Debussy in Jazz

Deux Arabesques, Part 2 Analysis and Jazz version generation

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1. Introduction

When I first heard about this assignment, choosing a jazz piece, probably with an interesting vocal solo, popped into my mind. However, I then realized it is not easy to find a midi version of a jazz vocal improvisation, not to say, a midi that would match the audio version. I gave it another thought and came up with the idea of choosing a classical music piece, which I am also very fond of, and remembered how I never get tired of listening to the first movement of Deux Arabesques of Debussy over and over again. This is how I decided this is the piece I would analyse the first part of Deux Arabesques by Debussy.

Next issue resided in what type of analysis or 'reconstruction' of the piece I would be both willing and capable of doing. The idea of doing something jazzy was still strolling about my mind, which lead to coming up with the idea of creating a jazz version of the selected musical piece, in a jazz standard style. I have some knowledge on music theory, yet not fully grounded, but I play some jazz on the piano and slowly start to comprehend the harmonic structure behind it. Hence, I decided my goal would be to analyse the piece the way I would interpret it from a jazz point of view, to create a jazz standard based on Debussy's harmony.

Furthermore, a new melody would have to be created too. I believe the interpretation of this musical piece is highly significant, and that a correct form of it should play with dynamics to highlight the leading notes of the melody. With this allusion to dynamics, I do not refer to crescendos, or fortes, which are also very important; I refer to playing one note with more intensity than the one next to it, in order to generate an effect of various voices sounding, and to hierarchize the relevance of these voices. I will use this interpretation of the relevance of dynamics to generate the new melody.

In this paper I will explain the initial analysis of the piece and the segmentation I propose of the piece, mainly based on the later analysis. Afterwards, the extraction of harmony and melody for the new composition are explained. To conclude, I comment about interpretation of the resulting piece, and propose a topic of discussion and future work. At the end of this article one can find a brief definition of the content of the files attached.

2. First Overall Analysis

Debussy is a composer that breaks with the traditional way of generating tension in the piece [1], he employs his own resources to do so, and this is one of the main things I looked for in my initial analysis of the piece.

The first of these resources is the use of polyphonic rhythm. The sudden changes from triplets to quavers generate a sensation of tension and change of section, yet in such a subtle way, it doesn't feel abrupt. In figure 1 an example of this change can be observed. The left hand starts with triplets and shifts to quavers in the second bar, where section B starts.

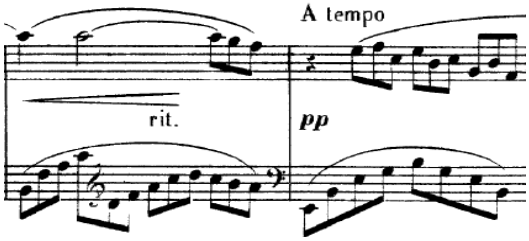

Figure 1: generation of tension by means of change in rhythm, tempo, and dynamics.

Another way Debussy generates tension is by using dynamics. The general pattern observed across the musical piece is to start with *piano*, followed an in *crescendo*, and falling into a *piano*, or *pianissimo,* where tension is released or a new section starts, as can be observed in figure 1. In this example, we can observe the in crescendo and the fall to *pianissimo* when tension is released and a new section starts.

The previous example is reinforced by combining it with tempo variations. Debussy indicates use of ritardando at the end of sections together with increase in dynamics to build a stronger sense of tension, which is released retaking the initial tempo and abruptly decreasing dynamics. This contrast in variables, where one increases while the other decreases, somehow implies a contradiction and therefore, tension.

Another interesting observation is the use of colour Debussy employs. Although in the example of figure 1, Debussy does make use of a dominant chord, mostly, instead of using dominant chords, he adds 11^{th}, $\#11^{th}$, 9^{th}, 13^{th}, b13th notes to add different tension sensations without constantly using the 7^{th}. I believe this resource plays an important role in generating the airy, delicate sensitivity this piece transmits.

Besides generation of tension, there were other observed resources Debussy employed in Deux Arabesques. One of them, is the way in which he generates various voices and how he distributes them amongst left and right hand. He first starts with a sole melody line, equally distributed between both hands, and after two bars, we can observe how it gradually evolves into two voice lines, one for each hand. When each hand has a defined voice, it can also be noted that the left hand draws a bass line and the right draws a melody line with the high notes, while both also fill in the harmony. Although this is not the main topic of this work, I believe analysing the way the voicings are conducted would also be an amusing task.

