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Elektrotechnik u.
Informatik

GUI based course on Digital Signal Processing in the field of Communications Technology
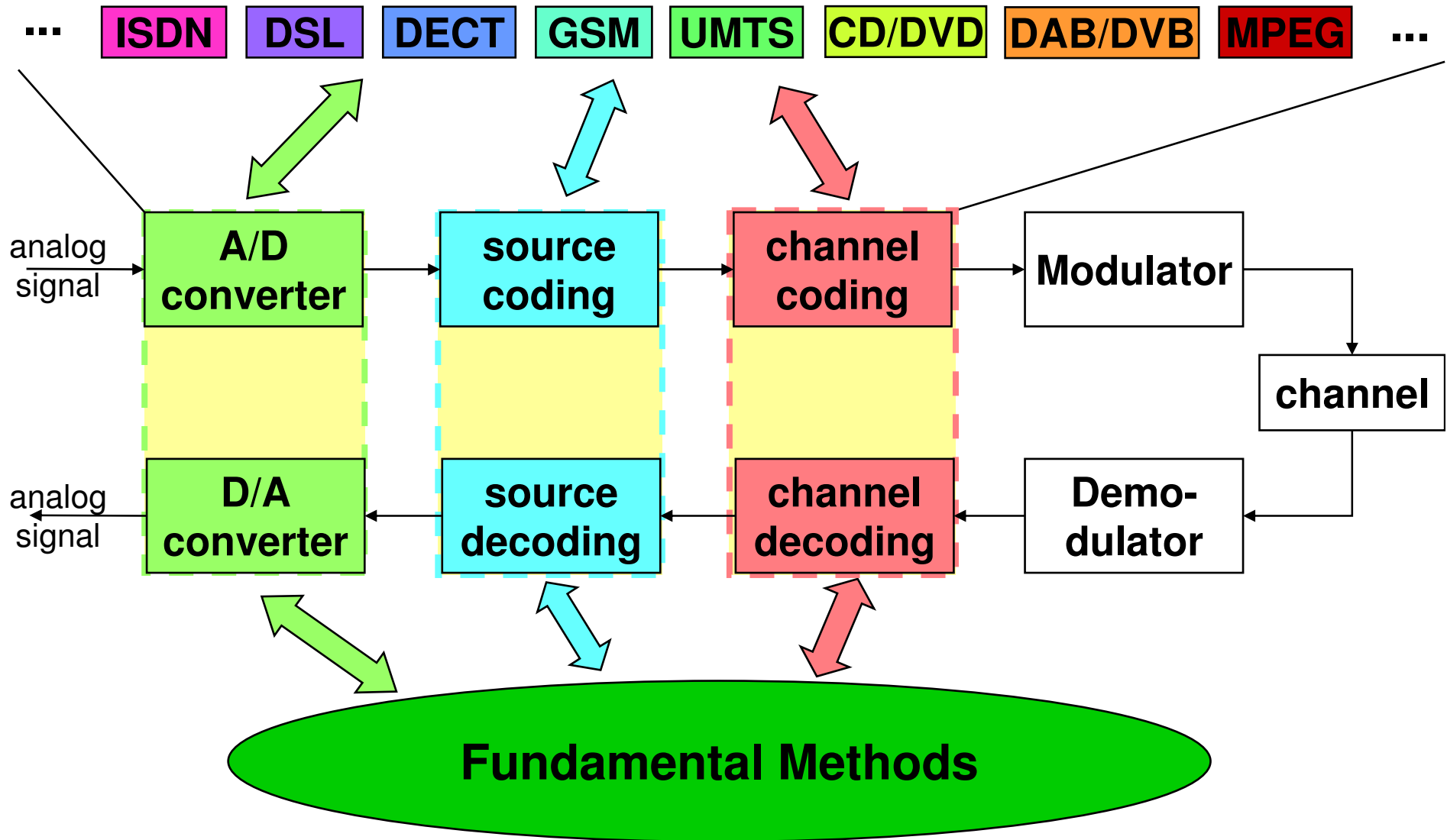
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Overview

