Compact Lecture

Multimedia Coding: Methods & Applications

Part 0: Overview

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Time Schedule 2008

Date	Start	End	Duration	Room	Topic	Lecturer
Wed 23 Apr	12:00	14:00	2:00	Z.1.29	Fundamentals of Signal processing	Illgner
	18:00	20:00	2:00	E.2.05	Fundamentals of Signal processing	Illgner
Thu 24 Apr	08:00	08:30	0:30	E.2.42	Fundamentals of Signal processing / Exercise	Illgner
	08:30	10:00	1:30	E.2.42	Audio Coding	Illgner
	14:00	16:00	2:00	V.1.01	Still Image Coding	Rauschenbach
	18:00	20:00	2:00	E.0.05	Still Image Coding / incl. Exercise	Rauschenbach
Fri 25 Apr	12:00	13:45	1:45	E.2.42	Video Coding	Illgner
	14:00	16:00	2:00	E.2.42	Video Coding	Illgner
	16:15	18:00	1:45	E.2.42	Video Coding / incl. Excercise	Illgner
Sat 26 Apr	08:30	10:00	1:30	E.2.42	Bearer Systems / Transmission Protocols	Rauschenbach
	10:15	12:00	1:45	E.2.42	Transmission Protocols / Service Enabler	Rauschenbach
	12:45	14:15	1:30	E.2.42	Service Enabler	Rauschenbach
	14:30	16:00	1:30	E.2.42	Broadcast Service & Business Landscape	Illgner
Fri 23 May	tba	tba	2:00	tba	Written Exam	

All 2hr lecture blocks contain a 10 min break.

Some general thoughts …

- **Please ask, if you think there is something not clear**
- **We tried to balance out fundamentals and applications. Let us know if you miss something.**
- **Please give us your feedback. This is important to optimize the lecture. We hope that you will find it useful, but let us know if you things didn't went well.**

Do you know what „Multimedia" is?

Wikipedia

> **Multimedia (Lat. Multum + Medium) is media that uses multiple forms of information content and information processing (e.g. text, audio, graphics, animation, video, interactivity) to inform or entertain the (user) audience.**
>
> ***Multimedia* refers to *the use* of (but not limited to) electronic media to store and experience multimedia content. Multimedia is similar to traditional mixed media in fine art, but with a *broader scope*. The term "rich media" is synonymous for interactive multimedia. Multimedia means that computer info can be represented through audio, graphics, image, video and animation in addition to traditional media (text and graphics). *Hypermedia* can be considered one particular multimedia application.**

Multimedia is not an issue for the consumer and receiver terminals – it is equally important for production (professional and consumer generated)

Examples

Some data rates of typical signal sources

TV (SD): 720x576@25 Hz, 4:2:0, 8bit
→ 166 Mbps

speech: 3.4kHz cut-off, 8 bit, mono
→ 64 kbps

Audio: 20kHz cut-off, 16 bit, Stereo
→ 1.28 Mbps

TV (HD): 1920x1080@25Hz (4:2:2), 8bit
→ 830 Mbps

Capacity of some transmission links:

- ISDN 64kbps
- DSL 1-3 Mbps (typical) up to 16 Mbps
- GSM 9.6 kbps (netto) / Edge N x 14.4 kbps
- UMTS typically ~384kbps (up to 10Mbps in HSDPA)
- WLAN: 54 Mbps (proprietary 108 Mbps)
- TV-cable: (862 MHz) DVB-C → ~4Gbps
- Satellite: DVB-S MUX → 38 Mbps / Transponder
  DVB-S2 MUX → 56 Mbps / Transponder

Capacity of some storage media

- PC hard discs (typical) : > 1 TByte
- USB Memorystick: up to 64 GByte
- CD: 740 MByte
- DVD: 4.7 – 15 GByte
- Blue-Ray Disc / HD-DVD 25GByte (50 GByte dual layer)

Why do we need Coding?

- **Transmission capacity not sufficient**
  - Possibly for a few parallel signals, but not for a large number of service
- **Storage capacity is limited (and will remain it)**
  - Archiving of all digital material
- **Demand per service increases (N x HD + mulitchannel)**
  - Multiple services per home in parallel
- **Necessary processing steps**
  - digitization → „ingest“ – feed the material to the “computer”
  - compression → reduction of data volume
  - Storage / transmission
  - decompression
  - visualization
- **Additional tasks by “multimedia”**
  - Combining various media or different signals (identical media, e.g. audio tracks)
  - functionality, which can be executed on the media and allow for individual usage (e.g. search, retrieval)
  - Synchronization of different media
  - Presentation of media in various contexts