

Music Making Using Markov Chains

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1 Introduction

- Why music making?

2 Transition Matrices

- Length Matrix
- Pitch Matrix
- Velocity Matrix

3 Examples

Why Music Making?

- There are distinct states, classified as notes, that are easy to model
- We have existing models of "good" music to build our transition matrix
- We can recreate a song randomly from this "good" transition matrix.

How We Did It

- There exists a online database storing are of MIDI files
- MIDI files basically break down musical notes into 3 categories
 - Tick - description of tick
 - Pitch - description of pitch
 - Velocity - description of velocity
- Used this representation of music to create transition probabilities for each of these categories

Transition Matrices

- Length Matrix - We combined different elements of the tick characteristic here
- Pitch Matrix
- Velocity Matrix

Length Matrix

Insert our transition matrix Here

Length Matrix

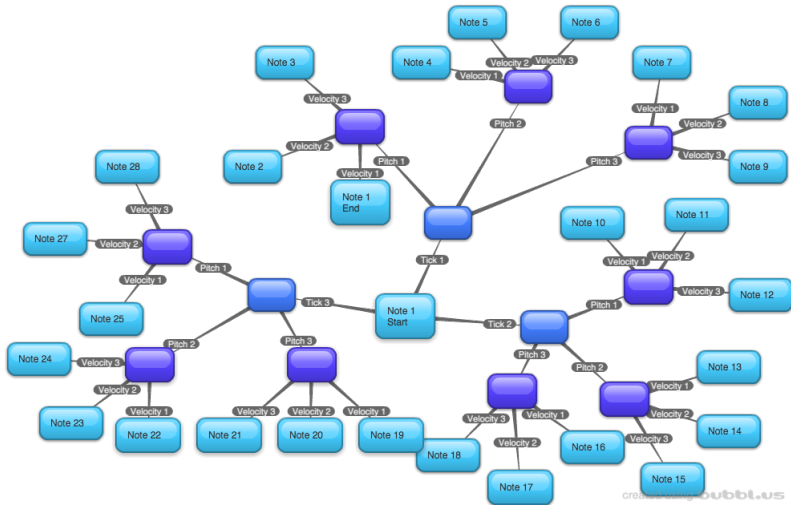
$$\begin{array}{c} \text{Length1} \\ \text{L2} \\ \text{L128} \end{array} \begin{array}{c} \text{Length 1} \quad \text{L2} \quad \text{L128} \end{array} \left[\begin{array}{cccc} m_1 & 0 & \cdots & 0 \\ 0 & m_2 & & \vdots \\ \vdots & & \ddots & 0 \\ 0 & \cdots & 0 & m_i \end{array} \right]$$

Velocity Matrix

$$\begin{array}{c} r_1 \\ r_2 \\ r_3 \\ r_4 \\ r_5 \end{array} \begin{array}{c} c_1 \\ c_2 \\ c_3 \\ c_4 \\ c_5 \\ c_6 \end{array} \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{bmatrix}$$

One way of visualization

- Visualization of our MC with 3 ticks, pitches, and velocities



created using coubbl.us

Simulation?

Examples

hayden.mid

Acknowledgements

We acknowledge all who helped us participate on this thingy. Thank you very much

References



John Smith (2012)

Title of the publication

Journal Name 12(3), 45 – 678.

The End