Datasets for AVC (H.264) and HEVC (H.265) for Evaluating Dynamic Adaptive Streaming over HTTP (DASH)

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Motivation

- Provide researchers with a sufficiently diversified dataset
  - number of clips and genres
- Encoded for both H.264 (AVC) and H.265 (HEVC)
  - HEVC dataset with low data-rate video suitable for evaluation networks with limited bandwidth
- Facilitate both experimental and real testbed evaluation of DASH.
- Supporting advanced objective video quality metrics (e.g., VQM)
Outline

• Dataset Overview
• A closer look
• A use case
• Conclusion and Future Work
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- *Dataset Overview*
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Dataset Overview

- Twenty three clips
  - 20 16-min + 3 ~10-min
- Six genres
  - Action, comedy, sci-fi, documentary, animation, thriller
- Two encoders
  - H.264 (AVC) and H.265 (HEVC).
- Five segment durations
  - 2-, 4-, 6-, 8-, and 10-second.
Dataset Overview

- Encoding configurations comparative to the representations and resolutions matching those used by content distribution provider.

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<th>Resolution</th>
<th>Encoding Rate</th>
<th>Quality Level</th>
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<td>384x288</td>
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H.264 v H.265 Comparison

Highest representation rate for clip 5 with a 4-second segment duration

H.264

H.265
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Types of Datasets

• Content Dataset

• Trace-Based Dataset

• Compressed Header Dataset
Content Dataset

- Based on three well-known open-source animated videos
  - Big Buck Bunny (BBB) - 9 minutes 46 seconds
  - Elephant Dreams (ED) - (10:54) and
  - Sita Sings the Blues (SSTB) - (16:00)
- This dataset provides all DASH content.
- Can be used with any DASH compatible player
Trace-Based Dataset

- Additional 20 video clips.
- Extracted from High Definition (HD – 1920 x 1080) Blu-Ray content.
- Offering clips with a mixture of fast and slow action and with static and dynamic scenes.
- All clips 16 minutes in length.
- Can be used to drive trace-based evaluations,
  - Simulators (NS3, OPNET,...etc)
  - Experimental clients (e.g. scoot player, ..)

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Compressed Header Dataset

- The header of every segment is typically composed of
  - the Movie Fragment Box ‘moof’, which is the segment meta data, and
  - the Media Data Box ‘mdat’, which contains the video and audio content.
- For every segment
  - GPAC is used to determine the header structure of the segment
  - we store the ‘moof’ and a part of the ‘mdat’ data.
Compressed Header Dataset

- Per clip, compressed header dataset offers
  - MPD file
  - the header information for the MP4 file, and
  - the compressed header information per segment

- Reduces our entire dataset of 464GB to 518MB.
- We combine the segment size information, from our trace-based dataset, and the stored actual data to reconstruct the compressed dataset. (script is released)
- Tested with **GPAC@Rawmode**
- Can be also used with experimental players
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Evaluation Setup

• We evaluate our datasets with GPAC in a real testbed

• Experiment
  • 6 streaming clients
  • sharing a link with a variable bandwidth
  • running default GPAC adaptation algorithm

• We determine per segment, the arrival time (ms), delivery time (ms), stall duration (ms), representation rate and buffer level (in seconds) at the client.
Evaluation Results

H.264

H.265
Objective Quality Assessment

- We complement our data set with
  - PSNR for each segment to enable the comparison of the encoding efficiency of H.264 and H.265
  - VQM (in progress)

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</table>
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Conclusions

• We present datasets for both trace-based simulation and real-time testbed evaluation of (DASH).
• Available in both H.264 and H.265.
• Encoded rates comparative to the representations and resolutions of popular content distribution providers.
• We offer twenty three different clips across a range of genres.
• Across five different segment durations.
• Our header-only compressed dataset offers a means of streaming our entire dataset locally.
Dataset Website

- Links to all MPD files for the Content Dataset.
- Download link for trace-based Dataset.
- Download link for PSNR values.
- The Compressed Dataset and build instructions.
- Instruction for building GPAC, and its dependencies.
- A VirtualBox VM of a fresh install of Ubuntu 14.04, complete with all required dependencies for H.264 and H.265 decoding and streaming using GPAC and our datasets.
Future Work

- Supplementing the existing datasets with a Scalable Video Coded version of both H.264 and H.265.
- Developing a Server side segment generator
  - create segments in real-time based on the requested segment, the header data in the “Compressed Dataset” and the actual segment size from traces
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http://www.cs.ucc.ie/misl/research/current/ivid_dataset

http://tinyurl.com/ivid-dataset

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Related Work

- The Dynamic Adaptive Streaming over HTTP Dataset is the first of the publicly available DASH datasets:

- Ultra High Definition HEVC DASH Data Set

- Further expanded by the Scalable Video Coding (SVC) Dataset