

# VMAF framework performance on UHD videos

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In collaboration with Netflix: Zhi Li, Ioannis Katsavounidis

# Introduction and motivation

- **ICIP2017 Grand Challenge**

- Identify technology that improves compression beyond the most recent standard HEVC.
- Participants will be asked to deliver bitstreams with pre-defined maximum target rates for a given set of sequences

- **Evaluation of the proposals:**

- Objective evaluation → **Need of a SW package** to compute several metrics.
- Subjective evaluation → for selected test cases.

- **Webpage:** <http://www.provision-itsn.eu/grand-challenge-videocompression-icip2017.htm>

# Test material: sources

Class	Name	Resolution	Frames	Frame rate	Chroma format	Bit depth
A	CatRobot1Crop	2560x1600	600	60	4:2:0	10
A	DaylightRoadCrop1	2560x1600	300	60	4:2:0	10
A	FoodmarketPopcornCrop	2560x1600	300	60	4:2:0	10
A	FoodmarketSteamCrop	2560x1600	300	60	4:2:0	10
A	ParkRunning2Crop1	2560x1600	250	50	4:2:0	10
B	CalmingWater2	1920x1080	300	60	4:2:0	10
B	DropsOnWater1	1920x1080	300	60	4:2:0	10
B	LampLeaves1	1920x1080	300	60	4:2:0	10
B	TreeWills	1920x1080	600	60	4:2:0	10

