Utrecht University

Department of Information and Computing Sciences

Researching music with Computer Science

Music makes us move. However, some musical pieces are easier to tap or clap along than others. What information in the musical piece is it then that helps us finding the beat and moving along? If we would know this, we could predict what piece would be suited for running, or dancing or would provide good motivations in rehabilitation exercises.

We know from Cognitive Science, that regular accent patterns in the music help us moving along, and help us counting along. For instance if we need to learn to dance to a Waltz, we would need to count like 1-2-3-1-2-3 in order to know when and how to move. I use now Computer Science to automatically extract these kind of accent patterns from the music. Below you can see two accent profiles for two different musical pieces, which were extracted from a digital format of that piece. I used a mathematical model to calculate these accent profiles, which basically measures the amount of regularity we can find.

Hi! My name is Anja Volk.
I am assistant professor in the Interaction Technology group at the Department of Information and Computing Sciences. My research area in Music Information Retrieval lies at the intersection of computer science, mathematics and music. I use computational methods to extract information from digitized music as a way to research music as a fundamental human trait. For instance, I want to understand what characteristics in the music allow us to easily dance to it, or not so easily dance to it. When do we perceive two melodies as similar? What part of a musical piece sticks to our mind the most? Computer science allows us to extract lots of information from many different pieces for answering these kind of questions. It also enables us to apply the fundamental insights we gain on music for developing music technology that offers new ways of interaction with music. For instance, I collaborate with the e-learning service Chordify that allows you to take any youtube file you want to play long, and displays the chords to the audio file such that you can play along the chords.

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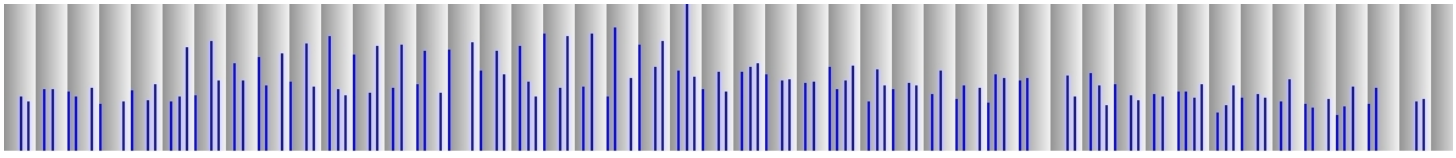
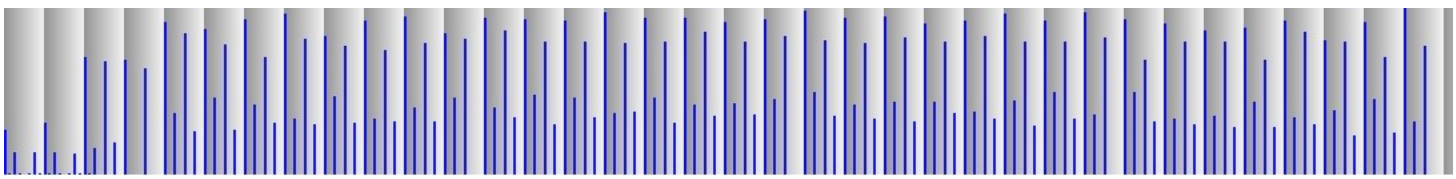
The higher the blue line, the greater is the accent of the corresponding note. Which of those pieces do you think can we easier move along?





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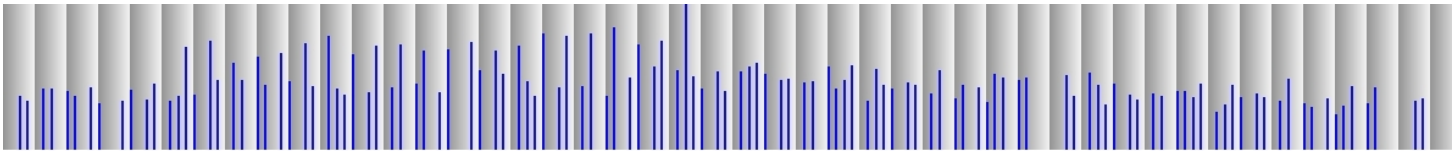
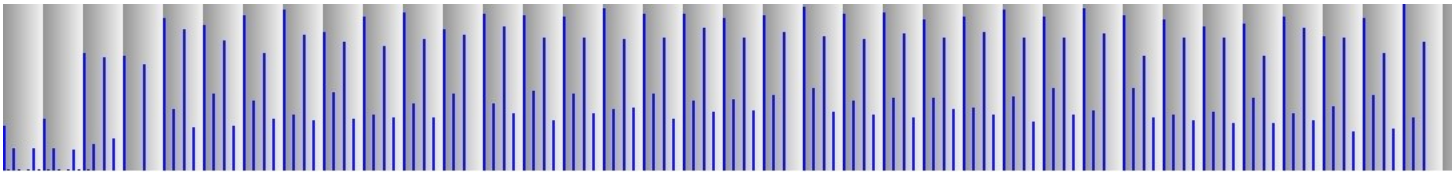
Answer!



This piece does not lead to regular accent patterns. The piece is by Anton Webern and makes it very difficult to move along.



Here we can see regular accent patterns, such that you can count along like 1-2-1-2. This musical pieces belongs to the well-known genre of Ragtime which hardly allows you to remain quietly sitting on your chair if you listen to it.

This handout has been created by WICS (**wics.sites.uu.nl**), the women's network of the Department of Information and Computing Sciences, and WIT, the Women in IT group of student association Sticky (**svsticky.nl**).

You can download this and more handouts from: **wics.sites.uu.nl/outreach**

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