# Status update on the Content of the Large Scale Database
## new Metrics and How to Visualize them

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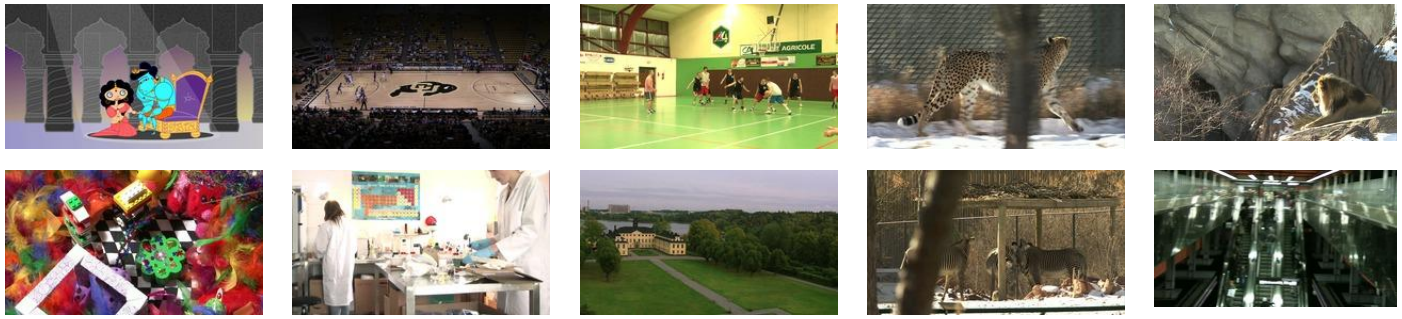
# Context

- JEG-Hybrid Large Scale Database. Current status:
  - 59,520 HEVC-encoded video sequences (1,920 HRCs)
    - 10 sources, 250 frames each, 25 fps
    - 3 resolutions: 1920x1080, 1280x720, 960x544
      (details in references, already presented in previous meetings)
    - Distortion due to encoding
    - Distortions due to encoding + data (packet) loss (~500,000 samples)



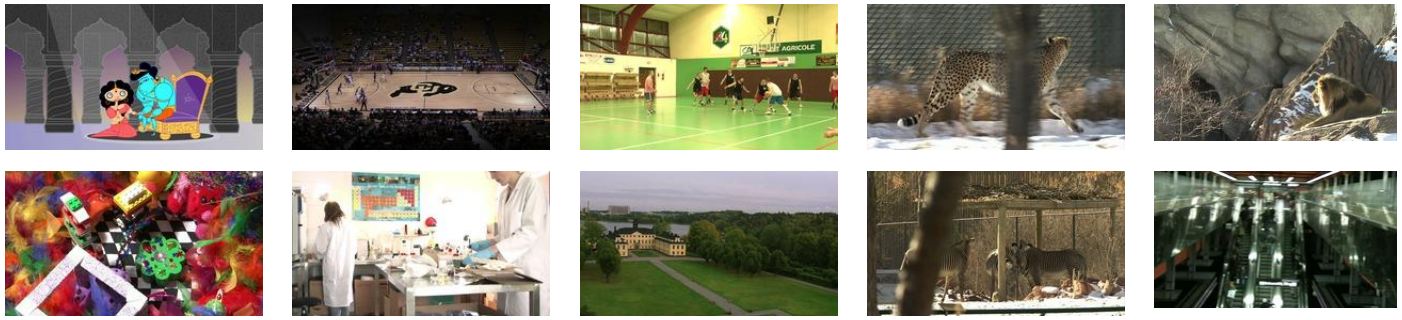
# Recent Additions

- 59,520 HEVC-encoded video sequences (1,920 HRCs)
  - 5 metrics already available: PSNR, SSIM, VIF, VQM, PVQM
  - 3 new metrics have been computed and made available recently:
    MS-SSIM, VMAF (model v. 0.6.0 and 0.6.1)

NEW!