Basic Signal Processing

Convolution

DFT / FFT

Digital filters

Correlation analysis

Source Coding

Optimal coding (Huffman)

Linear (PCM), nonlinear, adaptive quantization

DPCM

LPC based speech coding

Image processing

DCT based image coding

Channel Coding

Linear codes

Convolutional codes

DSP conference – 7th May 2003, Günter Hirsch

Presentation and on-line demonstration of a few examples

Properties and design of digital filters

Comparison of different quantization techniques
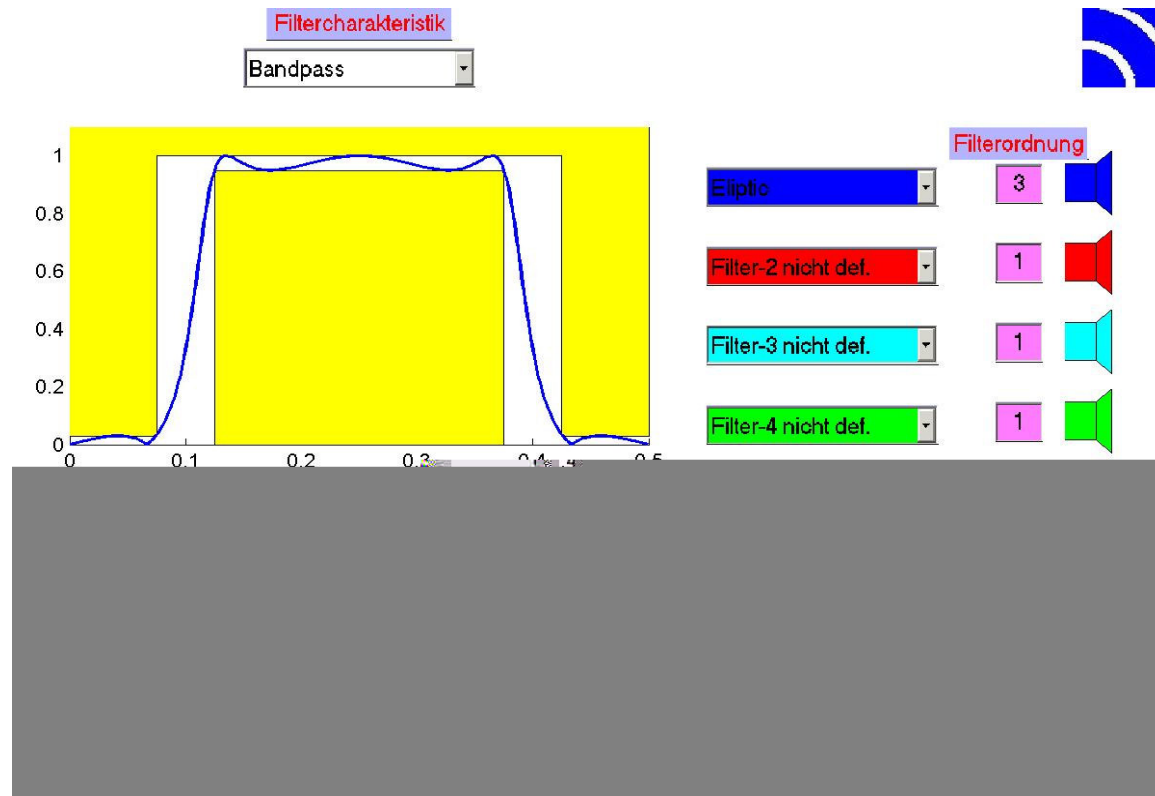
LPC based speech coding

