

# Abstract

Music improvisation in Python using a Markov Chain Algorithm

William Clinton

May 2019

Music generation is a wide area of academia and has been investigated in many aspects in the field of computer science. There are many different methods of algorithmic compositions developed since the field began in the 1950s. One of the oldest techniques in this area is the principle of the Markov Chain. This is a form of stochastic probability which is used to generate music without human interaction depending on some prior knowledge.

This dissertation deals with the implementation of an algorithm that uses Markov Chains to add improvisation into a known piece of music ('Ode to Joy' by Ludwig van Beethoven) by replacing selected bars of music. The aim of this dissertation is to see if the method can be implemented in Python so that it works autonomously. The goal is to have as little human interaction as possible while staying true to the original method.

The algorithm in question was taken from a MatLab program which manually created every aspect of the music. In this form there was little to no automation and there was not much room for expanding the algorithm. The program only worked for 'Ode to Joy'.

In the Python system, the music piece is inputted in the form of a MIDI file which allows the system to work in a much more automated fashion as the data stored in the MIDI can be easily read and analysed.