

DEUX

Alison Bans, Alain Schöbi, Hironobu Akiyama
SHS Musical theory and creativity, 2020 - 2021, EPFL
[ENJOY](#)

Chapter 1

A heart beating for centuries, seen everything from the start of humanity to the present, a tree is a living being playing with singing birds and coming alive again each spring, putting up with modern dancers and wildlife helping themselves with its precious fruits in summer, dying leaves and drying trunk from insufficient sap in autumn to finally slowly closing its eyes to reach a dormancy state, to endure the cold and the dark winter days.

As one can certainly notice, our idea resembles the Four Seasons of Vivaldi, but only by the name. We will not base our composition or inspire it by Vivaldi's, but rather build a whole new world based on our vision of the seasons. It will include many natural elements like birds, bees or waves in the form of background sound to further deepen the atmosphere. The piece should sound organic, as we will implement some rules into the aleatoric algorithms, which will allow a better representation of each season and therefore the audience's imagination will be able to easily follow the storyline of our piece

Now let's talk about how one should listen to this piece. The first step will be closing one's eyes and representing oneself on a flat surface, let's say in the middle of an empty plain. Nothing has grown except for some small bushes. Time elapses faster than one has ever experienced. This precise moment is the beginning of the story about a tree.

Some instruments will be playing in multiple seasons while others are specific to a season. We experimented with several combinations of them, and we finally chose the most appropriate ones according to us.

In addition, for each season we will add specific instruments that best represent its general flow. The spring will be represented mainly by the piccolo, the summer by the saxophone, the autumn by the organ and the winter by the horn. Each one of them indicates the overall atmosphere surrounding the tree.

Seasons certainly are a popular topic in the musical world, even in the non-classical genres. We can quote for example "Summer" from Calvin Harris or "A Winter's tale" by Queen and more classically "Ein Sommernachtstraum" from Felix Mendelssohn. Every artist has their own way to evoke a perfect world.

Chapter 2

As we go deeper into the reflection of our piece, let us state what we want to achieve and how. The base of our composition is the idea of it being mostly randomly generated while still sounding as organic as possible. We also chose to represent the four seasons throughout our composition. We first thought about inspiring our composition from Vivaldi's piece, but ended up deciding otherwise. Indeed, as we had already started implementing our own ideas into code, we realised that we wanted to carry on representing the seasons from our own perspective and in our own style rather than attempting to base our work on Vivaldi's. We then started thinking of words to describe each season best, which enabled us to incorporate them in the composition and through sound effects. Our main tool is Jupyter Notebook which is used to code the raw random music. Sound effects and the assembly of our piece were done with Audacity.

As our piece is based on aleatoric algorithms, we had to structure the randomness such that it sounds as natural and structured as possible. This allows the listener to concentrate more on the story rather than on the composition style. To do so, we have implemented the following classes: Scales, Chords and NotesRange.¹

As part of our original goal to compose an aleatoric piece, we found it appropriate to compute a random rhythm which will be used for the melody but not for the chords.² In order to generate one whole piece, we put all of the previously mentioned code together in a paragraph called "Music Generation" which serves as an example for the final composition of our seasons.³ To emphasise the beauty and characteristics of the different seasons, unlike Vivaldi, we decided to add multiple sounds to each of our randomly composed movements.⁴

While composing our final piece we had to think of multiple aspects we wanted to incorporate such as instruments, sound effects and the structure. For the spring, we believe that wind instruments such as the piccolo and the flute would best represent an atmosphere with singing birds and buzzing bees whereas brass instruments, such as saxophone, trombone, horn and tuba, would fit better with the festive atmosphere of the summer. The celesta, organ and bass have been chosen to represent the wind and vibrant leaves in the autumn movement. To finish off, the horn and the bass have been chosen for their lower pitches to depict best the cold and dark season that is winter.⁵

While the spring mornings rise, nature is still asleep and slowly wakes up towards the end of the intro and start of the first verse. After the slow awakening from the first verse comes the movement of the chorus where life is in full action: trees are growing, birds are singing and bees are buzzing. All of a sudden the rain comes, the wildlife seeks shelter, it is a calm moment in nature. Once it stops raining, life resumes with once again an eventful chorus. The trees were able to get their nutrients with the rain and are now growing more flowers to feed the bees and birds. The outro shows that life has calmed down, everything has fallen into place and summer is ready to start.