Furthermore, Debussy makes use of modulations. By examining the music sheet, one may see in section D the armour is modified, which implies a modulation is taking place. Moreover, in the second half section D', the armour is once again modified. A new modulation is occurring, to then go back to the main tonality in section A.

These last resources can be better observed by looking at the 'Structure' file or figure 2, and the original music sheet attached.

3. Segmentation of the piece

The previous tension resources are often also queues to section changes in the piece. Figure 2 ilustrates the segmentation I decided the piece was divided into, by following the resources explained in section 2, and my musical intuition. I did this separation manually, over the music sheet, and then represented these with Matlab, using midiToolbox [2]. To so do, I wrote a small script which would cut the piece into the segments I indicated manually (in seconds), and to represent these segments separately. Also, I modified the 'pianoroll' function contained in midiToolbox to centre the representations of the selected sections, and to show the x axis in terms of absolute seconds for better understanding of what moment of the piece each segment is in.

These representations are interesting, because, although listening was enough to decide which segments were repeated, or a repeated version of a previous segment, this can also be extracted by comparing the patterns in the different sections. Moreover, it can be observed that sections don't only seem to grow in terms of dynamics towards the end, but also in terms of frequency. Patterns tend to show a tendency to increase frequency towards the end of a section, in general. As a matter of fact, I would say the only section that releases its tension before finishing, is section D, which is the only section that shows a fall in frequency towards the end. I believe Debussy intentionally coordinates growth of tension with growth of frequency.

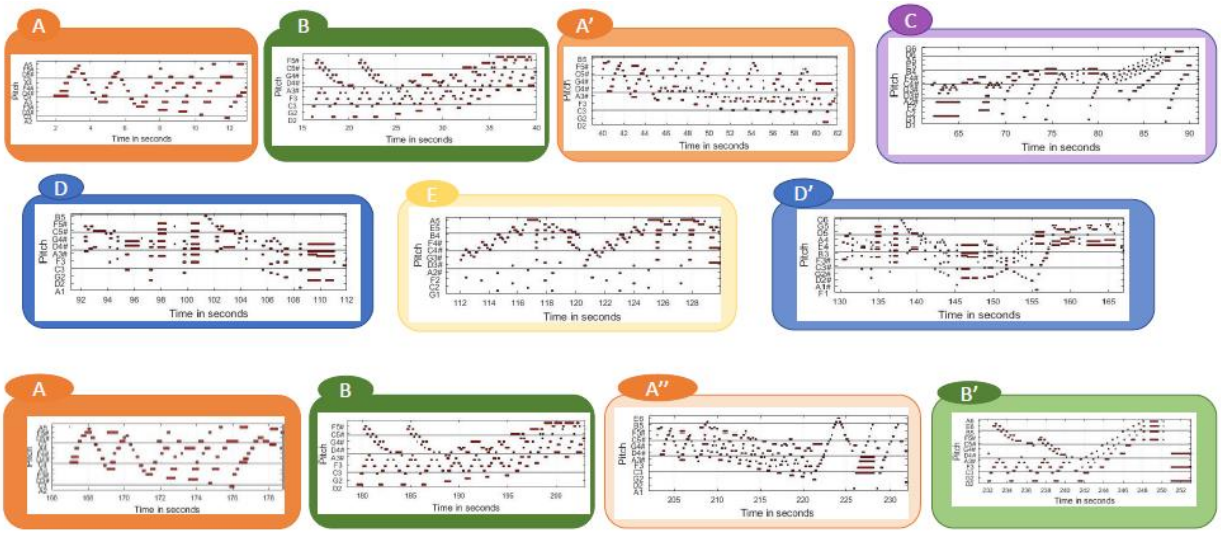

Figure 2: segmentation of my piece using miditoolbox for Matlab.

