H.264 video coding

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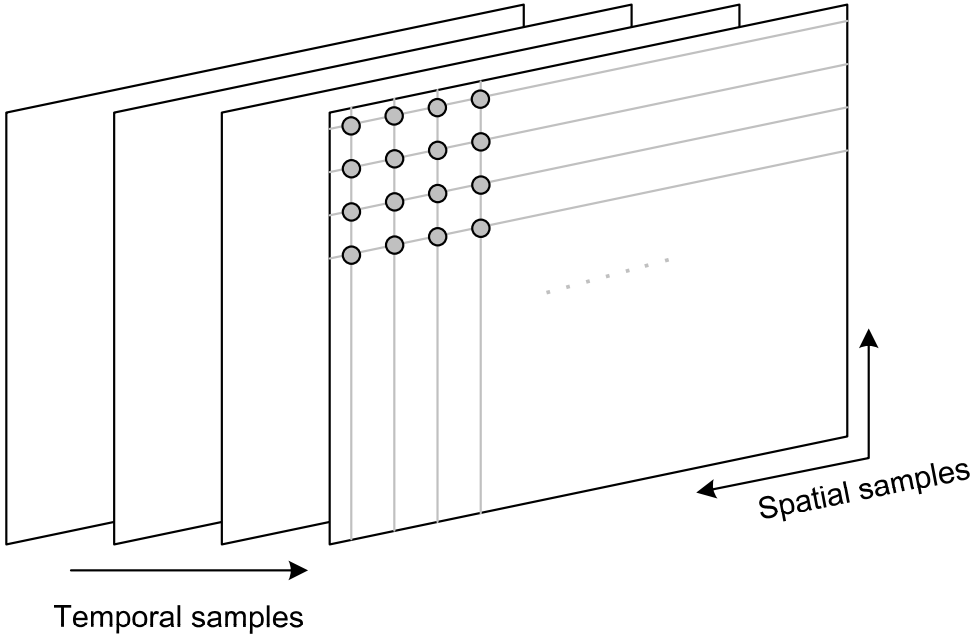
April 2009

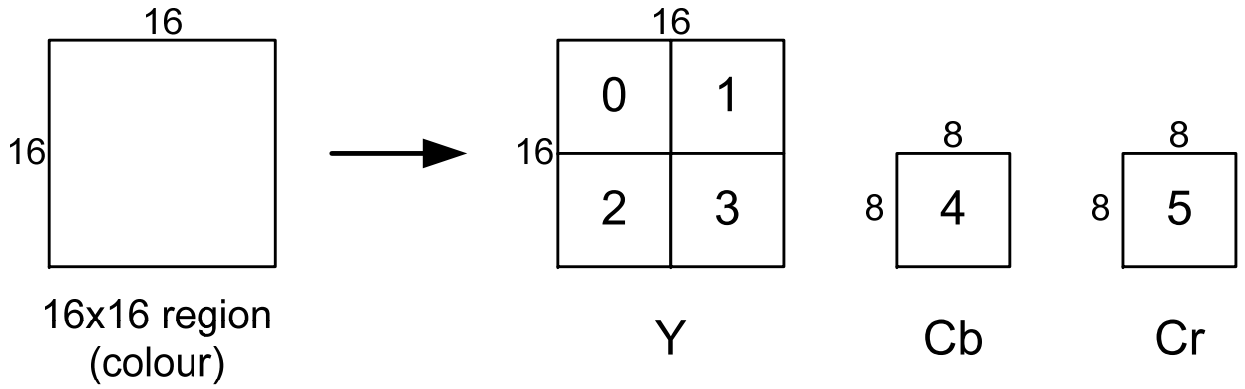
Programme

- H.264 codec overview
  - Overview of H.264
  - Coding tools and processes
  - Essentials + options
- H.264 performance and implementation
  - Performance criteria: rate, quality, computation
  - Coding tools analysis
  - Licensing
- Case study: coding mode selection
  - The problem
  - Overview of recent approaches

