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Master's thesis

Multi-instrument music transcription

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THANKS (remove entirely in case you do not with to thank anyone)

Declaration

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Abstrakt

V několika větách shrňte obsah a přínos této práce v českém jazyce.

Klíčová slova   Replace with comma-separated list of keywords in Czech.

Abstract

Summarize the contents and contribution of your work in a few sentences in English language.

Keywords   Replace with comma-separated list of keywords in English.

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[1] McGrain, M. *Music Notation: Theory and Technique for Music Notation.* Berklee guide, Berklee Press, 1990, ISBN 9780793508471. Available from: `https://books.google.cz/books?id=S_y7JAZqx6QC`

[2] Reference. An Explanation of Clefs: Treble, Bass, Alto, Tenor. [Cited 2019-10-05]. Available from: `https://makingmusicmag.com/explanation-clefs-treble-bass-alto-tenor/`

[3] of Encyclopaedia Britannica, T. E. Time signature. 11 2017, [Cited 2019-10-23]. Available from: `https://www.britannica.com/art/time-signature`

Acronyms

Musical notation

Music notation, when properly applied, can completely describe any musical score in a simple, concise manner. In order to achieve this, music notation must describe all definable parameters of each sound, specifically[1]:

- duration

- pitch

- dynamic

- timbre

Duration is described by time signature ($\frac{4}{4}$, $\frac{3}{4}$, $\frac{7}{8}$, etc.), tempo (primarily, beats per minute: ♩ = 120), and duration values of note-heads (𝅝, 𝅗𝅥, ♩, ♫, ♪, etc.) and rests (▬, 𝄽, 𝄾, 𝄿, etc.):

Pitch is defined by position of the note on the staff, key, accidentals (♭, ♯, ♮) and the specified clef (𝄞, 𝄢, 𝄡, etc.):

Dynamic of a sound describes its amplitude or loudness (!! mf, p, ff), its emotional intensity and change through time (crescendo, ..)

Timbre describes specific color of a played note/sound. Timber primarily depends on the instrument played but also can define other instrumental directions (i.e. *on bell of cymbal*, etc.)

B.1   The Staff

The base for all musical scores is the *staff*. All other music symbols go are placed on the staff or in relation to it.

The staff consists of five horizontal lines and four spaces between the lines. Every note-head is placed on one of the lines or on one of the spaces between

the lines. The higher the note-head on the staff - the higher the pitch of the produced note.

B.2   Leger Lines

Obviously, five lines and five spaces can provide only limited range of notes (precisely, eleven places to put the note-head, including just beneath the first(bottom) line and above fifth(top) line). If notes from outside this range are needed, they are placed on or between so-called *Leger lines*. These are the lines placed above or beneath the main staff only in places where they are needed, so for each note individually.

B.3   Clefs

The specified *clef* defines location of each pitch on the staff. The most commonly used clefs are the Treble and the Bass clefs[2].

B.3.1   The Treble Clef

The *Treble Clef* (or *G clef*, because the middle curl of it encircles line on the staff that represents a G-note) is used for most high-sounding instruments (i.e. violin, guitar, ukulele, flute, clarinet, saxophone, trumpet, etc.).

As it defines second line as G, the lines on the staff, from bottom to top, are E, G, B, D, F. The spaces then are F, A, C, E. The middle C[1] goes on the first leger line below the treble staff.

B.3.2   The Bass Clef

The *Base Clef* (or *F clef*, because line between two dots on the symbol represents an F-note) is used for low sounding instruments (i.e. bass guitar, cello, trombone, tuba, etc.)

As it defines fourth line as F, the lines on the staff are G, B, D, F, A, and the spaces are A, C, E, G. The middle C goes on the first leger line above the bass clef.

B.3.3   The Percussion Clef

The *Percussion Clef* is commonly used for drum-set notation. Each line and space represent different part of the drum kit. They ar often predefined at the start of the part in so-called *key* or *legend*, or when they first appear in the score.

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[1] *Middle C* is a commonly used reference note. It is a closest C to the middle of a standard 88 key piano (specifically, fourth C from the left). It is around 261.63 hertz.

B.3.4 The Alto and Tenor Clefs

Alto Clef (or *C clef*, because line in the middle of the alto staff represent middle C) and The *Tenor Clef* are less often used clefs. The viola and the alto trombone are generally the only instruments that use the Alto clef. Tenor clef is occasionally used to represent the upper ranges of the cello, double bass, bassoon, and trombone.

The lines of the alto staff are F, A, C, E, G, and the spaces are G, B, D, F. Similarly, for tenor clef, C is moved up one line from alto clef, making the notes on the lines D, F, A, C, E and notes in the spaces E, G, B, D.

B.3.5 The Great Staff

The *Great Staff* or the *Grand Staff* is a combination of the treble staff and the bass staff. Usually used by piano or harp musicians.

Often they also divide score into to parts played by left and right hand (i.e. on piano, treble clef part with the right hand, bass clef part with left hand). So, even if some notes belong to treble clef they may be put on leger lines above bass clef if played by left hand and vice versa.

B.4 Rhythmic Description

Alongside with pitch, it is required to describe rhythm. *Rhythmic description* determines exactly when note should be played and when it should stop playing. Notationally it is defined by note-heads, stems, flags, beams, rests, and time signature.

B.4.1 Note-heads, stems, flags, beams

There are two types of note heads open and closed.

Stems are vertical lines attached to the side of the notes-head. Together with flags, beams, and augmentation dots they define duration value:

B.4.2 Rests

Same as for notes, we can define pauses in music - *rests*:

B.4.3 Time signatures

Time signature is a sign that indicates the metre of a composition. Most time signatures consist of two vertically aligned numbers, such as $\frac{2}{2}$, $\frac{3}{4}$, $\frac{6}{8}$, and $\frac{11}{16}$. The top figure reflects the number of beats in each measure, or metrical unit; the bottom figure indicates the note value that receives one beat (here, respectively, half note, quarter note, eighth note, and sixteenth note). When measures contain an uneven number of beats falling regularly

into two subgroups, the division may be indicated as, for instance, $^{3+4}_{4}$ instead of $^{7}_{4}[3]$.

Contents of enclosed CD

readme.txt .... the file with CD contents description
└─ exe .... the directory with executables
└─ src .... the directory of source codes
   └─ wbdcm .... implementation sources
   └─ thesis .... the directory of LaTeX source codes of the thesis
└─ text .... the thesis text directory
   └─ thesis.pdf .... the thesis text in PDF format
   └─ thesis.ps .... the thesis text in PS format