During the summer intro, the audience should imagine slowly waking up to the sunrise, fresh air and the calming sound of crashing waves. The waves are represented by an arpeggio played to which we also

¹ Please take a look at the notebook to see the implementation, and examples for those classes. You will find them under the same chapter named as mentioned in the text.

² For further information on how we coded for this section and examples, please take a look at the "Rhythm Generation" section of the notebook

³ Please go to the "Music Generation" paragraph of the notebook to see how everything was put together into one score, with different instruments.

⁴ Please go to the paragraph entitled "Modified Audio Samples" to see how some samples have been modified before being added to the piece.

⁵ The paragraphs below explain how the movements have been created, what storyline they follow and how the structure (intro, verse, ...) guides the storyline. For more information regarding the instruments during the storyline or the code written for the seasons, please take a look at the notebook in the "The Piece" and "Audacity Final" chapters

added a sound effect of crashing waves to emphasise it. Once the day has finally begun, the beach starts to become crowded with people sunbathing, swimming and playing in the sand. This part of the day is represented in the verse, where we have introduced the melody which adds movement representing the crowd. As the atmosphere gets noisier, the sound of the waves fades out. Towards the end of the day people get ready for the festival; music is playing in the background. The chorus full of notes, yet with no sound effect, represents this transition from beach to festival. At the end of the chorus and onto the verse, the crowd gets excited and cheers on the artists. The last chorus nearly doesn't differ from the preceding verse as it is full of chaos from the festival. Finally, a heavy tropical rain starts to fall on the festival goers. The day is at its end and people start going home. The outro ends with an arpeggio to finish off the day accompanied by the heavy rain.

The autumn movement follows quite a simple structure. The intro is relatively calm and represents the fallen dead leaves being crushed with each step taken. The thunderstorm and heavy rain arise during the first verse and while the rain stops during the second verse, one last thunderstorm can be heard leaving place to the calmness of the chorus. The outro represents the cold autumn wind to which the temperatures drop stepping into the winter.

The winter mouvement has been constructed in a way that shows cold and darkness. There is very little structure in the sense that there is an intro and an outro, and in between seven verses, but no chorus. The listeners should feel like they are taking a journey through the winter. While they take the same route everyday, it feels like an eternity to get to their destination as the freezing winter winds are hitting their face. Their feet become colder and colder with every step they take on the snow or the ice. A sudden acceleration of the rhythm takes place creating a sense of chaos and impatience of getting out of this cold period. And all of a sudden comes the outro, with its whole note chords, it represents the calm at the end of the winter when the snow storms have ended and the spring is close.

Chapter 3

As can be noticed in our score, some notes may not be realistically playable. So how are musicians supposed to play our piece? The answer is that they shouldn't as the goal for our composition is to only be played by a computer.

The score itself does not give information about the sound samples. Images of our work on Audacity can be found in the "Audacity Final" chapter of the notebook.

We wish to add that in the beginning of our project, we evoked the idea of using percussion which we discarded as we believed it would have significantly changed the outcome and the storyline. Furthermore, we initially intended to play the melody with only one instrument but felt like it made our storyline incomplete.

One musical aspect of our composition that we could have paid more attention to is the use of the instruments. We chose them to represent the seasons but with more time we could have represented specific aspects of the seasons with an instrument, such as the bird with the piccolo.

During the presentation of our piece, we were asked whether the seasons would still be recognisable without the sound effects. As we mentioned before, multiple aspects were considered to represent each season through the aleatoric composition so yes, the seasons would still be identifiable. We decided to add those audio samples in order to add information in a different way and guide the listener's imagination.

One might notice that the list of discarded implementations regarding our algorithmic composition is not exhaustive. This is because even though we had an idea in mind that would guide our composition, the algorithms would themselves guide us through our work. Indeed at first we computed a very simple self-generating piece which we came to realise would not be applicable to our idea of building seasons. So we had to implement what we have called rules to guide our aleatoric algorithms to finally be able to have enough control over them to create different atmospheres. We could tell a story, create different environments and situations, giving birth to emotions and imagination.

Finally the algorithms help develop a different mindset than usual to compose a piece. Since we do not directly choose the notes, the outcome can be unusual in a certain way. That is, each time we compile the notebook, we get a different result. Constraining ourselves has a positive effect on our creativity. The outcome of our workflow does in a certain way suit our expectations however the code can always be completed : more rules can be added, new paths can be taken and a new perspective on the piece can be opened.

Sources

[C/C++ Program for Random number generator in arbitrary probability distribution fashion](#)

[Enumeration of random trees](#)

[Music video link](#)