
GP Assignment - Markov Analysis and Algorithmic Composition

Preliminary Task

Finding your way once again to the course page at http://www.cs.oswego.edu/~blue/course_pages/2022/Spring/Cog356/, please give another listen to Beethoven’s “Ode to Joy” and Turk’s “March”, this time performing a synchronized reading of the JFugue representations of the melodies as you do:

Ode to Joy (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

March (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

Next, please reflect once again on what both you and your classmates previously identified as the most salient differences between the two. Please do your best to be mindful of the most salient, characteristic differences between the two melodies as you work on this assignment.

Beethoven Task

Working by analogy, do for the Beethoven fragment what was modeled in the classroom activity that featured the Kabalevsky melody. That is, for the Beethoven fragment:

1. Create the state transition **count** matrix – being sure to consider the melody to be a “wrap around” melody. Do your best to render an accurate, professional looking count matrix.
2. Create the state transition **probability** matrix. Do your best to render an accurate, professional looking probability matrix.
3. Create the state transition **distribution** matrix. Do your best to render an accurate, professional looking distribution matrix.
4. Manually run the simulation algorithm presented in class on the following sequence of random numbers in order to obtain a melodic fragment in the spirit of Ode to Joy. (Like the real Ode, your fragment will contain 30 notes. Unlike the real Ode, your result won’t sound magical. Still it should sound like a sickly ghost of the real thing.

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

Turk Task

Working by analogy, do for Turk's march what was modeled in the classroom activity that featured the Kabalevsky melody. That is, for the Turk fragment:

1. Create the state transition **count** matrix – being sure to consider the melody to be a “wrap around” melody. Do your best to render an accurate, professional looking count matrix.
2. Create the state transition **probability** matrix. Do your best to render an accurate, professional looking probability matrix.
3. Create the state transition **distribution** matrix. Do your best to render an accurate, professional looking distribution matrix.
4. Manually run the simulation algorithm presented in class on the following sequence of random numbers in order to obtain a melodic fragment in the spirit of March. (Like the real March, your fragment will contain 26 notes. Unlike the real March, your result won't sound completely coherent. Still it should sound like a sickly ghost of the real thing.

```
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
```

Rendering your melodies

Please render both of your melodies as .mp3 files. In the previous lesson, I suggested one possible way to do this. That said please feel free to do this anyway that you like.

Perhaps I might mention that “algorithmic composition” will be a thematic thread running through our exploration of formal systems and generative processes in this course. Consequently, this won't be the only time that you will be called upon to generate .mp3 files to capture the product of your work.

Short essay

Please write a short essay, more than one page, but less than two pages, which incorporates your answers to the following questions, expressed at reasonable levels of abstraction, in a manner that achieves a sound narrative flow, and in a way that manages to capture highlights of what you learned in completing this assignment. (Please note that I am asking you to do more than to merely answer each question in turn. Doing so would result in a very poor narrative flow!)

1. What are the two melodies that were the focus of this assignment?
2. What do you think are the two most salient differences between the two melodies? (Things that the casual listener might pick up on as being most readily apparent distinctions between the two.)
3. Do you think the state transition probability matrix for Ode to Joy in some sense captures the spirit of Ode to Joy? Why, or why not? Please answer in terms of characteristic qualities of the melodies – the real one and the “fake”.
4. Do you think the state transition probability matrix for March in some sense captures the spirit of March? Why, or why not? Please answer in terms of characteristic qualities of the melodies – the real one and the “fake”.
5. What is a Markov process?

6. What are Markov processes used for?
7. How did you go about generating the two melodies that you generated?
8. Do you think that JFugue is a knowledge representation? Please say yes. And then defend your answer by answering the following question: What conventions are inherent in JFugue?
9. Do you think that JFugue is a an **executable** music knowledge representation?
10. How did you render the sequence of notes, encoded in JFugue, as a sound file that we can readily listen to?
11. What is meant by “improvisation”?
12. Do you think that the approach that you used to generate the melodies might be viewed as an improvisational process?

Further Instructions

1. Main document: Please craft a **PDF** document, naming it `main.pdf`, consisting of:
 - (a) A nice title
 - (b) A short abstract describing the assignment
 - (c) A section containing your work for the generation of the variant of Beethoven’s “Ode to Joy”, including the matrixes and the sequence of notes represented as JFugue tokens
 - (d) A section containing your work for the generation of the variant of Turk’s “March”, including the matrixes and the sequence of notes represented as JFugue tokens
 - (e) A section containing your short essay
2. Music files:
 - (a) Please name your Markov variation on the Beethoven melody `beethoven.mp3`
 - (b) Please name your Markov variation on the Turk melody `turk.mp3`
3. When I email you the invitation to submit your work on this assignment, please reply just one time to the email, attaching the three files: `main.pdf` and `beethoven.mp3` and `turk.pdf`

Due date

Wednesday, February 23, 2022. Any time of the day will due.