4. Harmonic analysis: chords, bass and structure

Chords

Once the goal of creating a jazz standard from Deux Arabesques was set, harmonic analysis was done. My harmony knowledge was acquired by playing jazz standards and slowly associating chord progression patterns with their roles in different pieces, and not by following a methodological learning process. Hence, the harmonic analysis I carried out was not executed in a traditional way, the process was carried out by taking a group of notes and questioning which chord these notes would correspond to in a jazz standard, taking into account the relevance of the root, its third, and its context. By context I mean the key in which the piece is in, the chord progression that is happening in each case, and tendencies observed in the composer. An example of tendencies observed in the composer, are the fact that he tends to omit the 5^{th} note of chords or play it last, he barely makes use of dominant chords, and that he tends to include notes such as the 13^{th} , the 11th or the 9^{th} of the chord. In this case, the key of the piece is Emajor, which was extracted both by analysing the piece and using midiToolbox, and was contrasted with other sources [3] [4].

Bass

The bass line is also an essential component of this piece, and is usually highlighted by the performer with dynamics, as the melody. In Debussy's piece, the lowest note is usually the first note of a chord, which indicates the bass and is a relevant queue for deciding where a chord starts. This makes it easy for the listener to follow this line, and it is how the bass was extracted for the analysis. It is interesting to observe a clear melodic line is drawn with the bass voice, which I believe enhances the sense of continuity Debussy constructs in his piece. The aim is that this line will be maintained in the standard, which is reflected in the generated music sheet attached, 'Debussy in jazz music sheet'.

Structure

This thorough analysis of the piece was only done for sections A and B, to follow the typical structure of a jazz standard [5]. Although there are other possible structures, the most common structure in jazz standards are ABAA or ABAC. A simpler structure also used, for example in 'All of me' [6], is AB, which will be the structure followed for the final composition. Even though there are other sections of the piece which would be interesting to analyse, I chose to concentrate on this part of the piece, since the whole piece would be too complex for the time and the knowledge I had. Moreover, I believe, sections A and B are the most representative parts of the piece.

The distribution of bars in the new jazz piece was based on a relatively subjective decision, which is here described, together with the reason behind it. After doing the harmonic analysis and trying to fit it into the structure of a jazz standard I observed section A of the piece lasted five bars and section B lasted eleven bar. I found this an unusual thing and tried to look for an explanation for this.

My explanation for section A being five bars long is the ritardando at the end of this section. I understand this could be interpreted or expressed as two typical-length bars. To map this section to the typical 8 bar A section of a jazz standard, I took the last bar as two bars, and broke the first two bars, which I find most relevant into four bars. This can be observed in the resulting music sheet attached, 'Debussy in jazz music sheet'. I thought making these changes could result badly, but after playing it, I believe it is quite an acceptable adaptation. For section B, I kept the initial eleven chords. Even though this is not typically found in jazz standards, it is a characteristic resource Debussy employs, and I wanted to keep this. After listening to it and playing it a few times, I came to understand that he skips a bar to generate a sensation of anticipation towards the end of section B, which already has tension inducing notes such as 11^{th}, to intensify this tension sensation without using dominant chords. In my opinion, section B could be subdivided into three parts: first, the four initial bars; second, the three that follow; and third, the last four bars. Hence, I believe the chord he is skipping is the last of the second part, where, as far as I'm concerned, he intends to start the tension towards the next section. If you look at the attached music sheet, 'Debussy in jazz music sheet', it is clearly seen how all lines have three bars except for this one.

In conclusion, the final disposition of bars of parts A and B was of eight bars for part A, and eleven bars for part B.

5. Melody

Deciding which is the main melody of this piece is relatively obvious at some points, and complicated at others. In order to apply a method that would be consistent for all parts, I decided to follow the dynamics of the piece. I hypothesize, as mentioned in the introduction, that dynamics are highly relevant in the interpretation of this piece, and they play a fundamental role in allowing the listener to tell the leading notes of the melody from a continuous flow of notes. It is the interpreter's responsibility to highlight these notes through slight changes in force applied to them. For this part of the work, I am assuming this was applied by the performer of the midi file I am using.