Digital video basics



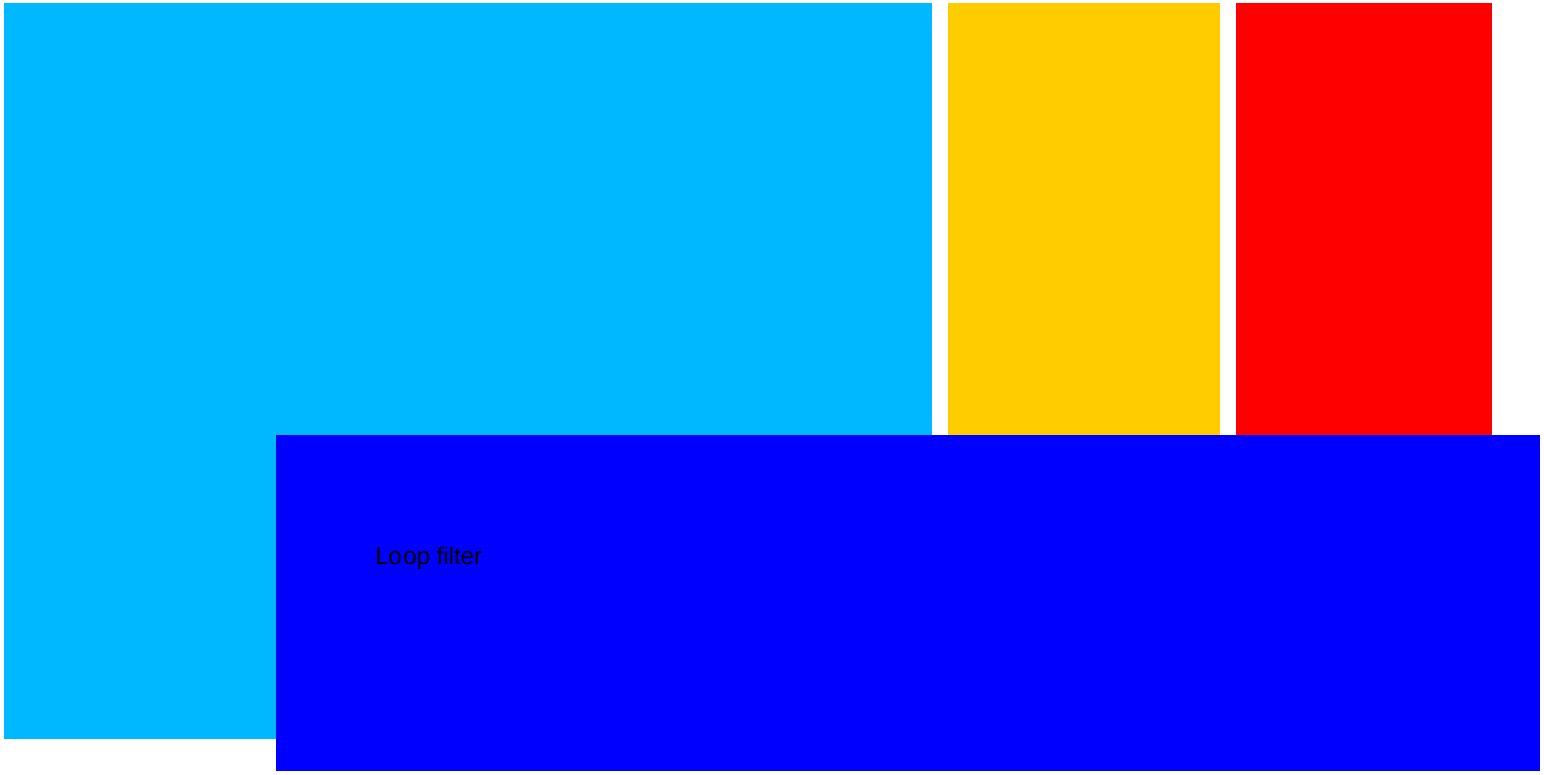
Macroblock


16
16
16x16 region
(colour)
16
16
0
1
2
3
Y
8
8
4
Cb
8
8
5
Cr
4:2:0 macroblock

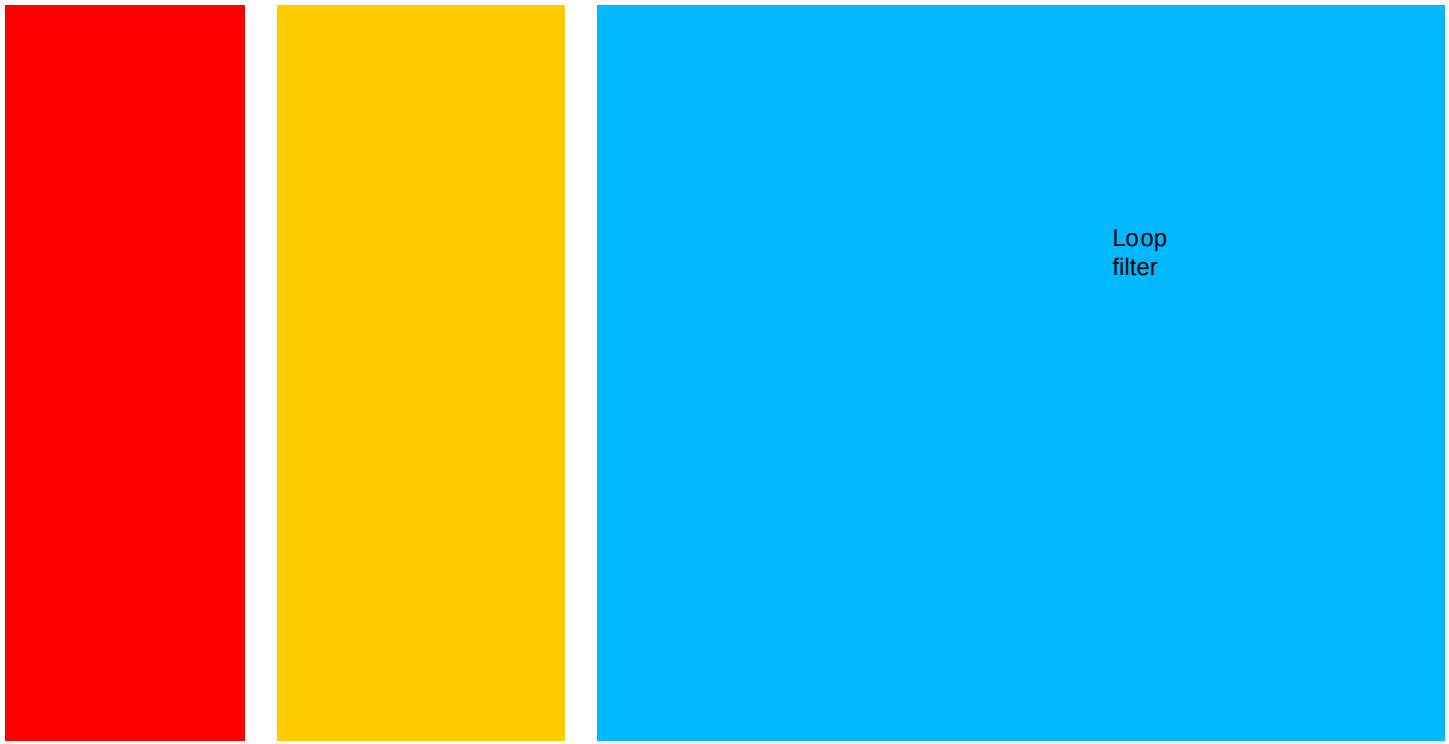
1. H.264 video coding

Scope of H.264

Encoder structure

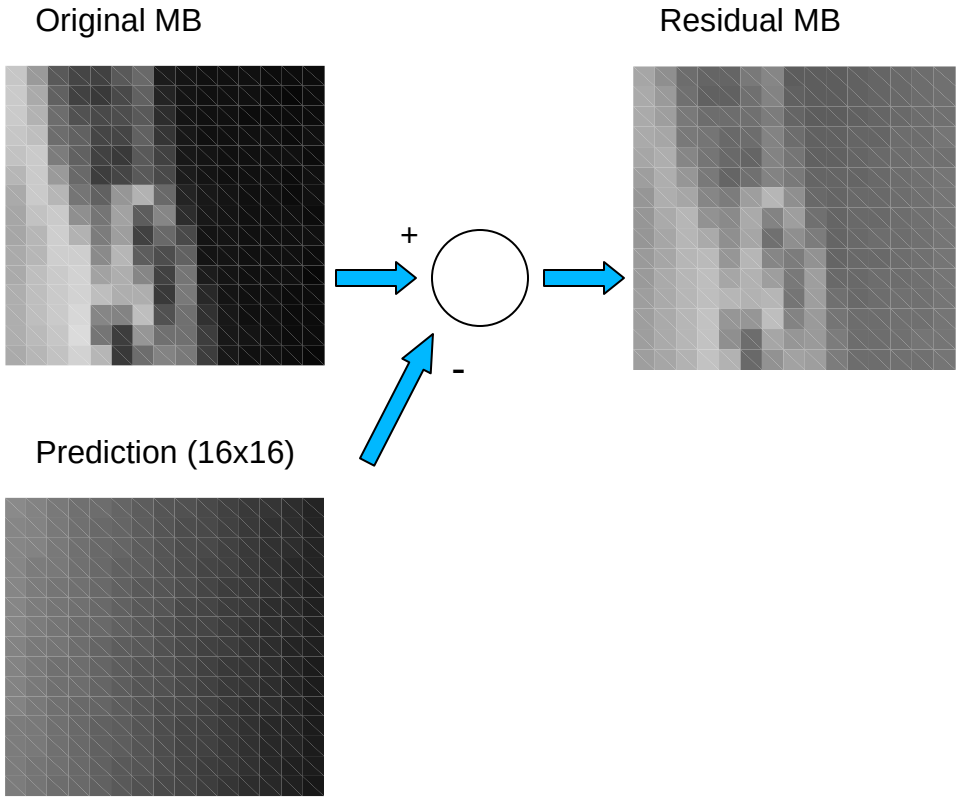


