Image Data Compression

FAQ on oral examinations
General examination procedure

Arranging an exam
• First, you need to contact Frau Gross at IES Lehrstuhl: gaby.gross@kit.edu.
• Please write her an email, stating the subject of the exam (Image Data Compression / Bilddatenkompression), your name, your matriculation number, study program, and a desired range of dates to schedule an examination.
• She then suggests a time slot that has to be confirmed by all parties.

Arriving to an exam
• The exams are held at Fraunhofer IOSB (Fraunhoferstrasse 1) at Prof. Beyerer’s office.
• Please try to arrive at the IOSB at least 10-15 minutes in advance.
• Upon arrival, please report at the gates, obtain an ID, and then wait at the lobby for someone to meet you and escort to the Prof. Beyerer’s office.
• Please make sure that you bring your student ID and a printed registration slip!

Oral examination procedure
• The exam takes about 20-25 minutes, an official protocol is written along.
• Some questions/problems may require small calculations/drawings on paper (provided).
• The results are discussed and communicated to the you immediately after the exam.
• The grades are between 5.0 (fail) and 1.0 (excellent).
Sample examination questions

General questions
• Describe the difference between lossy and lossless image compression.
• How can one evaluate the loss of quality due to lossy compression?
• Can we hope to find “the best ever” image compression algorithm?

Coding and pre-coding
• Estimate the information content of a printed page of text.
• A source emits random iid symbols, all symbols have the same occurrence probability.
   The alphabet size is 16. Find $H_{src}$.
• Describe run-length coding, its basic idea, and practical applications where it may help.

Image compression
• Sketch the main blocks of a typical image compression toolchain. Describe the purpose of each block and name some suitable algorithms.

Watermarking and steganography
• Define watermarking of digital images and name a few applications.
• Describe the least-significant-bit scheme: basic idea, practical advantages and drawbacks.
Books to read

  (A comprehensive book on all data compression-related topics)
  (A slightly outdated but in-depth description of practical image and video codecs)
  (A nice theoretical and technical introduction to many formats, such as JPEG, MPEG, H.264)
- J. Beyerer, F. Puente León, C. Frese, Automatische Sichtprüfung, Springer 2012 (in German).
  (Foundations of optics, image acquisition and exploitation)
  (Detailed overview of WM’ing and relevant theoretical foundations)
  (General foundations of information and communication theories)
  (Digital image processing, including basics of compression, enhancement, restoration etc.)

If you don’t find an answer in the books, contact me at alexey.pak@iosb.fraunhofer.de