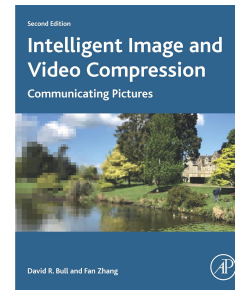# Data Compression Algorithms

Tomáš Dvořák

Fall 2023/24
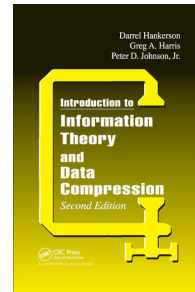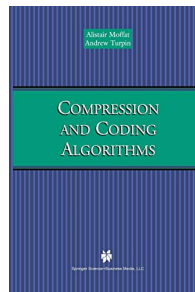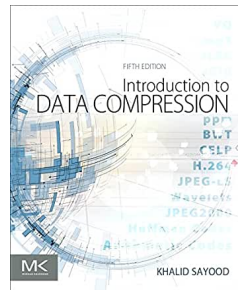
Lecture

- ⌛ 2/0 Exam
- 🕐 Tue 9:00 - 10:30 S3
- 💻 https://dl1.cuni.cz/course/view.php?id=6568

MOODLE pro výuku 1
Univerzita Karlova

Final Exam

- ✍ <u>Exam Content</u>
  - topics from the syllabus of the course
  - in the scope of the actually taught curriculum
- ✍ <u>Written Part</u>
  - 3 problems
  - cca 60 min
- 🗣 <u>Oral Part</u>
  - a discussion on your solution to the written part
  - you should be able to explain your answers
  - answering another question that may not be directly related to the content of the written part

Lecturer

☺ Tomáš Dvořák

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☎ 951 554 310

✋ MS, 4th floor, S 405

Syllabus

- Statistical methods
  - ✓ Shannon-Fano & Huffman code
  - ✓ aritmetic coding
  - ✓ theoretical limits of lossless compression
  - ✓ context methods
- Dictionary methods
  - ✓ dictionary methods of classes LZ77 and LZ78
  - ✓ applications: gzip, GIF
- Other methods of lossless compression
  - ✓ Burrows-Wheeler transform
  - ✓ application: bzip2
  - ✓ lossless audio compression

Syllabus

- Lossy data compression
  - ✓ digitization of sound
  - ✓ scalar quantization
  - ✓ A-law, μ-law
- Differential coding
  - ✓ linear prediction, Wiener-Hopf equations
  - ✓ DPCM, ADPCM
- Transform coding
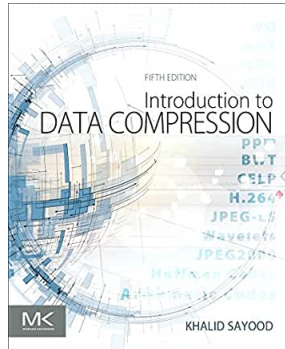 - ✓ DCT, DST, DWHT
  - ✓ JPEG standard

Syllabus

- Subband coding
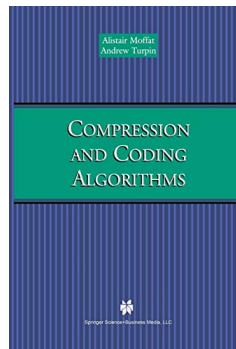 - ✓ linear filters, decomposition into subtends
  - ✓ MP3 standard
- Video compression
  - ✓ digitization of video, motion compensation
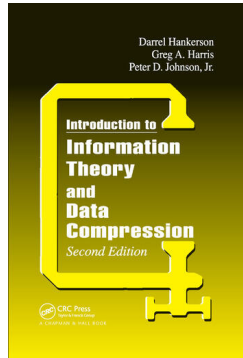 - ✓ MPEG standard

Literature

K. Sayood
Introduction to Data Compression
5th edition
Morgan Kaufmann, San Francisco, 2017

A. Moffat, A. Turpin
Compression and Coding Algorithms
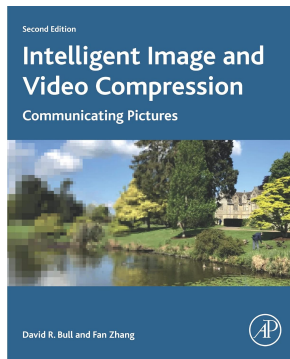Kluwer Academic Publishers, New York, 2002

Literature

G. A. Harris, P. D. Johnson, D. R. Hankerson

Introduction to Information Theory and Data Compression

2nd edition, Chapman & Hall/CRC

New York, 2003

D. Bull, F. Zhang

Intelligent Image and Video Compression

2nd edition, Academic Press

London, 2021

Literature