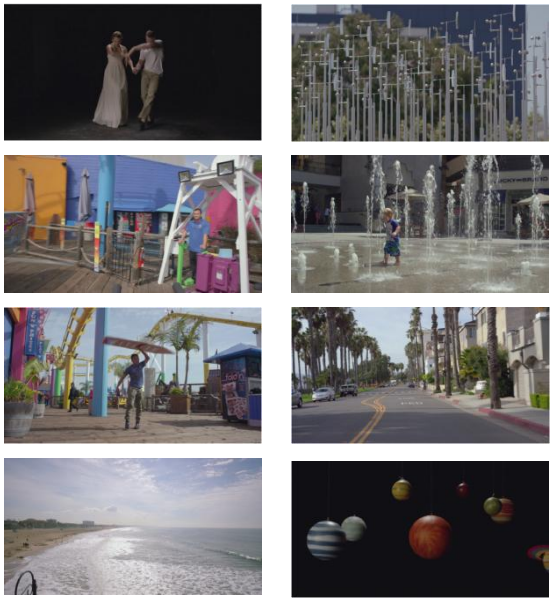
  - $PSNR_{sf}$, $SSIM_{sf}$, $MS\text{-}SSIM_{sf}$, $VIF_{sf}$ metrics also mapped to a 1-5 scale with sigmoidal fitting (parameters fitted on VQEG HDTV database and its MOS scores, thanks to Marcus Barkowsky)

NEW!



# Current Developments (in progress)

- Adding new temporal pooling methods
- Trying to better visualize the metrics to identify combinations / spots to be further analyzed through subjective experiments
- New content is being added
  - (Already presented in Los Gatos)
    - Netflix Chimera sequence
      - 8 episodes (5, 9, 10, 11, 12, 16, 17, 18)
      - 46 scenes (14, 1, 8, 3, 5, 8, 6, 1)
    - Frames: 21,880 total (about 12 min)
      (for each episode:
      3420, 4300, 2310, 3090, 2400, 2250, 2910, 1200)
    - Resolution: 4K, 2K, 1K
      (through downsampling)
    - Frame rate: 29.97 fps
    - Encoder: x265 with different presets



# Temporal Pooling (in progress)

- For the “frame based” metrics
  PSNR, SSIM, MS-SSIM, VIF, VMAF:
  - Pooling proposed in the VMAF software
    - Average of consecutive absolute differences (Total_variation), average of simple or exponential moving averages, harmonic mean, L(n) norm, 1,5,10,20-th percentile
  - Pooling (“collapsing function”) suggested in NTIA TR-02-392
    - 10, 25, 50, 90-th percentile, above90%tail (i.e., mean of above90 values minus value at 90)
  - Others?
    - Geometric mean
    - std deviation (indication of variation over time)