Decoder structure

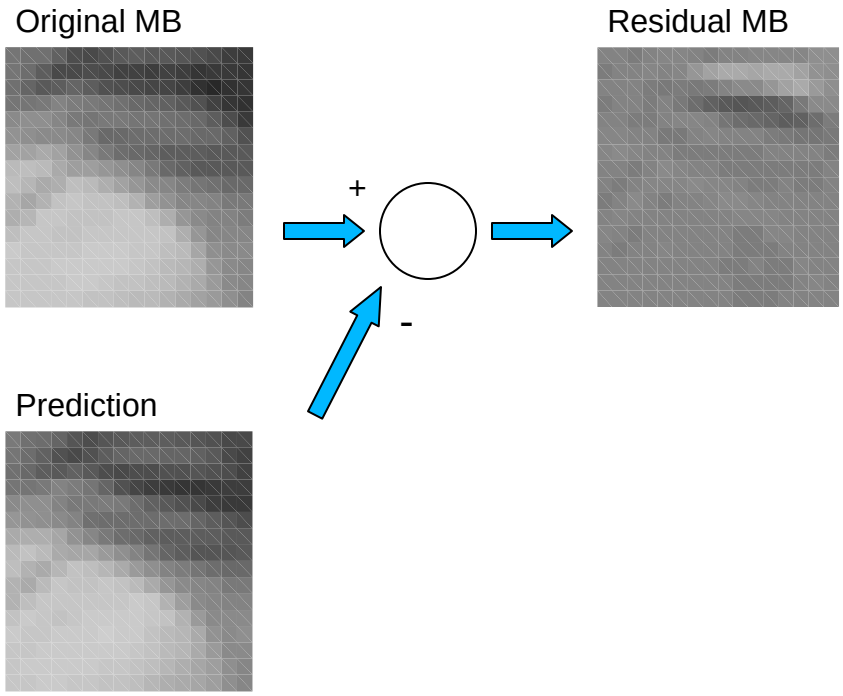


Prediction overview

Intra prediction



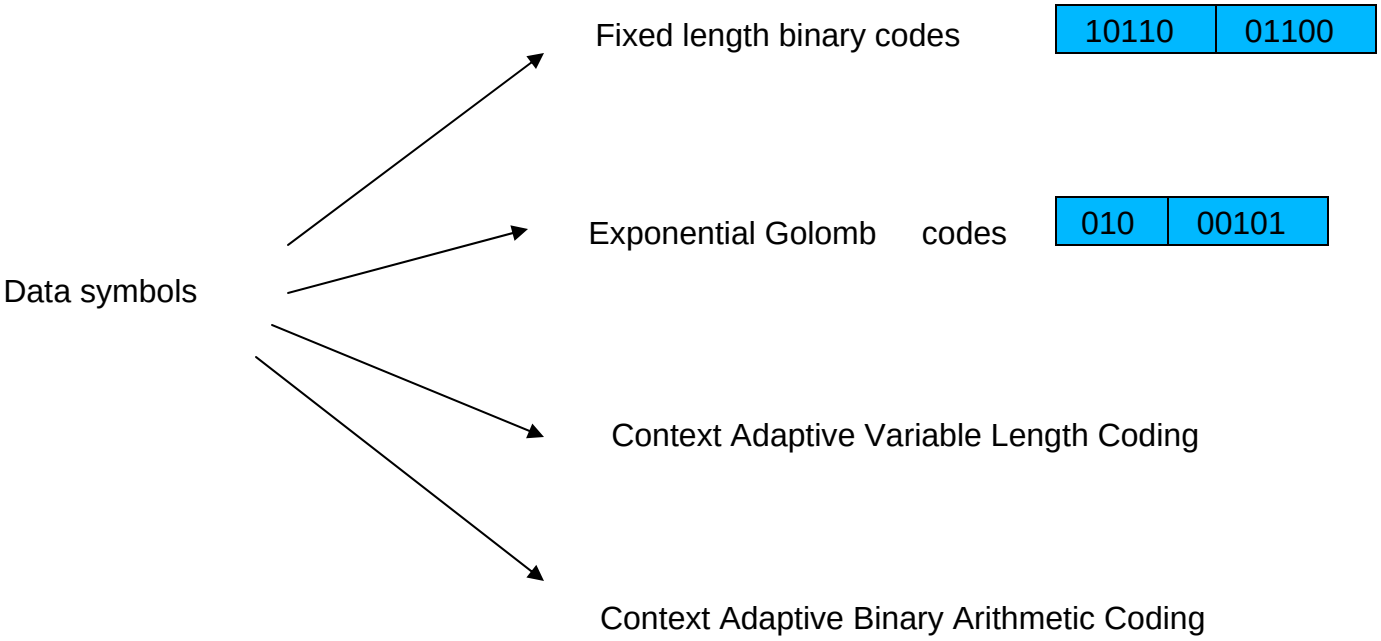
Inter prediction



Transform

Quantization

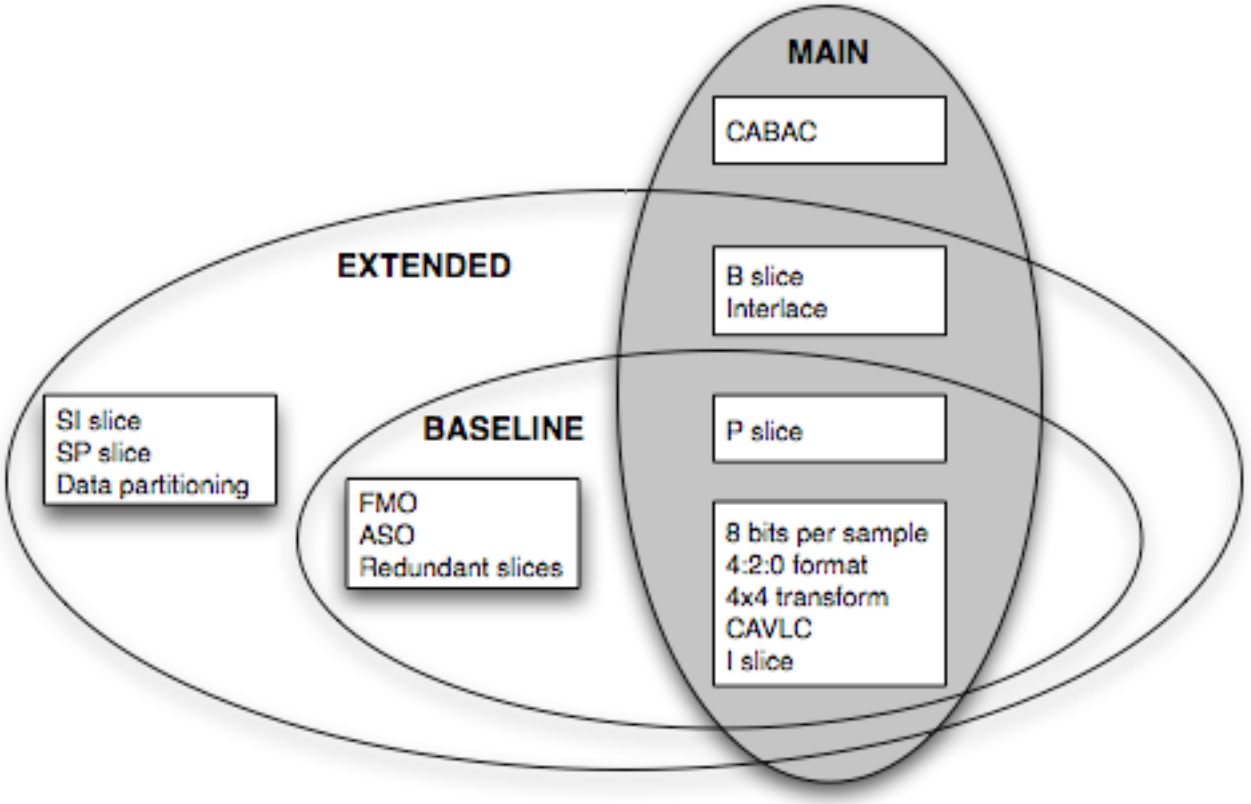
Entropy coding



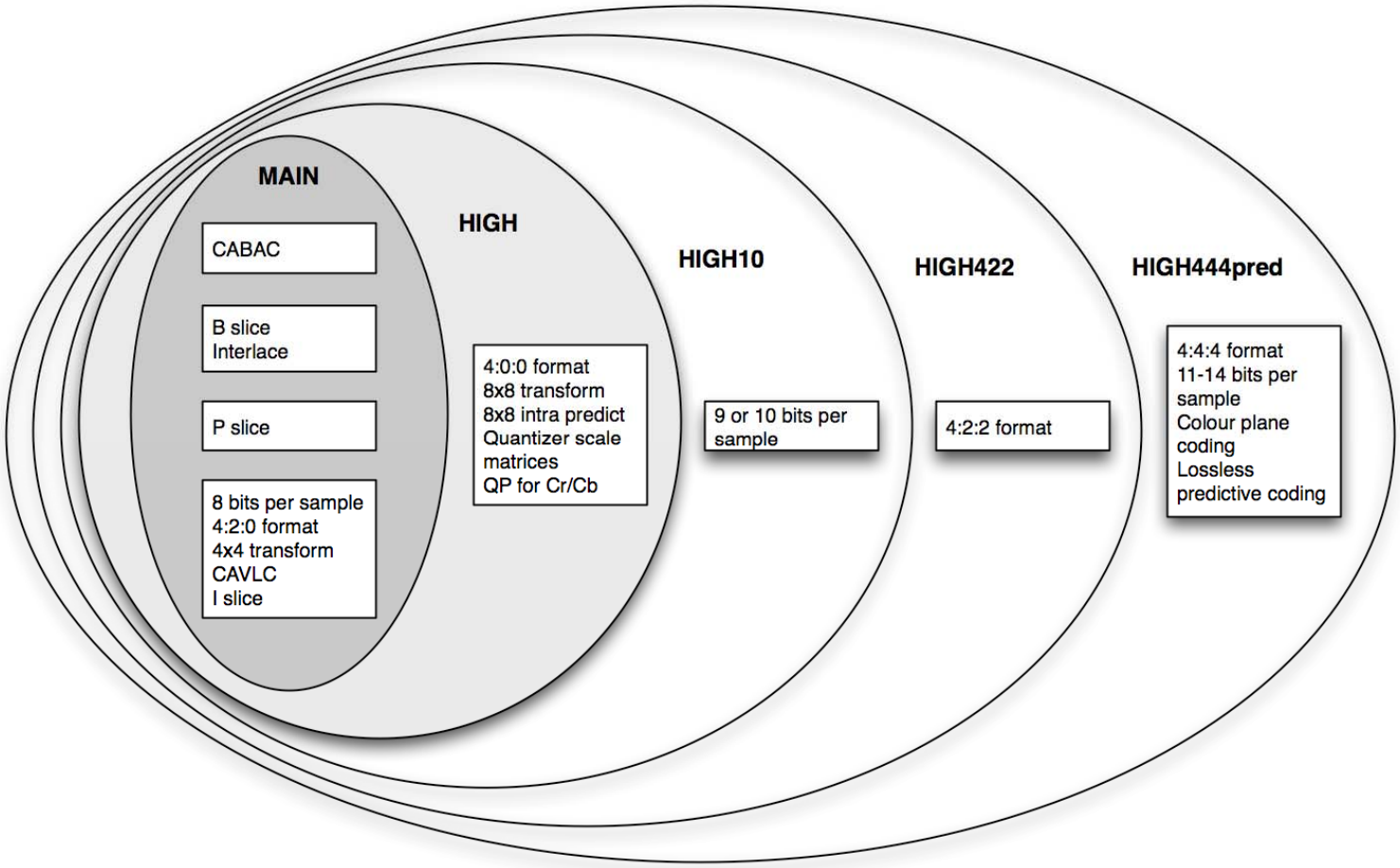
