LINKÖPINGS UNIVERSITET

Data Compression

Datakompression
6 credits

Programme course

TSBK08

Valid from: 2025 Spring semester

Determined by	Main field of study	
Board of Studies for Electrical Engineering, Physics and Mathematics	Electrical Engineering, Media Technology and Engineering	
Date determined	**Course level**	**Progressive specialisation**
2024-08-28	Second cycle	A1N
Revised by	**Disciplinary domain**	
	Technology	
Revision date	**Subject group**	
	Electrical Engineering	
Offered first time	**Offered for the last time**	
Spring semester 2009		
Department	**Replaced by**	
Institutionen för systemteknik		

Course offered for

- Master of Science in Information Technology
- Master of Science in Computer Science and Software Engineering
- Master of Science in Applied Physics and Electrical Engineering - International
- Master of Science in Computer Science and Engineering
- Master of Science in Applied Physics and Electrical Engineering
- Master's Programme in Data Science and Information Engineering

Prerequisites

Probability theory

Intended learning outcomes

After having taken this course, the student is expected to be able to

- Obtain a random model for a source, given data from the source.
- Analyze random sources and calculate theoretical limits for coding performance.
- Understand and explain the concept of codes.
- Understand and explain how the following coding methods work

  - Huffman coding
  - Golomb coding
  - Arithmetic coding
  - Lempel-Ziv coding
  - Burrows-Wheeler's block transform

- Understand and explain how adaptive Huffman coding and adaptiv arithmetic coding works.
- Design different types of coders and calculate their coding performance, given random source models.
- Know where the coding methods are used in different standards.
- Implement different coding methods, test these on real data and report the results in writing.

Course content

The course deals with coding and data compression from an information theoretic perspective. Subjects:

- Random models for sources
- Source coding theory
- Entropy
- Huffman coding
- Golomb coding
- Arithmetic coding
- Lempel-Ziv coding
- Burrows-Wheeler's block transform
- Adaptive coding methods
- Coding standards
- Lossless image coding

Teaching and working methods

The course consists of lectures, lessons and laboratory work.

Examination

LAB2	Small computer project	2 credits	U, G
TEN1	A written exam	4 credits	U, 3, 4, 5

During the project, the students implement a couple of the coding methods that are taught in the course and test them on several kinds of real data. The students can choose to work alone or in groups of two.

Grades

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

Other information

Supplementary courses: Image and Audio Compression

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is "Swedish", the course as a whole could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is "English", the course as a whole is taught in English. Examination language is English.
- If teaching language is "Swedish/English", the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.

Other

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

The course is campus-based at the location specified for the course, unless otherwise stated under "Teaching and working methods". Please note, in a campus-based course occasional remote sessions could be included.