Audio and Image Compression

Programme course

6 credits

Kompression av ljud och bild

TSBK35

Valid from: 2017 Spring semester

Determined by
Board of Studies for Computer Science
and Media Technology

Date determined
2017-01-25

Offered for the last time
Spring semester 2022

Replaced by
TSBK38

Main field of study

Computer Science and Engineering, Electrical Engineering, Media Technology
and Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Media Technology and Engineering, M Sc in Engineering
- Communication and Transportation Engineering, M Sc in Engineering
- Computer Science, Master's programme

Entry requirements

Note: Admission requirements for non-programme students usually also include
admission requirements for the programme and threshold requirements for
progression within the programme, or corresponding.

Prerequisites

Probability theory and basic signal processing.

Intended learning outcomes

The course should give knowledge about methods used for data compression and
how these methods are applied to audio and image signals. After taking the
course, the student is expected to be able to

- Make random models for sources
- Analyze random source models
- Understand source coding methods such as huffman coding and arithmetic
  coding.
- Understand quantization
- Understand linear predictive coding
- Understand transform coding.
- Understand subband coding.
- Calculate coding performance for different coding methods, given random
  models for the sources
- Know how different coding methods are used for compression of still
  images, video and audio data.
- Know what methods are used in different compression standards (GIF,
  PNG, JPEG, MPEG, mp3, AAC, speech kodning).

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Course content

Theory:

- Random signal models
- Lossless coding
- Entropy
- Huffman coding
- Arithmetic coding
- Lempel-Ziv coding
- Scalar quantization
- Vector quantization
- Linear predictive coding
- Transform coding
- Subband coding.
- Motion estimation and motion compensation.

Practical methods

- Still image coding: GIF, PNG, JPEG, JPEG-2000
- Video coding: MPEG-1/2/4
- Speech coding: CELP, GSM
- Audio coding: MPEG-1 audio layer I/II/III, Dolby Digital, AAC, Ogg Vorbis

Teaching and working methods

The course consists of lectures, lessons and computer lab work.

Examination

| LAB1 | Laboratory Work | 1.5 credits | U, G |
| TEN1 | Written examination | 4.5 credits | U, 3, 4, 5 |

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för systemteknik

Director of Studies or equivalent

Klas Nordberg

Examiner

Harald Nautsch

Course website and other links

http://www.icg.isy.liu.se/courses/tsbk35/

Education components

Preliminary scheduled hours: 46 h
Recommended self-study hours: 114 h

Course literature

Additional literature

Books

Khalid Sayood, *Introduction to Data Compression*
ISBN: ISBN 978-0-12-415796-5

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.