Comparison of Open and Free Video Compression Systems

A performance evaluation

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Introduction

Still images and video
   On the Web and for private use

Still images
   GIF/PNG, JPEG

Visual part of videos
   MPEG-1/2/4 Video/Visual, H.261/2/3/3+/3++/4, proprietory solutions

Issues with openess and royalties
   Quest for the one format for all

To evaluate
> Dirac, Dirac Pro
>> BBC, royalty-free, VC-2, broadcasting, streaming
>
> Theora I
>> Xiph.org Foundation, royalty-free, Web, NG browsers, unclear target applications

Reference systems
> H.264 / MPEG-4 AVC
>> Conversational services and storage
>
> Motion JPEG2000
>> Storage (Digital cinema) and streaming (Quicktime)

Dirac

Dirac/Dirac Pro
  Inter-/Intra-frame coding

Block-based hybrid codec
  Variable-length or arithmetic decoding

  Scalar inverse quantization

  Wavelet synthesis filter bank

  Overlay with predicted frame (Dirac only)

Other features
  Lossless mode

  Spatial and PSNR scalability (Pro only)

Block-based hybrid codec
    Variable-length (Huffman) decoding

    Inverse quantization

    Inverse 8x8 DCT

    Overlay with predicted frame

    In-loop deblocking filter

Limitations
    No lossless mode

    No scalability

Dimensions

    Rate (R) vs. distortion (D) vs. complexity

Measures

    (Near) RD optimization

    (Near) identical parameter sets

        Number of P-/B-frames between I-frames

        Full motion estimation search

        Etc.

