I400 Assignment 5 - Feb. 22, 2007

February 22, 2007

Due Mar. 1, 2007

1) All of the in-class melodies up to this point have been continuous, without any breaks in the sound. However, the use of silence is also an important part of music. Please design an addition to our programs to give them the ability to play melodies back with rests. Rests can be any of the values previously discussed: eighth note, quarter note, and half note. Specifically, turn in a new version of our symbolic program that can play the following melody back properly, with rests:

2) We have discussed in class two ways to automatically generate pitches and durations. These are using completely random values (white noise), and using random walks (Brownian motion). There is a magazine article online called "Mathematical Games" by Martin Gardner (1978) discussing the strengths and weaknesses of both types, as well as a third type called 1/f noise. The 6th page of the article (diagram on page 4) discusses a simple procedure for generating these types of values. Please write a short program that generates melodies using this procedure.

3) Write a short program that generates a melody based on the probability distribution of the Star Spangled Banner. Also do the same for two other anthems of your choosing.

4) There is a short program on the website to generate something called a Markov Chain from an existing melody. The program will be the topic of the class on Feb. 27. Please use this program to generate a new melody based on a combination of two national anthems from the list. Turn in your program.

5) The previously-mentioned article takes the position that the 1/f procedure creates melodies that are "just about right." In a short answer of a few paragraphs, please evaluate and discuss the following melody-generating procedures: completely random (white noise), random walks (Brownian noise), 1/f noise, probability distributions, and Markov Chains. Which do you think is better at producing melodies? Do you agree with the conclusions of the article? Be sure to explain your answer. The use of examples from your own research is strongly encouraged.

Note: in the interest of saving paper / electrons, it isn't necessary to turn in the playback portions of these programs. The symbolic manipulations are the most important.