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HS2020: 11072 Advanced Networking and Future Internet

Theoretical Exercises - Week 9

Jesutofunmi Ajayi
Institut Für Informatik
Universität Bern
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Uncompressed Audio & Video (1 point)

Q1. Given the following Audio and Video parameters, calculate the required Bandwidth to transmit the (uncompressed) data.

Audio

Quality	Sample Rate (kHz)	Quantization Level	Bandwidth (Mbps/Gbps)
AM Radio (stereo)	11.025	8	
FM Radio (stereo)	22.05	16	
HD/DVD Audio	192	24	

Video

Quality	Resolution	Bits Per Pixel	FPS	Bandwidth (Mbps/Gbps)
4K Video	3840 x 2160	24	24	
5K Video	5120 x 2880	36	30	
8K Video	7680 x 4320	48	60	

Digitization of Audio Data (3 points)

Q2.

- Explain(in detail!) the steps required to transmit audio data over a network.
- What is meant by the term *Aliasing*? Give an example of how such an effect could occur during digital audio transmission.
- How can Aliasing be corrected?

Source Encoding (2 points)

Q3.

- Describe what *Source Encoding* is in regards to audio compression, and explain how examples of such encoding work.

MPEG Audio (2 points)

Q4.

- Explain the differences between Advanced Audio Coding (AAC) and Audio Lossless Coding (ALC) used in the MPEG-4 coding standard.

Pulse Code Modulation (2 points)

Q6.

- How is demodulation of PCM signals performed?
- Discuss key advantages and disadvantages of PCM digital signals over analogue signals.

Huffman Coding (5 points)

Q5. Given the following table of symbol weights, provide an appropriate encoding for symbols in the binary Huffman Code.

Symbol	Weight
A	0.3
C	0.2
E	0.1
F	0.2
I	0.1
N	0.1

- Provide appropriate encoding for message “IACEANFI”. .
- Provide appropriate encoding for your full name. (assume appropriate weighting).
- Huffman coding not require separators between elements, and the signal can be uniquely decoded. What do we call codes of this property?

Grades

- Uncompressed Audio and Video (1 Pt)
- Digitization of Audio Data (3 Pts)
- Source Encoding (2 Pts)
- MPEG Audio (2 Pts)
- Pulse Code Modulation (2 Pts)
- Huffman Coding (5 Pts)
- **Deadline: 22.11.20 at 23:55**

Q/A

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- Tofunmi Ajayi: jesutofunmi.ajayi@inf.unibe.ch