

Exercises for Multimedia Databases

Sheet 7 (until 17.12.2009)

Please note that you need **50%** of all exercise points to be admitted for the final exams. Exercises have to be turned in until **Thursday** before the next lecture and should be completed in teams of two students each. Write both names and “Matrikelnummer” on each page. If you have multiple pages, staple them together! Please hand in your solutions on **paper** into the mailbox at the IFIS floor or to our secretary (Mühlenpfordtstraße 23, 2nd floor). You may answer in either German or English.

Exercise 1: Query by Humming (8P)

- How does a Query by Humming music recognition system work? Shortly explain the steps based on the architecture of such systems, presented in the lectures at slide 9. (5P)
- How do we extract the melody from the wave file? (3P)

Exercise 2: Representation (10P)

Parsons code:

- What is the Parsons code representation method? (1P)
- How is matching with Parsons code performed and why can't we do note to note matching? (2P)
- What is the cost matrix and why do we need it? (1P)
- Why should it be cheaper to replace R with U or D than replacing U with D or D with U? (2P)
- On which assumption can we optimize the minimum cost path finding algorithm, and how do we do that? (2P)

Frame based representation:

- What are the advantages of frame based representation? (1P)
- What is Dynamic Time Warping and why do we need it? (1P)

Exercise 3: Hidden Markov Models (7P)

Considering the 5 elements of HMM, presented in the lecture in slides 71 and 72, draw a HMM (together with the ADSR representation of a note and corresponding observations), and explain each of these 5 elements.