's cool and will be successful?

List the techniques of the project e.g. The three steps of the project are:

1. First technique/approach
2. Second technique/approach

5 Best-case Impact Statement

In the best-case scenario, what would be the impact statement (conclusion statement) for this project?

What are we looking to achieve? What's the conclusion?

6 Major Milestones

1. Become familiar with Haskore and Hagl – experiment with music generation
2. Have a well-defined (coded) definition for moves (i.e. sequence of time-stamped musical events).

   $\mathbf{r_1 = instru_1\ (player_1\ s_1\ r_1\ r_2)}$

   $\mathbf{r_2 = instru_2\ (player_2\ s_2\ r_2\ r_1)}$
3. Have some sort of quantification of payoff; quantify musical aesthetic
4. Define simple strategies for play – e.g. try to match the other player exactly, play a melody/accompaniment..other more music theoretically sound strategies for composition

7 Obstacles

7.1 Major obstacles

1. Possible lack of domain knowledge in music theory, game theory, or both
2.

7.2 Minor obstacles

1. One minor obstacle
2. Another minor obstacle

8 Resources Needed

What additional resources do you need to complete this project?

9 5 Related Publications

List 5 major publications that are most relevant to this project, and how they are related.

1. One relevant source
2. Another source

10 Define Success

When / How do you know if you have succeeded in this project?