DCT based image coding

Digital Filters

Intention

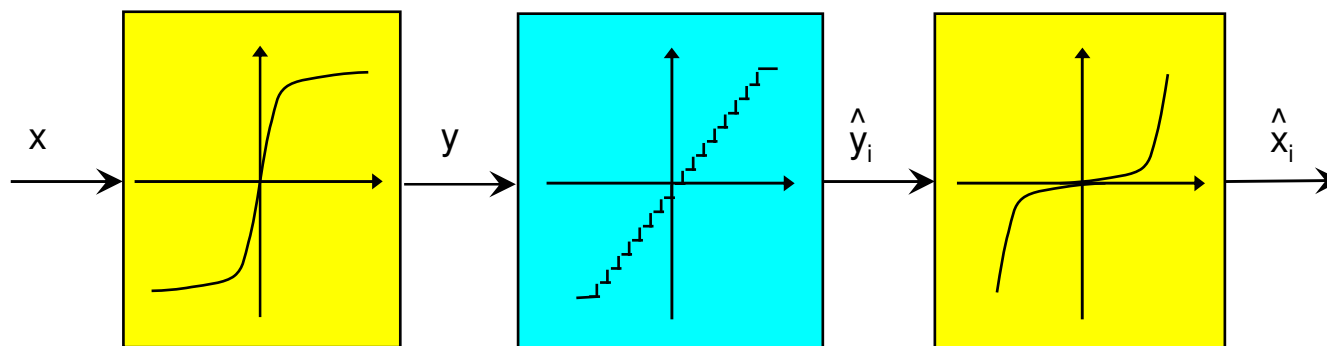Experience the properties of digital filters in time and frequency domain

Design of digital filters

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Quantization Techniques
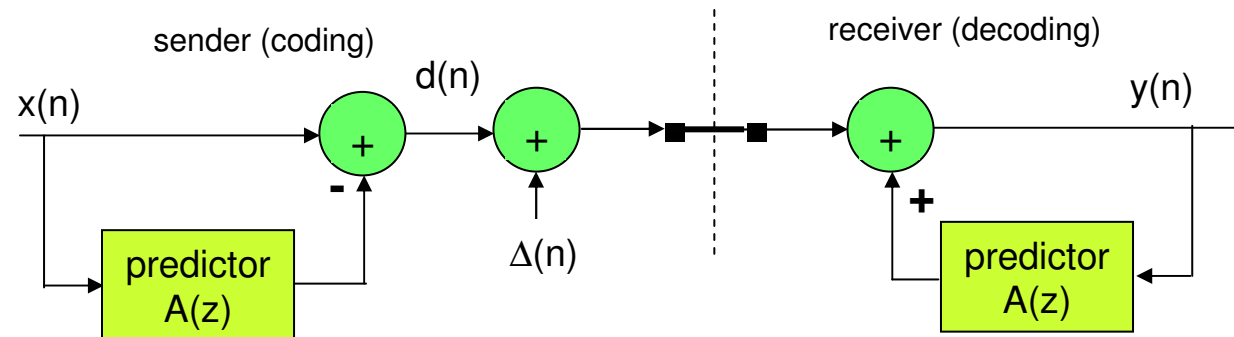
Intention

Experience the properties of

– linear (PCM) quantization

– nonlinear quantization e.g. as applied for coding speech in ISDN networks

– adaptive quantization as applied in many speech coding schemes

x → [ ] → y → [ ] → $\hat{y}_i$ → [ ] → $\hat{x}_i$ →

Intention

Experience the properties of

– LPC (linear predictive coding) based filtering

– quantization of prediction error signal

DCT based image coding

Intention

Experience the properties of

- transforming a block of pixels with a DCT (Discrete Cosine Transformation)

- coding a block of pixels with a few DCT coefficients only

8x8 pixel block

DCT coefficients

Conclusions

Course is well accepted by the students

Matlab and its easy programming of GUIs turned out to be an excellent basis for developing and setting up such a course

Future Plans

Additional experiments in the field of channel coding

GUI based analysis and visualization tools for speech recognition