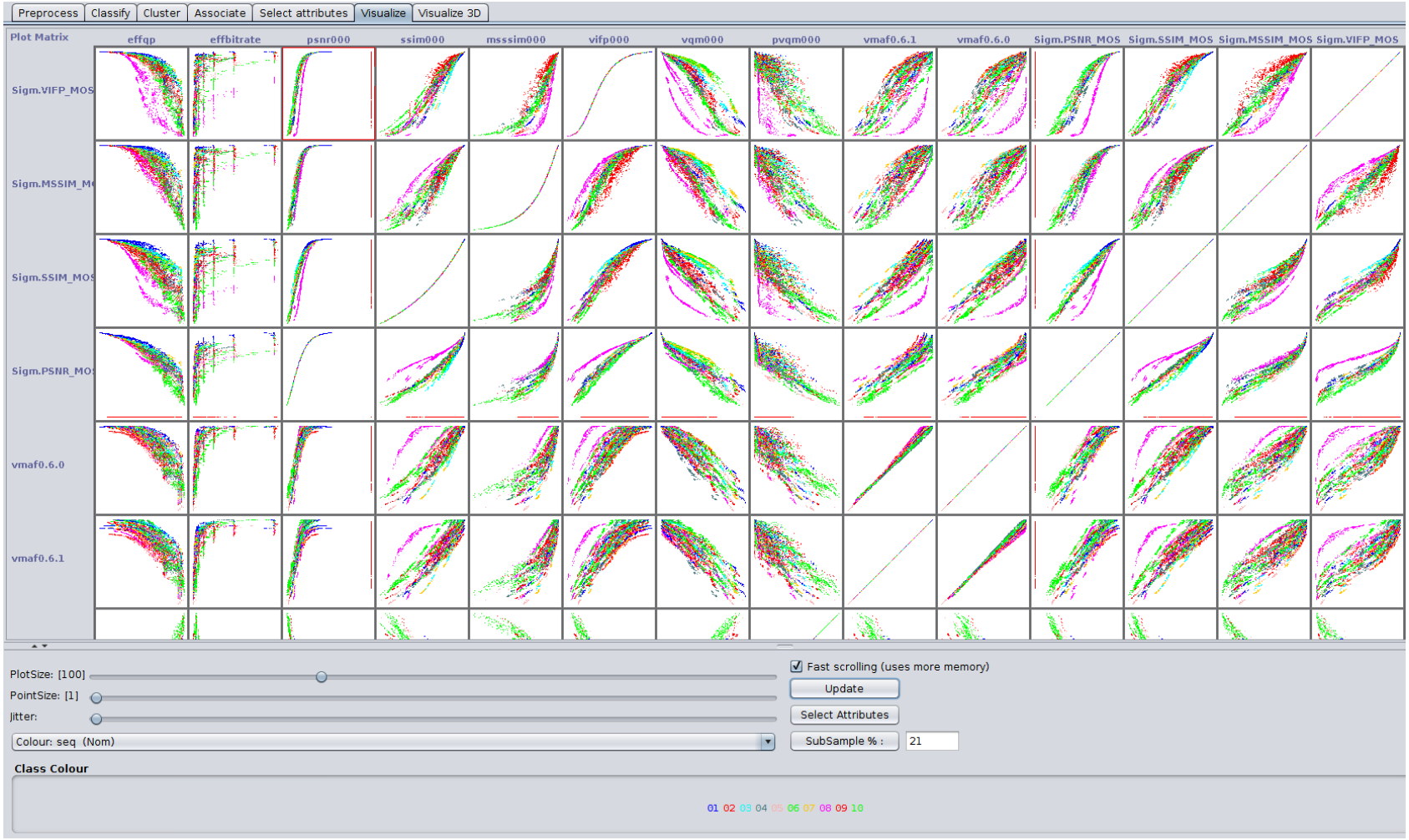
# Metric Visualization

- Better understanding of:
  - Current database content
  - Relations or unexpected behaviors in metrics
- Identifying sequences and/or parameters that deserve further investigation
  - Example: even with just objective metrics (SSIM or VIF vs PSNR), we can identify sequences that deserve further investigation, e.g., seq08 (quite noisy at highest res)

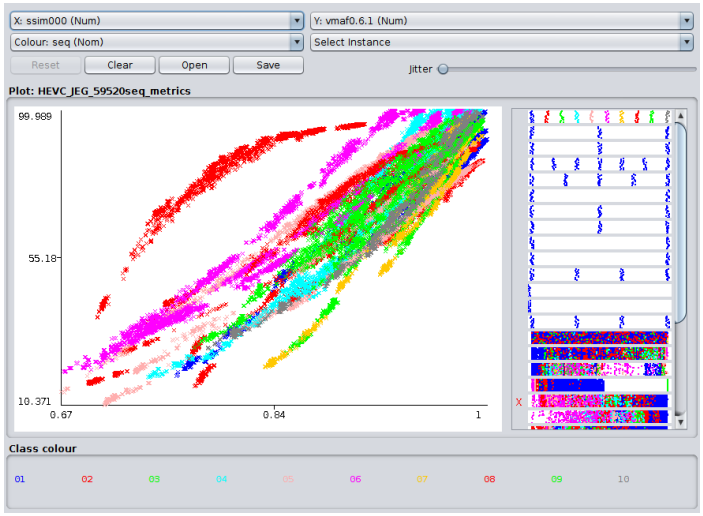
- Currently experimenting with the tool “Weka”