# Test material: sources



CatRobot1Crop



DaylightRoadCrop1



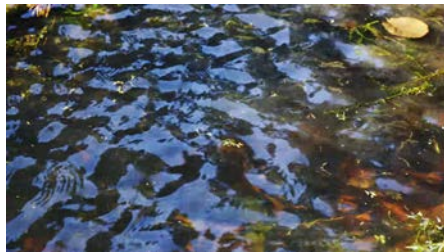
FoodmarketPopcornCrop



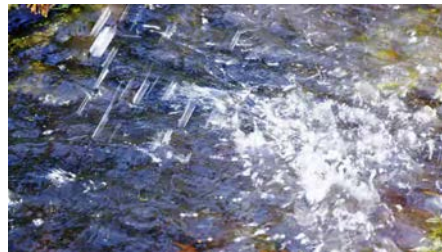
FoodmarketSteamCrop



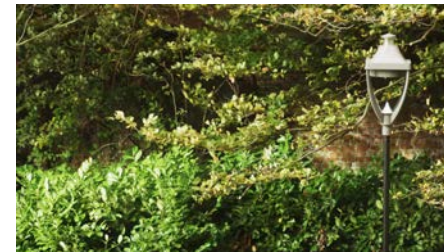
ParkRunning2Crop1



CalmingWater2



DropsOnWater1



LampLeaves1



TreeWills

# Test material: bitrate selection

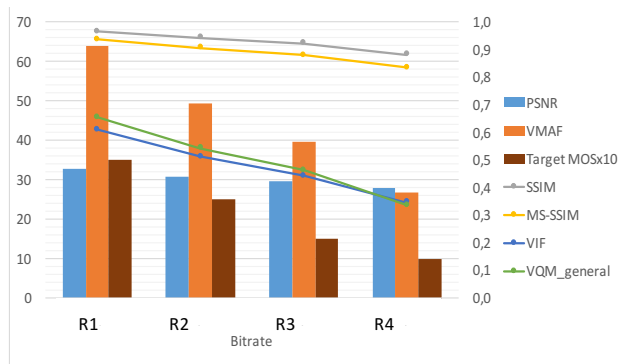
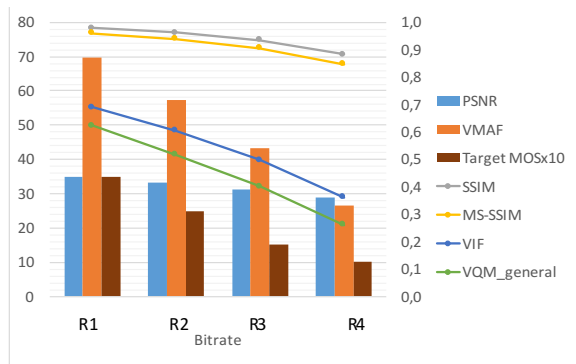
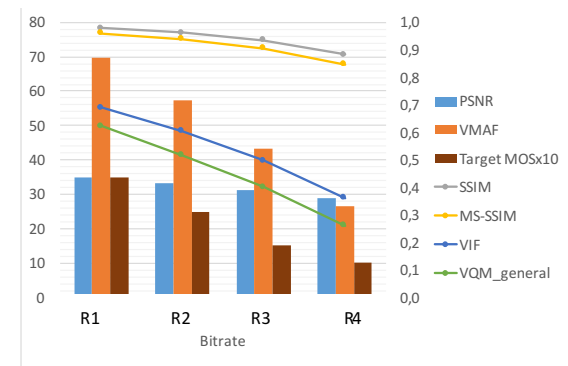
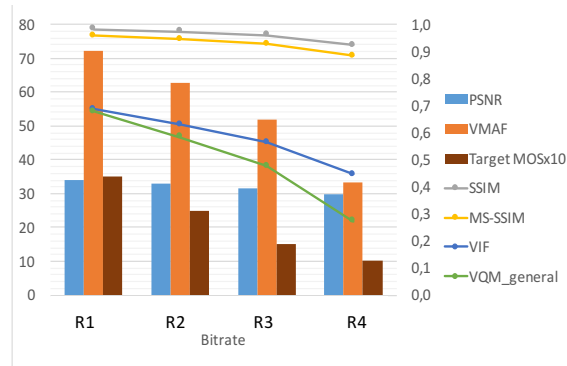
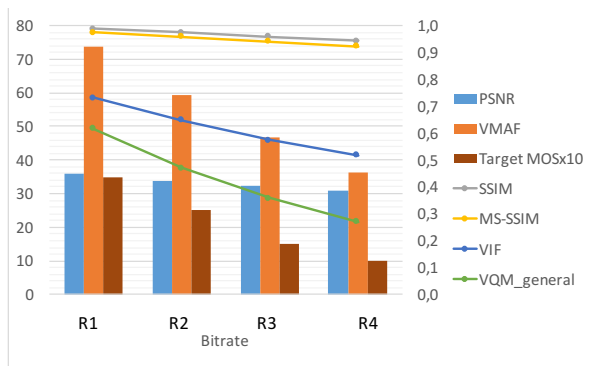
Class	Name	Bitrate 1	Bitrate 2	Bitrate 3	Bitrate 4
A	CatRobot1Crop	450	550	800	1400
A	DaylightRoadCrop1	450	750	1100	1600
A	FoodmarketPopcornCrop	500	750	1200	1900
A	FoodmarketSteamCrop	470	650	1200	1700
A	ParkRunning2Crop1	800	1400	2200	4300
B	CalmingWater2	1500	1800	3000	4300
B	DropsOnWater1	2800	3300	4800	8000
B	LampLeaves1	1500	2000	3300	7500
B	TreeWills	350	800	1100	1600

- Target bitrates selected particularly per sequence.
- Target MOS range from 1 to 3.5 for more easily identify improvements from the proponents.

# Preliminary evaluation

- Subjective assessment test by experts to select anchors.
  - Viewing distance:
    - 3H for HD videos.
    - 1.5H for UHD videos.
- Objective evaluation:
  - VMAF framework:
    - PSNR, SSIM, MS-SSIM, VIF, VQM.

# Preliminary results



Generally, **VMAF** and **VQM** are the best following the trend marked by the target MOS

# Preliminary results

- Correlation results:
  - **VMAF** and **VQM** are the best performing.
  - Better results for UHD videos than HD ← Content influence: HD videos from an specific dataset for texture coding.

Pearson Correlation

	PSNR (Lin)	VMAF (Lin)	SSIM (poly)	MS-SSIM (poly)	VIF (exp)	VQM (poly)
Class A	0.7212	<b>0.9389</b>	0.8873	0.8319	0.8887	<b>0.9019</b>
Class B	0.663	<b>0.9216</b>	0.5755	0.601	0.6779	<b>0.8163</b>

Spearman Correlation

	PSNR (Lin)	VMAF (Lin)	SSIM (poly)	MS-SSIM (poly)	VIF (exp)	VQM (poly)
Class A	0.7756	0.9539	0.8997	0.8376	0.8764	0.8997
Class B	0.7276	0.958	0.5578	0.6185	0.667	0.8125

MSE

	PSNR (Lin)	VMAF (Lin)	SSIM (poly)	MS-SSIM (poly)	VIF (exp)	VQM (poly)
Class A	0.6652	0.3304	0.4429	0.5328	0.4403	0.4147
Class B	0.7188	0.3728	0.7852	0.7674	0.7245	0.5546



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