Reconstruction

H.264 syntax

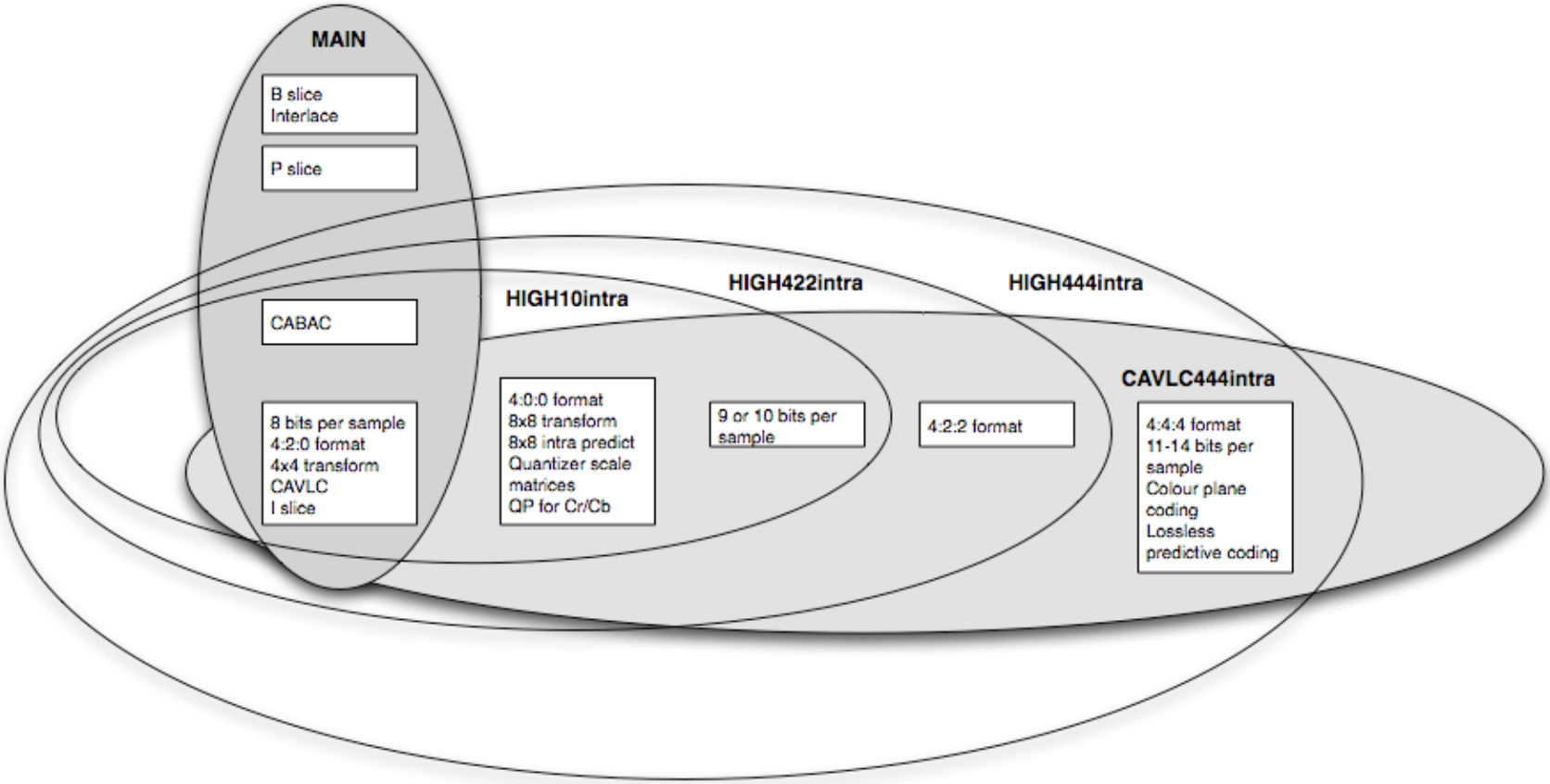
H.264 profiles



H.264 profiles



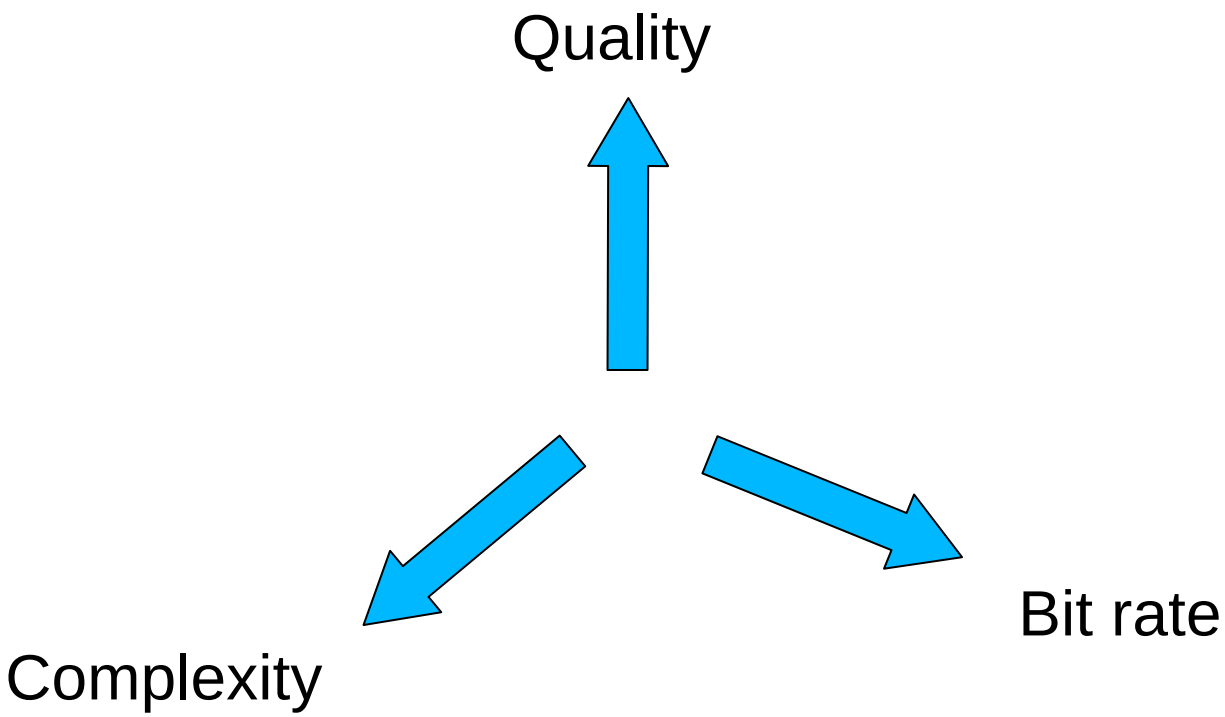
H.264 profiles



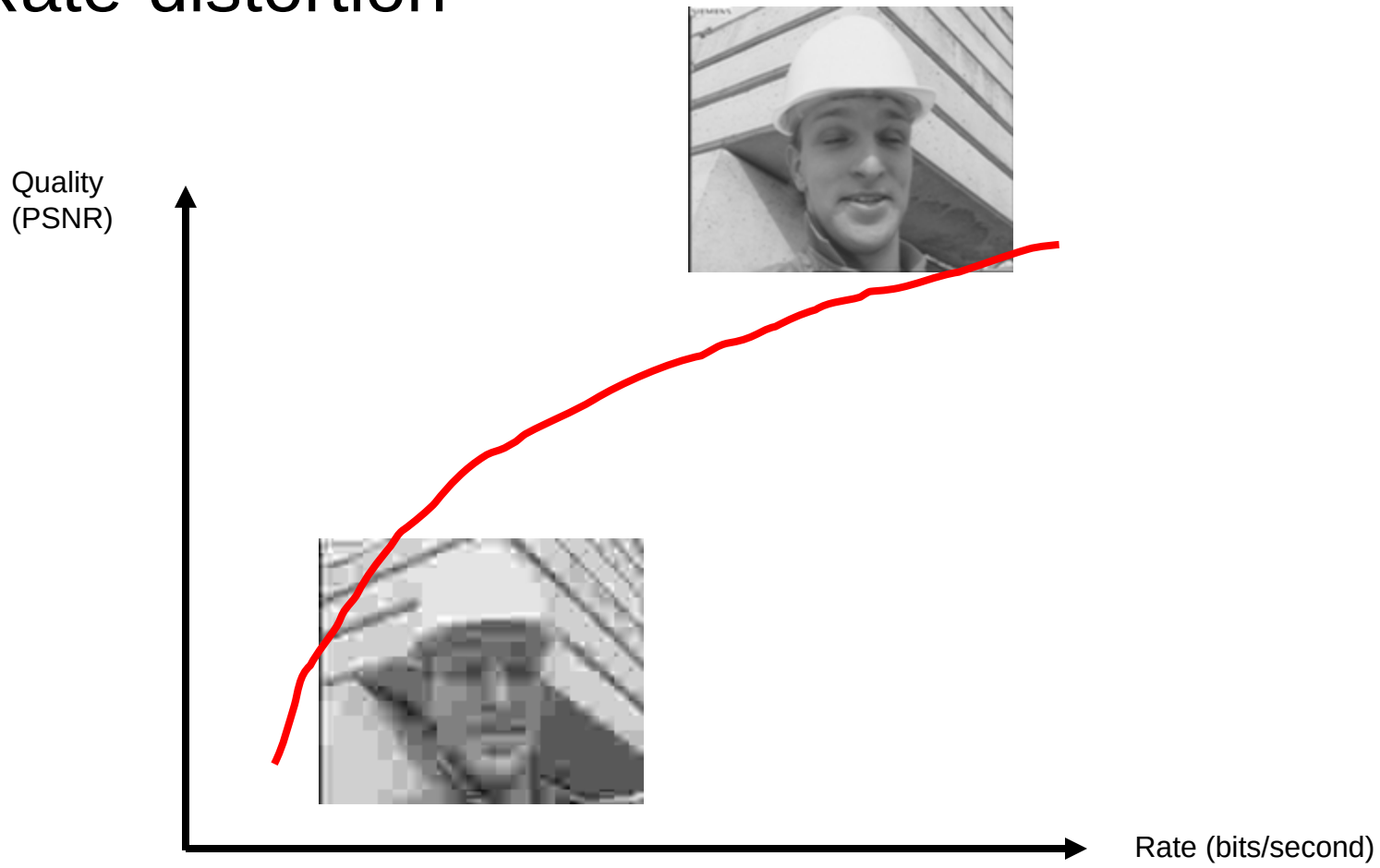
Review

2. Coding and performance

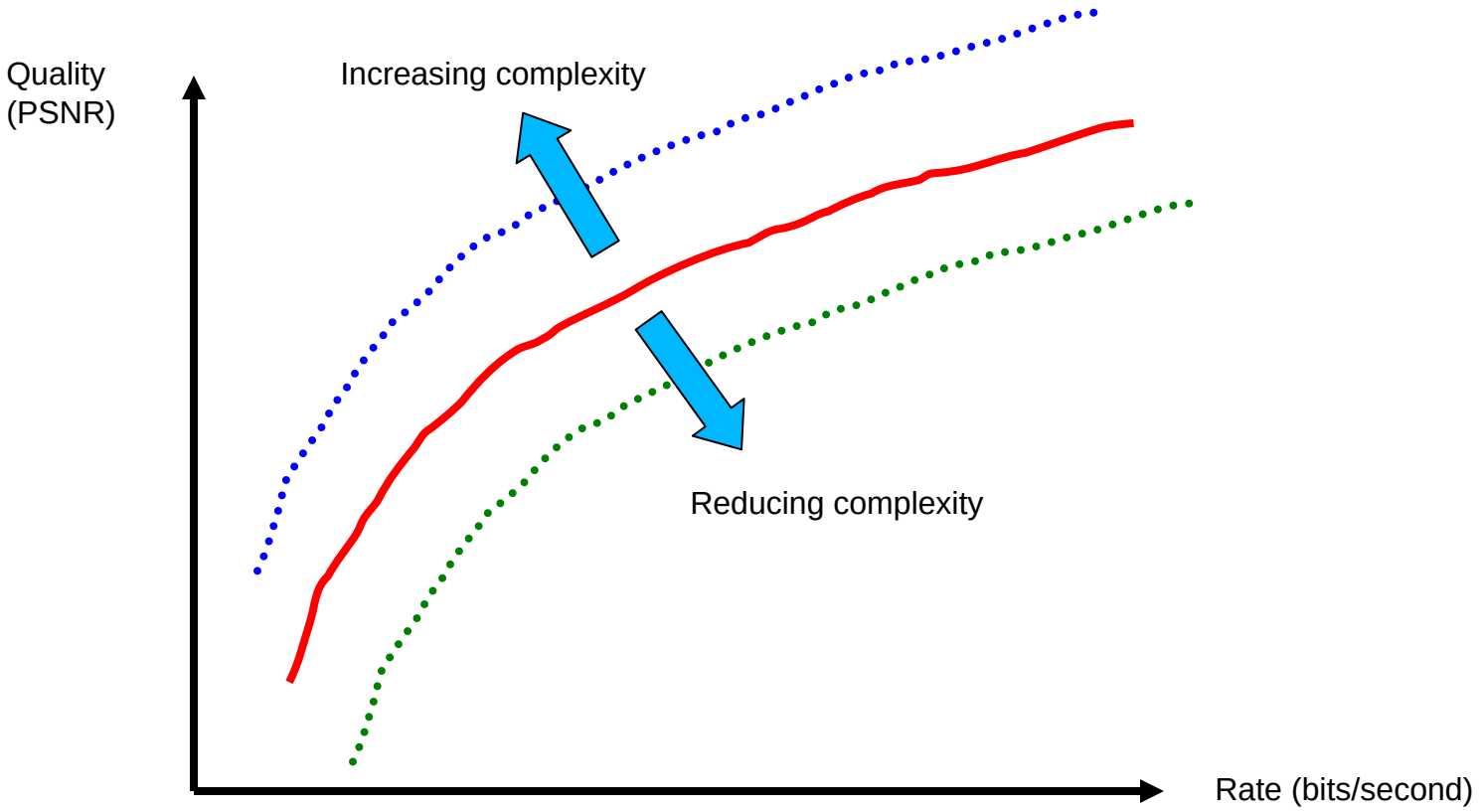