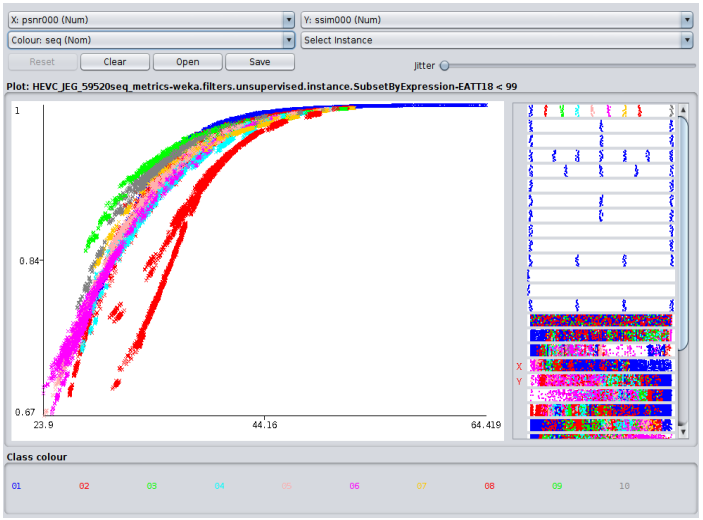
# Example: scatter plot of everything vs everything

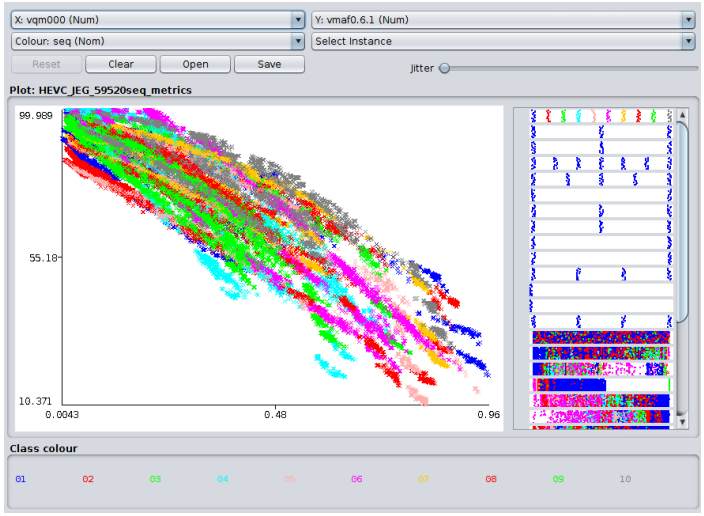
- All metrics + actual bitrate, actual avg QP

