Exam Sound and Music Technology 2018/19

Jan 31, 2019, 8:30-10:30

The exam consists of 6 questions. Please answer the questions in a compact and to-the-point manner and avoid superfluous information. The first 5 questions will each contribute 15% weight to the final grade, questions 6 will contribute 25%. When necessary, make drawings or diagrams.

Question 1 *Tone attributes and musical features*

Please name and give a 1-phrase description of:

a. three different basic perceptual attributes of a musical tone (pitched sound event)

b. four perceived musical features that arise from *relations* between pitched sound events.

c. one application context in MIR in which one of the attributes described under a) or b) plays a significant role.

Question 2 *Symbolic music processing*

a. You have been presented in course lectures and student presentations with the processing of information from symbolic music encodings for the following musical dimensions: 1) rhythm/meter and 2) melody. Name for each of the two musical dimensions one computational task/purpose that it is used for and give a 1-phrase description of the task/purpose.

b. Choose one of the two tasks/purposes from 2a and describe how the task is performed. What are the steps involved? How is the task evaluated? Typically, around 5 steps are expected.

c. We discussed in the course the research area of *automatic pattern discovery* in music. Name and shortly describe two different application scenarios which make use of extracted patterns from digitized music.

d. Name and shortly describe two musical features that are typically used for detecting patterns in music. (one sentence each)

Question 3 *Modelling Emotions in Music*

a. The BRECVEMA framework by Juslin & Västfjäll for music emotion distinguishes 8 different principles on how music induces emotion, namely Brain stem reflex, Rhythmic entrainment, Evaluative conditioning, Emotional Contagion, Visual Imagery, Episodic memory, Musical expectancy and Aesthetic judgment. Give a short description for three of these principles.

b. For the three principles you have described under 3a), which type of information extracted from digital music (high-level symbolic, low-level audio or contextual information) might be most appropriate to model the principle? Provide explanations.

c. Select two from the 8 principles listed under 3a from the BRECVEMA framework and describe in what ways they might be employed for enhancing the effects of music in games on the players.

d. Please describe the difference between *perceived* and *induced* emotion when listening to music.

e. Name and shortly describe two application scenarios from MIR for automatic music emotion recognition.

Question 4 *Chord label extraction from audio features*

a. If you would have to extract chord labels from audio – what is the technical task you would have to solve for this? Describe one accepted method for solving this problem. Describe the main steps involved that lead from the audio signal to the chord label.

b. Automatic chord label extraction is used as a subtask for several MIR research topics. Please name and shortly describe three MIR research topics that make use of automatic chord label extraction.

Question 5 *Corpus analysis*

We discussed numerous examples of corpus analyses employing computational methods in the course.

a. What do we mean by *corpus analyses*? Please shortly describe the general goals of corpus analysis in MIR.

b. Please name two examples from the course on specific corpus analyses and describe what insights have been gained about the musical corpora with the help of the computational models (except the example of chorus analysis, which is covered in question 5c). What musical features have been extracted from the corpus to answer the research questions?

c. As one prominent example of corpus analysis we discussed the *chorus analysis of popular music*, in order to investigate what distinguishes a chorus from the rest of the song. We discussed three important *psychoacoustic features* extracted from audio signals. Please name and shortly describe these psychoacoustic features (one sentence per feature).

d. Please name and describe three features that have been shown to distinguish chorus parts from other parts of popular songs. (one sentence each)

Question 6 *Sound and music in games*

a. We discussed in the course Sander Huiberts' IEZA model on game audio typologies for systematizing the different functions of sound and music in games. Please name and shortly describe the 4 types from the model that are located along the two-dimensional plane spanned by the axes of the activity/setting vs. diagetic/nondiagetic dimension. Provide for each type an example.

b. One important function of sound and music in games is to increase the player's immersion in the game. Sander Huiberts distinguishes the following three different aspects of immersion:
1 - Being transported into the game world.
2 - Absorption in the activity.
3- Identification with the situation or a character of the game.
For each aspect, describe how sound/music can be used to enhance this aspect of game immersion (one sentence per aspect).

c. Please name two compositional techniques employed by game composers to support the interactivity of games through sound and music. Give a one-sentence-description of each technique. For each technique, describe one challenge for realizing the technique.

d. Please choose one challenge that you would be interested in working on sound and music in games – think e.g. about a concrete game situation. What features that you have learned about in Module B would you consider to model/adapt to solve the challenge? How would you evaluate your approach? (indicative length: 10-15 sentences)