Performance criteria



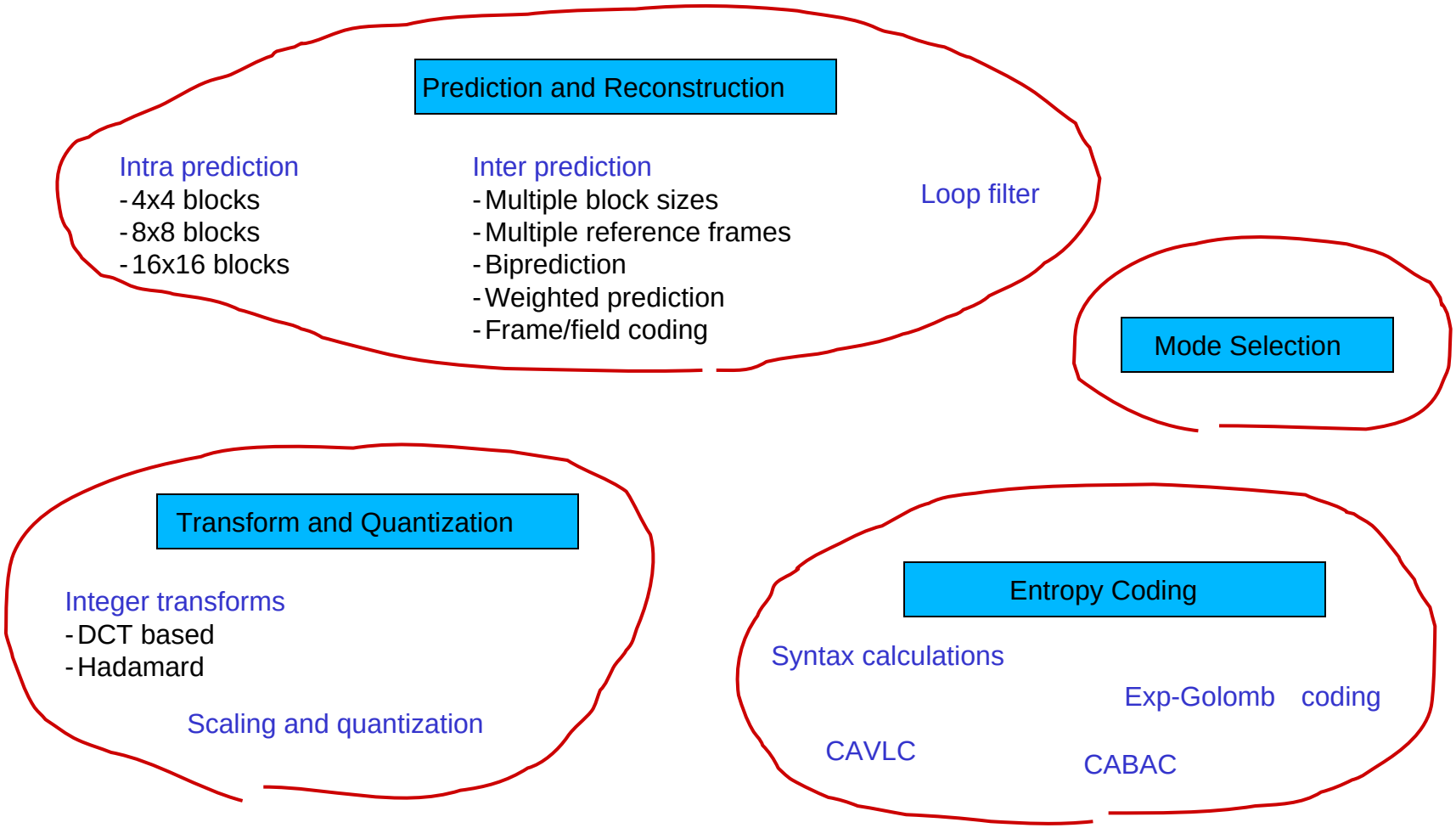
Rate-distortion



Computational complexity

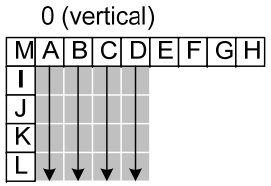


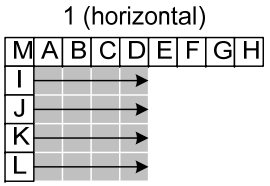
H.264 coding tools

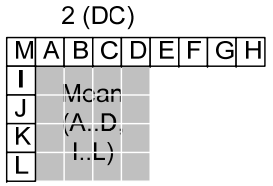


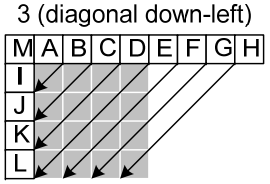
