The Apple Never Falls Far From The Tree

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1 Background

The apple is a fascinating plant. There are presently over 7,500 *cultivars* of apple known[1]. The genome is incredibly complex, with approximately 57,000 genes, almost double that of humans. If one were to plant a apple from a Granny Smith tree, the resulting tree and fruit would be unique. All Granny Smith's are grown from cuttings from the original tree. This composition tries to reflect some of these characteristics.

The English folk song **I will give my love an apple**[2], dating from 15th century[3] is used as the basis of a piece of music concréte which progressively transforms the source material through a series of mutations, much in the manner that the apple genome itself morphs from generation to generation[4]. Some generations are similar to their parents, some are far removed. Obvious progenitors for the composition would include Steve Reich's seminal tape piece *It's Gonna Rain*[5] which uses found sound and process-driven composition in a similar fashion. Another source of inspiration was Luciano Berio's *Sequenza III for Human Voice*[6]. Here, text, or rather words, are split into constituent parts, or phonemes, and recombined to create new groupings.

2 Musical Form

The composition loosely follows sonata form. There is an initial introduction and exposition of the material (an extract from the source recording) which is then sliced into sections. Imagine these sections to be representative of genetic strands, mobile and malleable. Next, there is a *pseudo*-development, an attempt to mimic the transition in sonata-form. This uses, initially, a purely random duplication of some elements, followed by a process controlled by a first-order Markov chain[7]. This terminates with a brief recapitulation, before the process

[1] `https://en.wikipedia.org/wiki/Apple`

[2] `http://www.thecanadianencyclopedia.ca/en/article/ill-give-my-love-an-apple-emc/`

[3] here in a performance by Andreas Scholl

[4] Lines from Hardy's poem 'Heredity' come to mind: I am the family face;/ Flesh perishes, I live on,/ Projecting trait and trace/ Through time to times anon,/ And leaping from place to place/ Over oblivion.

[5] Reich, 1965

[6] also, by coincidence, from 1965

[7] `http://explodingart.com/jmusic/jmtutorial/Markov1.html`

of mutation starts. A randomized population is tested for *fitness* against the original seed (that is, the original musical extract)[8]. Slowly, the fragments move further and further from the source material, until only fugitive elements are left, leading the listener back into the final, and real, recapitulation.

3 Technical Details

The program is written in Python3.5, using the pydub library for audio sampling and numpy for fast mathematical procedures. As each performance will be different, a recording of one possible performance has been submitted. Running the program again should result in a unique, but genetically related, composition.

[8]The method for this is explained more fully in the ipython presentation