Name: Amanda Pirie

Algorithmic Composition

Abstract: Perform and complete a count, probability, and distribution matrix for Beethoven's and Turke's fragments, then render those melodies as mp3 files. After those, complete a short essay that captures the highlights of what was learned in completing this assignment.

Beethoven: "Ode to Joy"

E E F G G F E D C C D E EQ. DI DH E E F G G F E D C C D E DQ. CI CH

1. *State transition count matrix*

from/ to	E	F	G	D	C	EQ.	DI	CI	CH	DH	DQ.
E	2	2	0	2	0	1	0	0	0	0	1
F	2	0	2	0	0	0	0	0	0	0	0
G	0	2	2	0	0	0	0	0	0	0	0
D	2	0	0	0	2	0	0	0	0	0	0
C	0	0	0	2	2	0	0	0	0	0	0
EQ.	0	0	0	0	0	0	1	0	0	0	0
DI	0	0	0	0	0	0	0	0	0	1	0
CI	0	0	0	0	0	0	0	0	1	0	0
CH	1	0	0	0	0	0	0	0	0	0	0
DH	1	0	0	0	0	0	0	0	0	0	0
DQ.	0	0	0	0	0	0	0	1	0	0	0

2. *State probability distribution matrix*

from/ to	E	F	G	D	C	EQ.	DI	CI	CH	DH	DQ.
E	0.25	0.25	0.00	0.25	0.00	0.125	0.00	0.00	0.00	0.00	0.125

F	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D	0.50	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00
C	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00
EQ.	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
DI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
CH	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DH	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DQ.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00

3. State transition probability distribution matrix

from/ to	**E**	**F**	**G**	**D**	**C**	**EQ.**	**DI**	**CI**	**CH**	**DH**	**DQ.**
E	0.25	0.50	0.50	0.75	0.75	0.875	0.875	0.875	0.875	0.875	1.00
F	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
G	0.00	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
D	0.50	0.50	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
C	0.00	0.00	0.00	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EQ.	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00
DI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00
CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
CH	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DH	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DQ.	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00

4. *STPDM pseudocode simulation*

0.571 0.790 0.693 0.359 0.009 0.252 0.134 0.839 0.846 0.863 0.396 0.213 0.540 0.976 0.351
0.619 0.227 0.798 0.595 0.438 0.278 0.235 0.138 0.212 0.202 0.309 0.689 0.829 0.060 0.725

Beethoven: E E F G G F E D C C D E EQ. DI DH E E F G G F E D C C D E DQ. CI CH
Fake tune: E D C C D E F E EQ. DI DH E E D C D C D C C D E E E E E F G G F G

Turk's "March"

C C C G EH CH D D D G FH DH E E E C D D D G E E D D CH CH

1. *State transition count matrix*

from/to	C	D	EH	CH	G	FH	E	DH
C	2	1	0	0	1	0	0	0
D	0	5	0	1	2	0	0	0
EH	0	0	0	1	0	0	0	0
CH	1	1	0	1	0	0	0	0
G	0	0	1	0	0	1	1	0
FH	0	0	0	0	0	0	0	1
E	1	1	0	0	0	0	3	0
DH	0	0	0	0	0	0	1	0

2. *State probability distribution matrix*

from/to	C	D	EH	CH	G	FH	E	DH
C	0.50	0.25	0.00	0.00	0.25	0.00	0.00	0.00
D	0.00	0.625	0.00	0.125	0.250	0.00	0.00	0.00
EH	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
CH	0.33	0.33	0.00	0.33	0.00	0.00	0.00	0.00
G	0.00	0.00	0.33	0.00	0.00	0.33	0.33	0.00

FH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
E	0.20	0.20	0.00	0.00	0.00	0.00	0.60	0.00
DH	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00

3. *State transition probability distribution matrix*

from/to	**C**	**D**	**EH**	**CH**	**G**	**FH**	**E**	**DH**
C	0.50	0.75	0.75	0.75	1.00	1.00	1.00	1.00
D	0.00	0.625	0.625	0.750	1.00	1.00	1.00	1.00
EH	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00
CH	0.33	0.66	0.66	1.00	1.00	1.00	1.00	1.00
G	0.00	0.00	0.33	0.33	0.33	0.66	1.00	1.00
FH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
E	0.20	0.40	0.40	0.40	0.40	0.40	1.00	1.00
DH	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00

4. *STPDM pseudocode simulation*

0.033 0.932 0.257 0.925 0.796 0.267 0.401 0.721 0.604 0.430 0.587 0.334 0.418 0.229 0.286 0.438 0.569 0.606 0.721 0.528 0.763 0.853 0.383 0.708 0.081 0.565

Turk: C C C G EH CH D D D G FH DH E E E C D D D G E E D D CH CH
Fake tune: C C G EH CH CH C C D C C D D D D D D D D CH D G E D CH C D

** The short essay is written on the next page **

Short Essay

The above assignment was based on these two melodies: Beethoven's "Ode to Joy" and Turk's "March." The two melodies differed in many ways, but one stood out above the rest: Beethoven's song had a rising tune, whereas Turk's piece didn't. As I finished each matrix in the two melodies, I realized that the "fake" melody for Ode to Joy did not reflect the spirit of the original tune composed by Beethoven. When comparing the two Ode to Joy tunes ("real" vs. fake), the fake one contained a recurring (E) note that distinguished it from the original "real" melody. Furthermore, Turks' melody didn't necessarily retain the spirit of the original melody either after completing the matrices; there was a recurring (D) note that caused the "fake" melody to differ significantly from the original.

Markov processes are made up of a series of probabilistically determined occurrences that are often described as "memoryless." The Markov processes are used to forecast the process's future based purely on its present state. The two "fake" versions of the melodies were generated by using matrices that were used to develop the notes and try to catch the spirit of the original melodies. We were required to use three different matrices: a count matrix, probability matrix, and distribution matrix. Plus STPM, which was used to generate the "fake" melody by using the distribution matrix chart. After generating the "fake" melody, I used the command prompt on my HP to type it into SimplePlayer, then it generated a midi file, which I then converted into a mp3 file.

Because of its expression and presentation of musical notes, it is also a knowledge representation. Because we were able to enter our JFugue into SimplePlayer and subsequently make an mp3 file with it for anyone to listen to, I concluded that it is an executable music knowledge representation. This assignment required four stages to create a melody that used

these musical notes (JFugue); our creations were all improvised. Improvisation is the act of creating something unique while relying on guesswork as a guide. The approach we used to generate the "fake" melodies would not be considered improvisational because our work was guided by the matrices to make the “fake” melodies, and they were not developed during a whim.