Two other script functions, 'dynamicsFiltering' and 'maxVelNotes' were written in Matlab to extract the new melody of the jazz standard. After reading a midi version of Deux Arabesques containing dynamics values, 'AnalyseMidi' script calls 'dynamicsFiltering' function in a loop for each section manually divided, as explained above. Then, 'dynamicsFiltering' receives a section of the musical piece, and applies windowing of 0.5 seconds duration and no overlapping. For each window, 'maxVelNotes' is called for. 'maxVelNotes' receives a window of the piece and computes the median dynamics of the notes contained in this window. This value is then modified with a percentage threshold

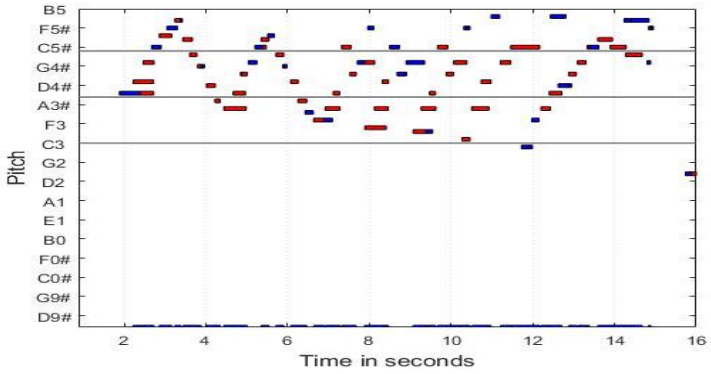

Figure 3: representation of section A with (in blue) and without (in red) applying dynamics filter

parameter (from 0 to 1), *th*, to define the relative threshold of the window. This is done so that instead of defining the median as the only possible threshold, the user can modify this initial value. The formula applied is: relative_threshold = (1+*th*)*median. Once the relative threshold is defined, all notes with dynamics below this threshold are set to cero. Finally, all returned matrices from 'maxVelNotes' are concatenated in 'dynamicsFiltering' to return to 'AnalyseMidi' the matrix containing only notes above the relative thresholds for each window. These resulting matrixes are then represented over the original matrix with 'pianoroll' function. Due to problems with 'writemidi' function from midiToolbox, the notes selected after applying the dynamics filter, as shown in the example in figure 3, were then written into a music sheet manually. The durations of notes were adapted due to many silences generated by the function. The resulting music sheet with melody and chords is attached *Debussy in jazz music sheet*.

6. Interpretation

I wanted to make a brief comment about the attached file *Interpretation of Debussy in jazz*. The resulting piece could be played in many styles, but I decided to play in a ballad style because it resembles more to the original piece, and it seemed difficult to play something completely different, although I believe it could sound well. Moreover, I could just play the piano and sing, and some styles would require more instruments or at least percussion to give the groove. The interpretation consists on a piano introduction of AB, followed by two rounds of AB with piano and voice, then a round with a piano solo, and a closing round of piano and voice. My intention was to keep the first voice round as close as possible to the music sheet, and gradually modify it and improvise in the next. Nevertheless, since the melody was not generated by a human, I always slightly modified it, adding passing notes to round it up, and make it sound more natural. As I will propose in the discussion below, in my interpretation I unconsciously use many additional notes from the original piece because I interiorised it. That is why I believe it would be interesting to hear how somebody who is not influenced by the original piece would interpret it.

Two other possible interpretations of the piece can be found attached, *Swing accompaniment of Debussy in jazz and Bossa accompaniment of Debussy in jazz*. These versions are generated by an application called iRealPro [7] that many jazz players use to practice songs, to modify, or create their own standards. It allows playing the chords in the music sheet with background percussion and bass, to transpose it to other tonalities, to change its tempo, or its style, and it can be used to practice solos or to sing over it. I added swing and bossa style interpretations to allow experiencing possible ways of playing the same jazz piece. A music sheet is also generated by iRealPro, which is attached as *Debussy in jazz chords*.

7. Discussion

What about interpretation? Jazz standards are simply guide lines to what each musician will make its own version. Jazz standards are never played exactly as they are written, each musician gives its own interpretation to the piece, which is what I did in *Interpretation of Debussy in jazz* with the melody obtained after applying the dynamics filter. As well as being influenced by musicians I listen to, or previous songs I might have heard or sung, I am inevitably strongly influenced by the original piece of Debussy. Hence, I question how would both the interpreter and the listener be conditioned depending on whether they were previously exposed to the original piece? Both in playing and in the interpretation or likeability of the newly interpreted composition.

8. Future work

Deux Arabesques has many beautiful details, and only those comprised in sections A and B of the piece were considered to compose the final piece. I believe it would be engaging to thoroughly analyse further sections of the piece to add new colours to the new composition.