Intra prediction

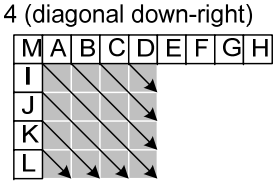
4x4
8x8 (High profiles)
16x16

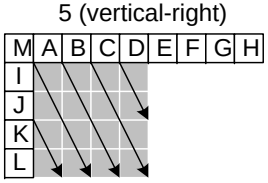


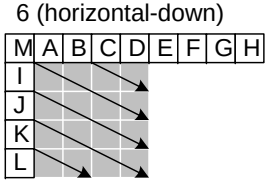


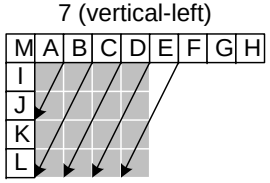


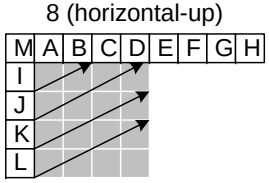




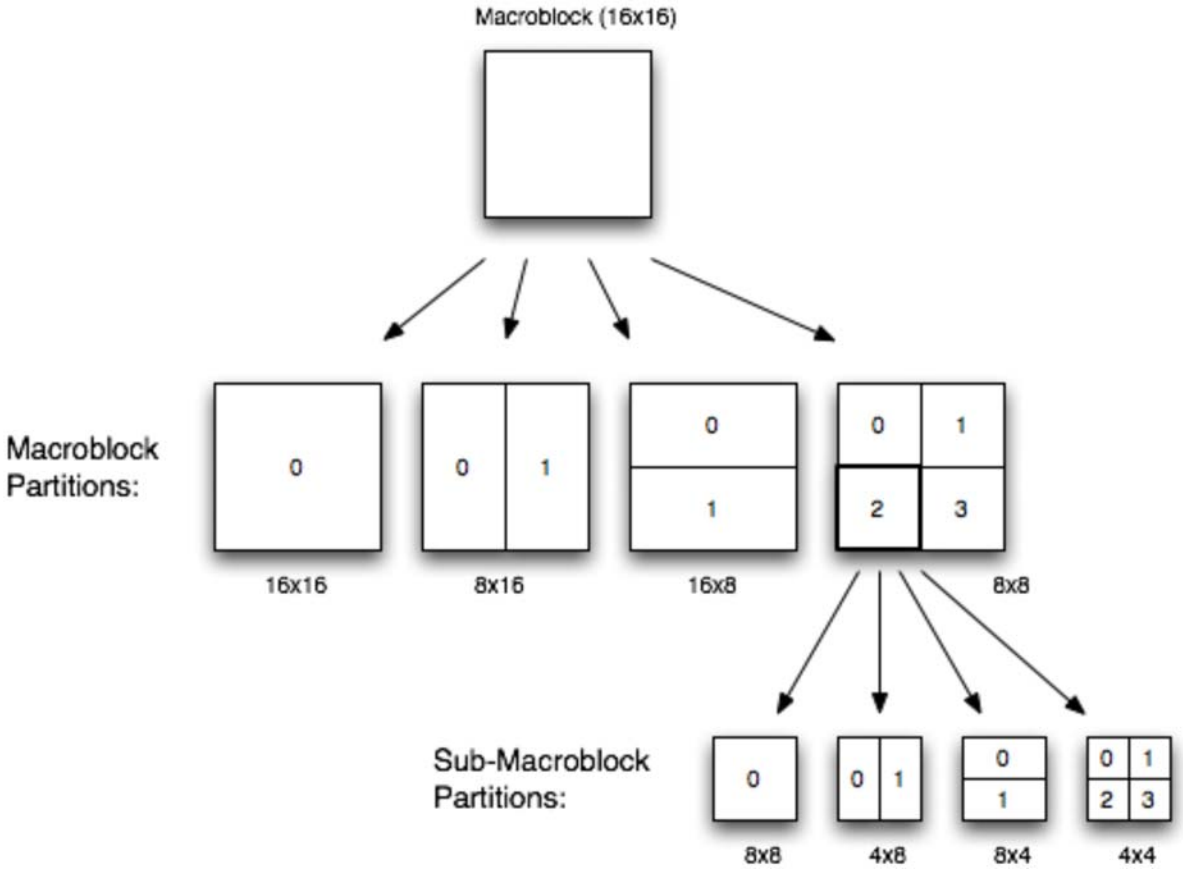




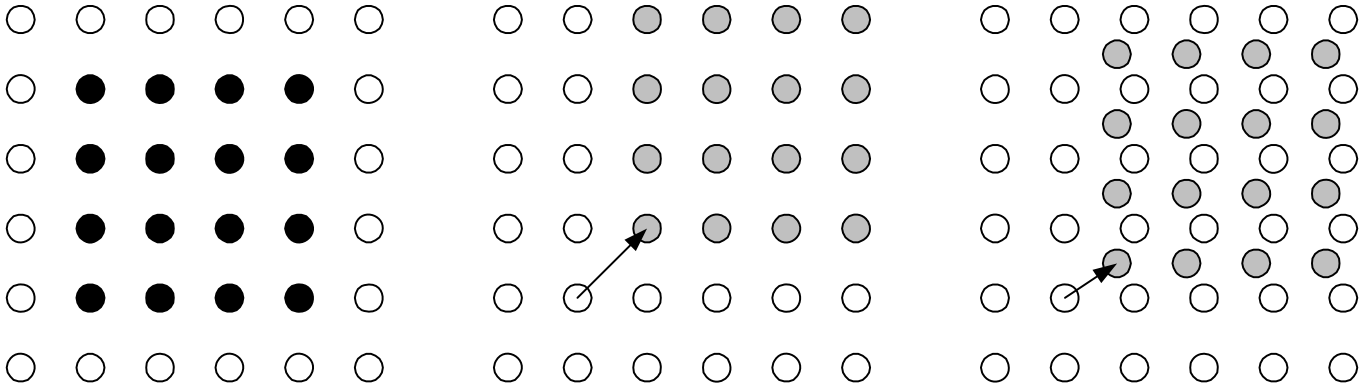




Inter prediction: Partitions



Inter prediction: sub-pixel prediction (1)



(a) 4x4 block in current frame

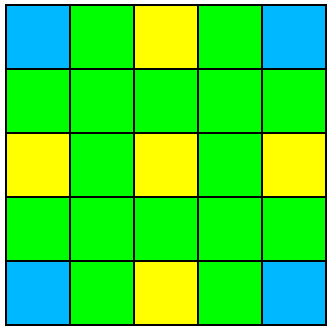
(b) Reference block: vector (1, -1)

(c) Reference block: vector (0.75, -0.5)

