Summary

What we have learned in this module?

- Different multimedia data and their representations
  - Audio
  - Image/Graphics
  - Video
- Colour model and perception
  - Different colour models (benefits and applications): RGB, CMYK, YUV, YIQ, L*a*b*...
  - Chroma subsampling (why and how)




Fundamental Tools

- Nyquist theorem
- Fourier Transform and Discrete Cosine Transform: Frequency Analysis
- Information theory and basic compression techniques:
  - Run-length encoding
  - Entropy encoding (Shannn-Fano, Huffman, arithmetic)
  - LZW
  - Predictive/Differential encoding
  - Frequency Domain Compression
  - Vector Quantisation




Audio

- Processing: Digital Audio Effects [CM0268]
- Synthesis: Additive, Subtractive, FM, Wavetable, Sample-based, Granular, Physical
- Compression:
  - Traits of human hearing system
  - MPEG Audio, Dolby AC
- Representation: MIDI, MPEG-4 Structured Audio

Image

- Representations: monochrome (dithering), index (LUT), greyscale, true-colour
- Chroma Subsampling (also used in Video)
- Compression:
  - What to exploit?
  - JPEG: true colour
  - GIF: index




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Video

- Compression: What to exploit?
  - Static intra-frames compression — JPEG like
  - Motion Compensation based Prediction (H.261)
  - Bidirectional (B) frames (MPEG-1/2)
  - Object-based coding, synthetic objects (MPEG-4)
  - Various technical improvements:
    - flexible macroblock partitioning,
    - subpixel motion estimation,
    - multiple references etc. (MPEG-4 AVC)




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Beyond the Material

- Problem-solving skills,
  - e.g. the development of various methods for video compression
- Identify the challenge: what is the real problem?
- Learn the nature: what to exploit?
- Understand the practice: e.g. encoder / decoder balance

The End