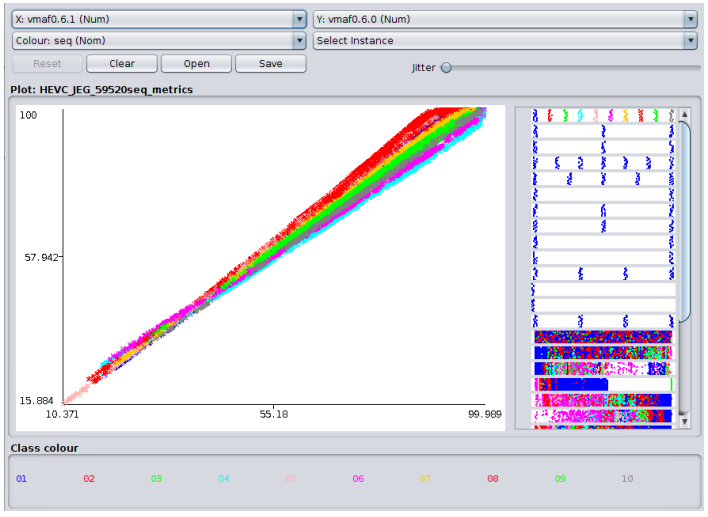


# Some Examples

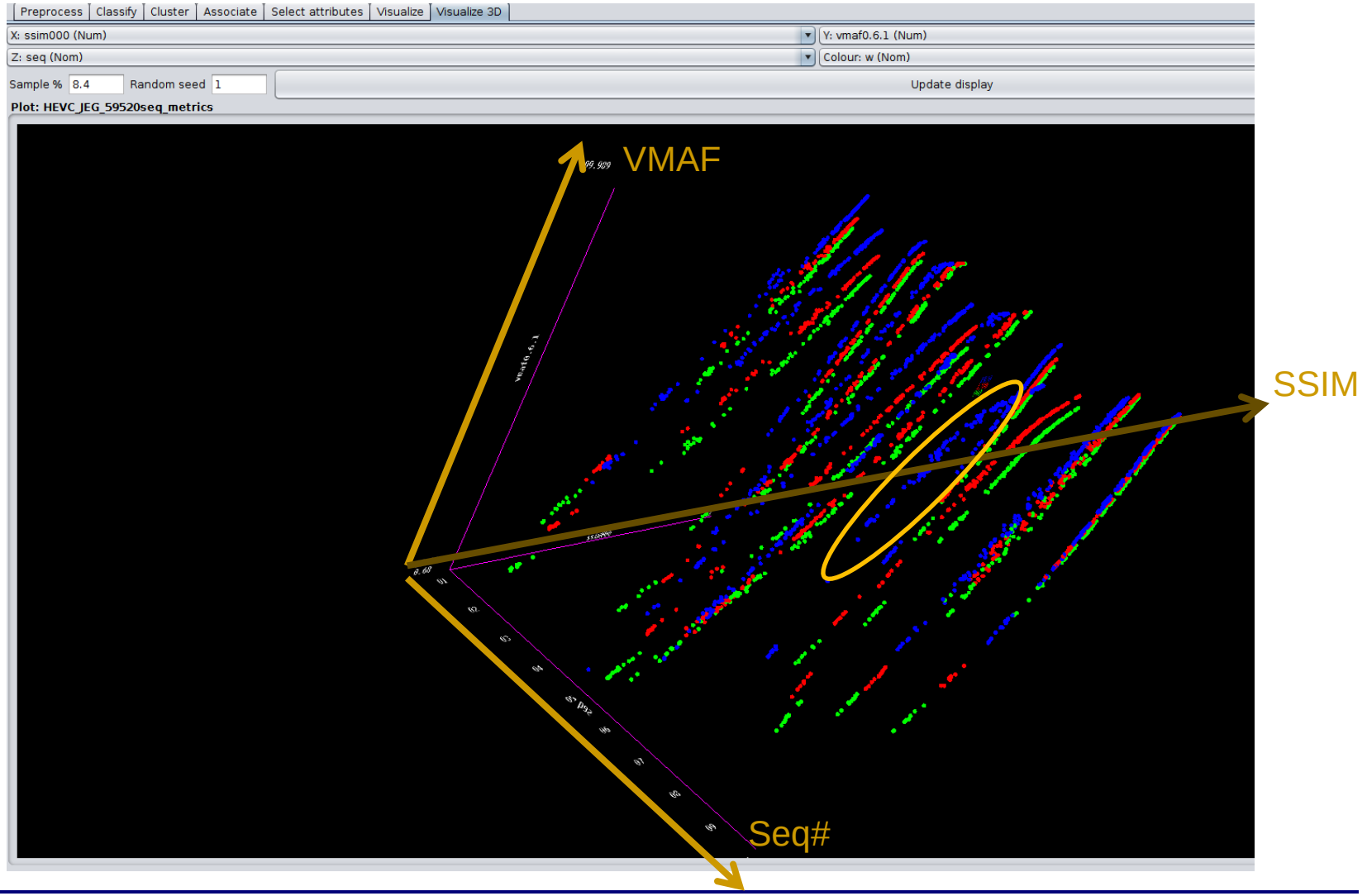


# Some Examples



# Next Steps

- Experimenting with available clustering/classification algorithms

# References


- M. Barkowsky, E. Masala, G. Van Wallendael, K. Brunnstrom, N. Staelens, P. Le Callet, Objective Video Quality Assessment – Towards large scale video database enhanced model development, IEICE Transactions on Communications, vol. E98-B, n. 1, pp. 2-11, Jan 2015
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- Weka 3: https://www.cs.waikato.ac.nz/ml/weka/