Inter prediction: sub-pixel prediction (2)

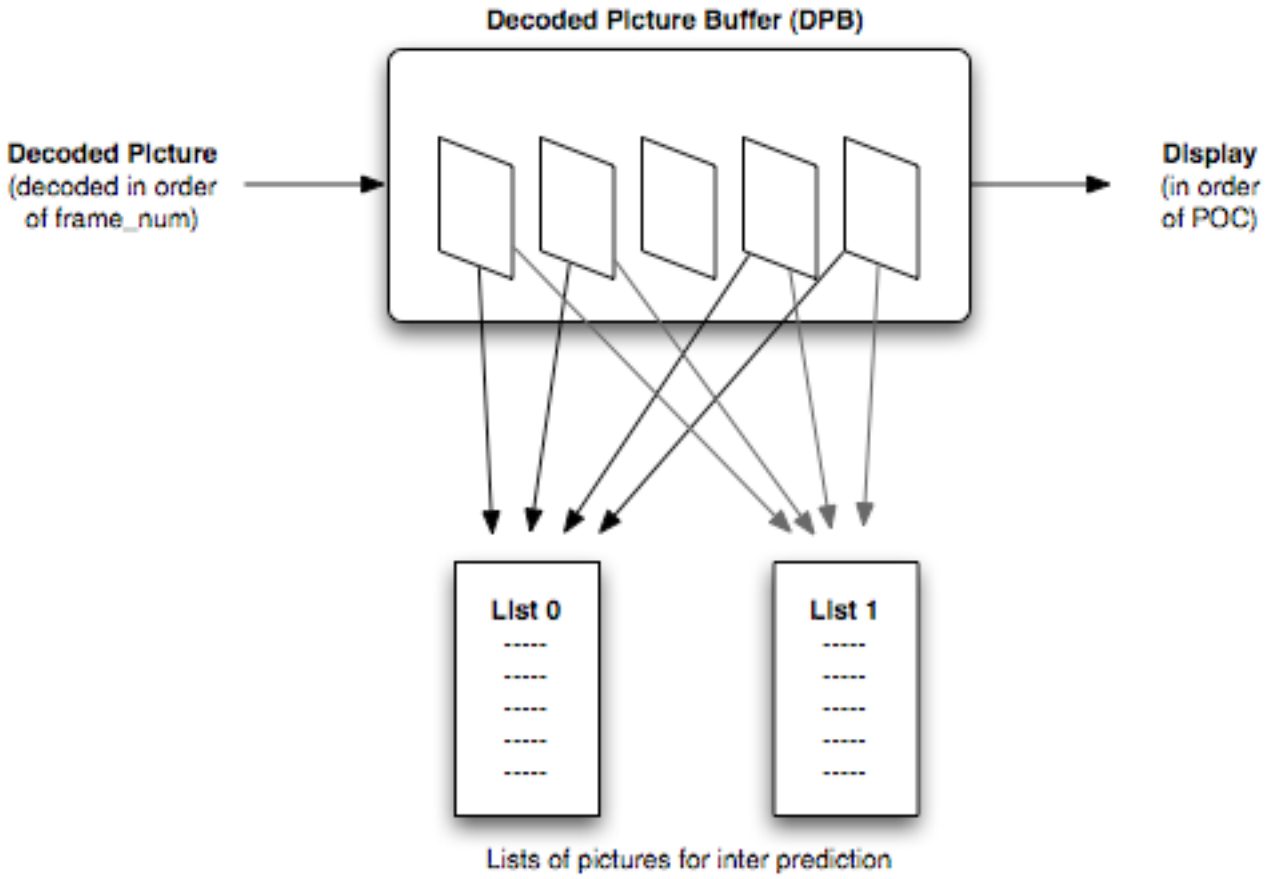
Integer samples

Half-pixel interpolated



Quarter-pixel interpolated

Inter prediction: Reference pictures



Inter prediction: P slice prediction

Inter prediction: B slice prediction