Lossy inter-frame compression — SD video
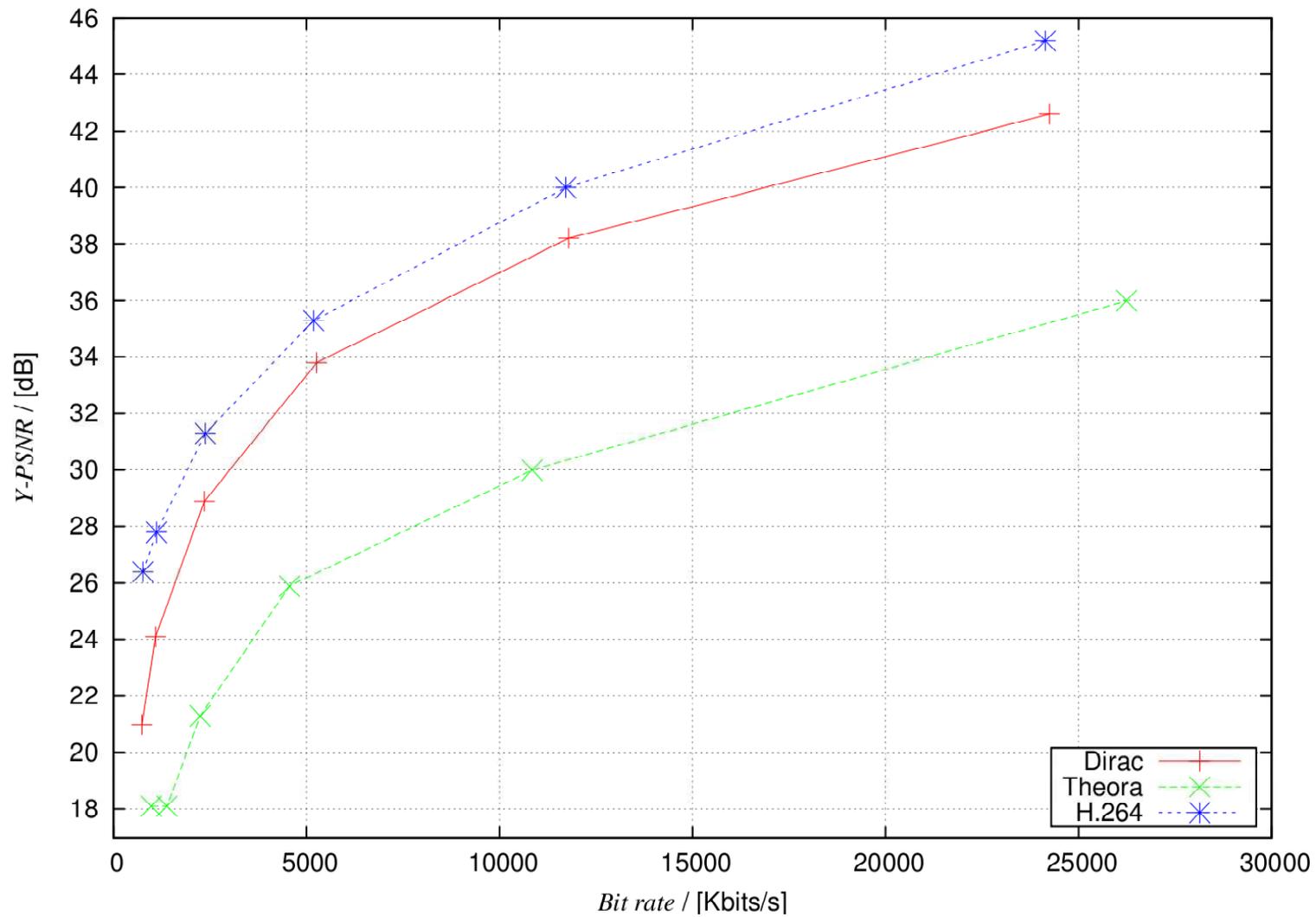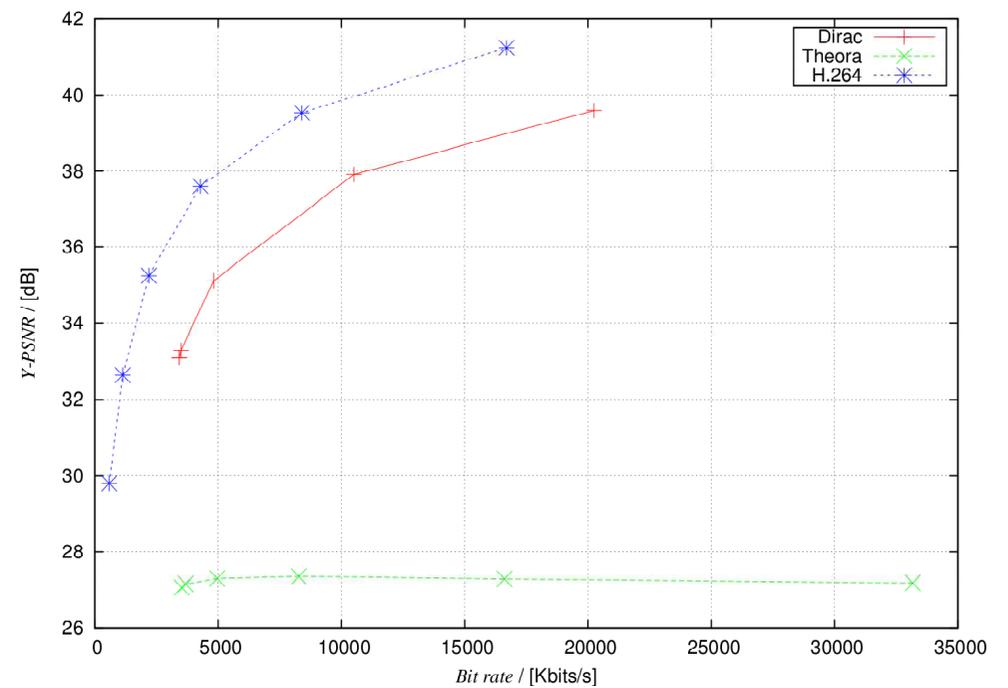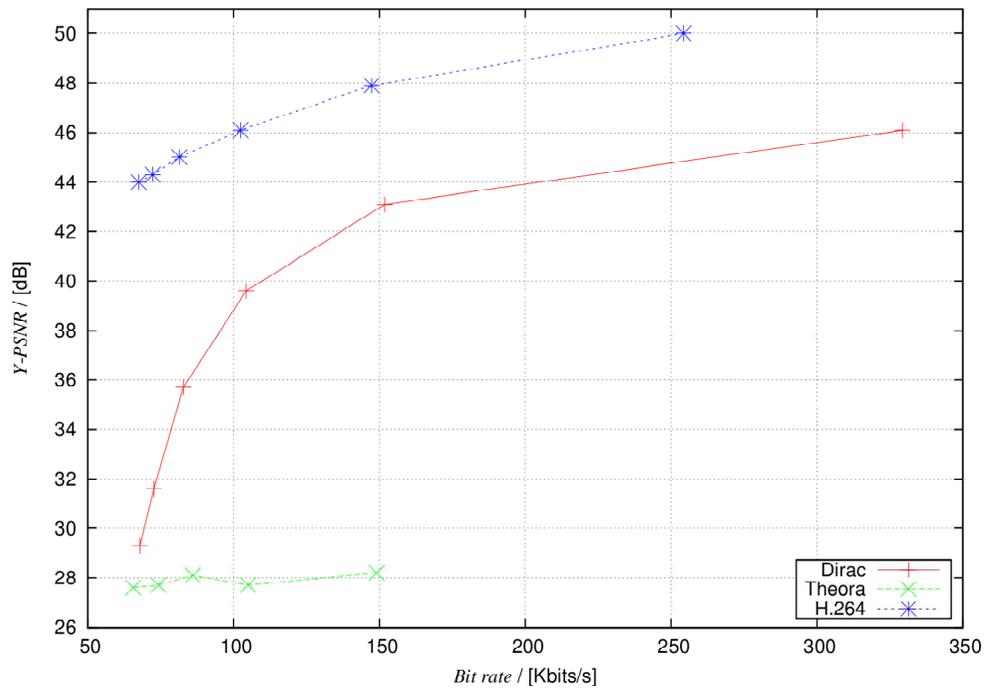
Other results
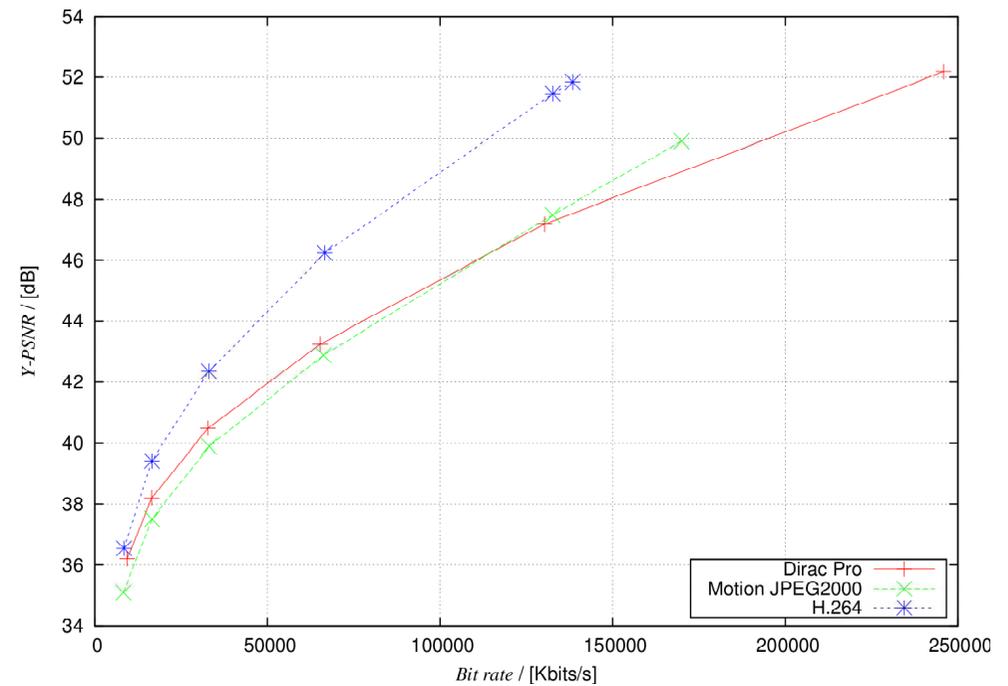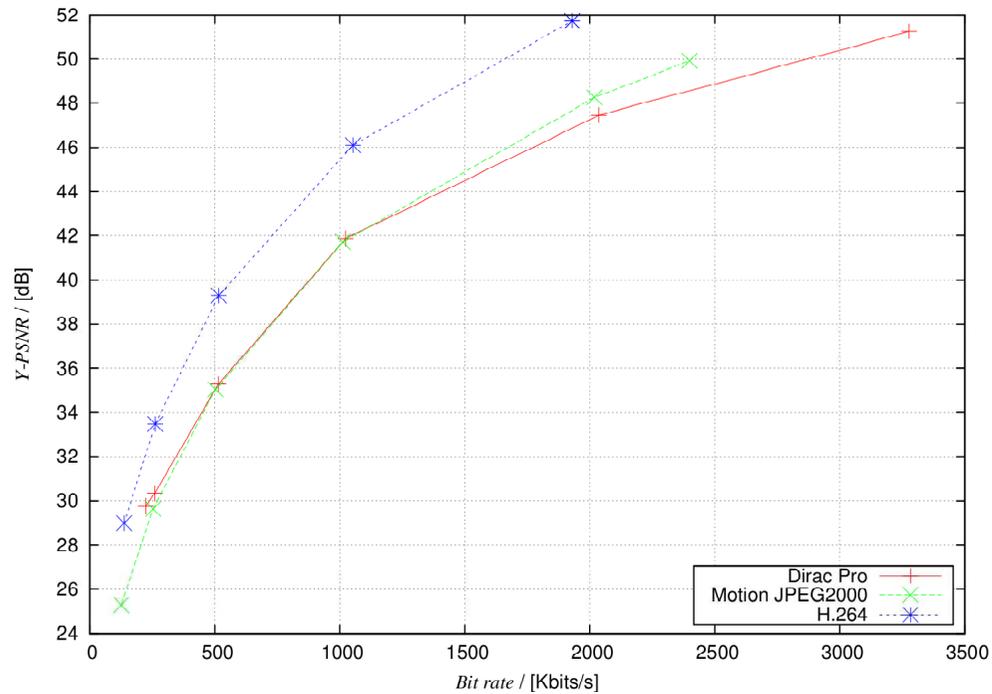
Implementation efficiency

    Lossy inter-frame compression

    Lossy intra-frame compression

    H.264 reference implementation superior

Lossless intra-frame compression

    Motion JPEG2000 superior

Conclusions

Need for cutting-edge open and royalty-free standards

Improved implementations

Better algorithms

Focus on Web and private use (storage)

Outlook

Improved existing technologies
    Dirac, Theora, H.265, Motion JPEG XR

New technologies
    Sun (Open Media Commons), others

Thank you for your attention!

Questions?