Multimedia Databases Exercises
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University of Passau
Prof. Dr. Mario Döller, Prof. Dr. Harald Kosch, Kanishka Ghosh Dastidar, Alaa Alhamzeh

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Exercise 1

Subject: Multimedia and Multimedia Databases - Initial Concepts

Aufgabe 1: Signal Processing

i In the context of the Pulse Code Modulation process, explain the sampling and quantization steps.

ii The basic formulation of a sine wave is given by $f(x) = A \cdot \sin(2\pi f x + \varphi)$. Given A = 10V, what is the maximum quantization error if a uniform quantization to 5 bits is applied to this wave?

iii State the Nyquist–Shannon sampling theorem. Based on this theorem, for the composite signal given in equation (1), calculate the minimum sampling rate so that the underlying information is not lost.

iv What is meant by the term aliasing?

$$f(x) = \sin(0.7\pi x) + \sin(\pi x) + \sin(3\pi x) \tag{1}$$

Aufgabe 2: Structured and Unstructured Data

i What are the characteristics of structured, unstructured and semi-structured data. Give examples for each.

ii What are the effects of such data on databases and their query properties?

Aufgabe 3: Semantic Gap

Refer to Figure 1. Based on this picture give examples for “low level features” and ”high level features”. Following from this, how would you interpret the term “bridging the semantic gap”?

Aufgabe 4: Components of MMDB

Where does the difference between multimedia databases and “classical” databases lie? Consider in particular the different components of databases (e.g. indexing, data model, query languages...).

Figure 1: Semantic Gap