For example, one can listen to section D' and hear it is a repetition of modifications of section D. Observing the changes in armour in the music sheet, it could be argued the first half of D' has modulated from Emajor, the main key of the piece, to A mayor or F# minor; and the second half of D' then modulates to D mayor of Bminor. However, even though when listening to it, the second half melody somehow resembles to the melody of the first half, the chord succession is not exactly the same. The relation between them is more complicated. I would like to fully understand the changes taking place in this section to then apply them to the main melody of the new composition. I would be curious to hear how this would result.

Another modification of the melody takes place in the last repetition of section A. I thought a beautiful ending of the jazz standard would result by modifying the melody to the one in A". However, accomplishing this change wasn't trivial. It also implies a change in harmony towards the end, to fall into the last repetition of section B. In my opinion this new ending needs to be thought through more carefully to be properly added. When doing so, I am positive a nice turn would be given to the piece, and another distinctive part of Debussy's piece would also be captured.

9. Attached files

Audio files:

Interpretation of Debussy in jazz.wav Jazz standards are a defined structure which are then freely interpreted. To obtain an idea of how this could sound, I recorded my interpretation of the music sheet outcome.

Swing accompaniment of Debussy in jazz.wav To give a different interpretation of the outcome, I employed iRealPro to generate an instrumental version of the composition. This is automatically generated so it is not as natural, but I believe the result is good. This is usually used by jazz musicians as backgound track to rehearse. The structure of this audio is three turns of AB.

Bossa accompaniment of Debussy in jazz.wav. To have another possible style variation of the piece, the same as the previous but with bossa file is attached. Same structure is employes: three turns of AB.

Pdf files:

Structure. I have attached a pdf with the structure I propose for the piece, in case it is useful to check while reading some of the explanations in this article.

Debussy in jazz music sheet. This is the final music sheet with chords and melody.

Deux Arabesques analysed music sheet. This is the original music sheet of Deux Arabesques with my handwritten annotations and analysis of tensions. Yellow indicates low tension, orange implies tension is starting to grow, and red much tension. I also highlighted in green the notes the I thought were the main melody, and circled in purple the notes selected for the melody after applying the dynamics filter in 'AnalysiMidi'.

Debussy in jazz chords.pdf This is the music sheet containing the chords of the composed piece generated by iRealPro.

Script:

AnalyseMidi.m. This is the code in which the structure is represented and velocity filtering is applied and represented. It runs in a lop though all sections of the piece and calls 'pianoroll' function from midiToolbox and velocityFilter. It also extracts the key of the piece.

maxVelNotes.m. This function is called from 'velocityFilter.m' and it is in charge of setting to zero all frequencies whose velocity is below the computed threshold. This is done for a sole window.

velocityFilter.m. This function receives a section from 'AnalyseMidi' and divides it into windows in a loop. In every turn of the loop, 'maxVelNotes' is called for, to obtain only the relevant notes in terms of dynamics.

Pianoroll.m. I added the modified version of this function from midiToolbox, which is used in 'AnalyzeMidi'.

midiWindow.m. I did not write of modify this function, but it is used in my code and is not included in midiToolbox. Hence, I am attaching it, so the 'AnalyseMidi' can be used.

References

[1] « Reo cites, Claude-Achille Debussy,» [En línea]. Available: http://reocities.com/RainForest/2685/html/wct3c/debussy3.htm.

[2] T. &. T. P. Eerola, «MIDI Toolbox: MATLAB Tools for Music Research. University of Jyväskylä: Kopijyvä, Jyväskylä, Finland,» 2004. [En línea]. Available: https://www.jyu.fi/hum/laitokset/musiikki/en/research/coe/materials/miditoolbox/.

[3] B. Moon, «Arabesques and Polyrhythmic Jazz,» 10 feb 2011. [En línea]. Available: https://sites.google.com/site/rjmoon17/debussy-s-arabesque.

[4] «Wikipedia, Deux arabesques,» 26 nov 2016. [En línea]. Available: https://en.wikipedia.org/wiki/Deux_arabesques.

[5] S. Smith, «1. The Structure of Jazz,» de *Jazz Theory*, 2008.

[6] S. &. M. Real Book. [En línea]. Available: http://www.guitarcats.com/realbook-jazz-standards/all-of-me.

[7] «iRealPro,» [En línea]. Available: http://www.irealpro.com/.