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I – SCIENTIFIC ACTIVITY DURING YOUR FELLOWSHIP

The first goal was to understand Video Multimethod Assessment fusion (VMAF) Features.

VMAF is a machine learning based tool where features are extracted from the reference and target videos and a support vector regression is run on a video quality dataset for the computation of metric. In this study we also measure the different features of VMAF to compare them with MOS. The VMAF features are the following:

- **Visual Information Fidelity (VIF):** The VIF metric is widely used in assessing image quality, operating under the assumption that quality is inversely related to the degree of information fidelity loss. In its initial formulation, VIF quantifies fidelity loss by amalgamating four different scales. In the context of VMAF, a modified rendition of VIF is employed, wherein the loss of fidelity within each individual scale is integrated as a fundamental metric.
- **Motion2:** This is a simple way to quantify the temporal variation between consecutive frames, achieved by computing the mean absolute pixel difference specifically for the luminance component.
- **ADM:** Previously known as Detail loss Metric (DLM) is an image quality metric which operates by distinctively assessing the degradation of details that impacts content visibility and the superfluous impairments that divert viewer attention. The initial metric integrates both DLM and an additive impairment measure (AIM) to produce a conclusive score. In the context of VMAF, only the DLM component is incorporated as a fundamental metric. Particular attention was given to unique scenarios, like black frames, where the numerical calculations in the original formula encounter challenges.

In the HD verification test, four 10s sequences have been used:

- BarScene (1080p60, 600frames)
- DrivingPOV (1080p60, 600frames)
- Meridian2 (1080p60, 600frames)
- Metro (1080p60, 600frames)

In the UHD verification test, five 10s sequences have been used:

- DrivingPOV3 (2160p60, 600frames)
- Marathon2 (2160p30, 300frames)
- MountainBay2 (2160p30, 300frames)
- NeptuneFountain3 (2160p60, 600frames)
- TallBuildings2 (2160p30, 300frames)

Analysis of different VMAF features

VMAF is a support vector regression technique based on different features described above. In Figures 1 and 2 we plot the ADM and VIF features against Subjective Mean Opinion Score (MOS) for both UHD and HD test sequences and we observe the correlation between each feature and the mean opinion scores and it is far from ideal.

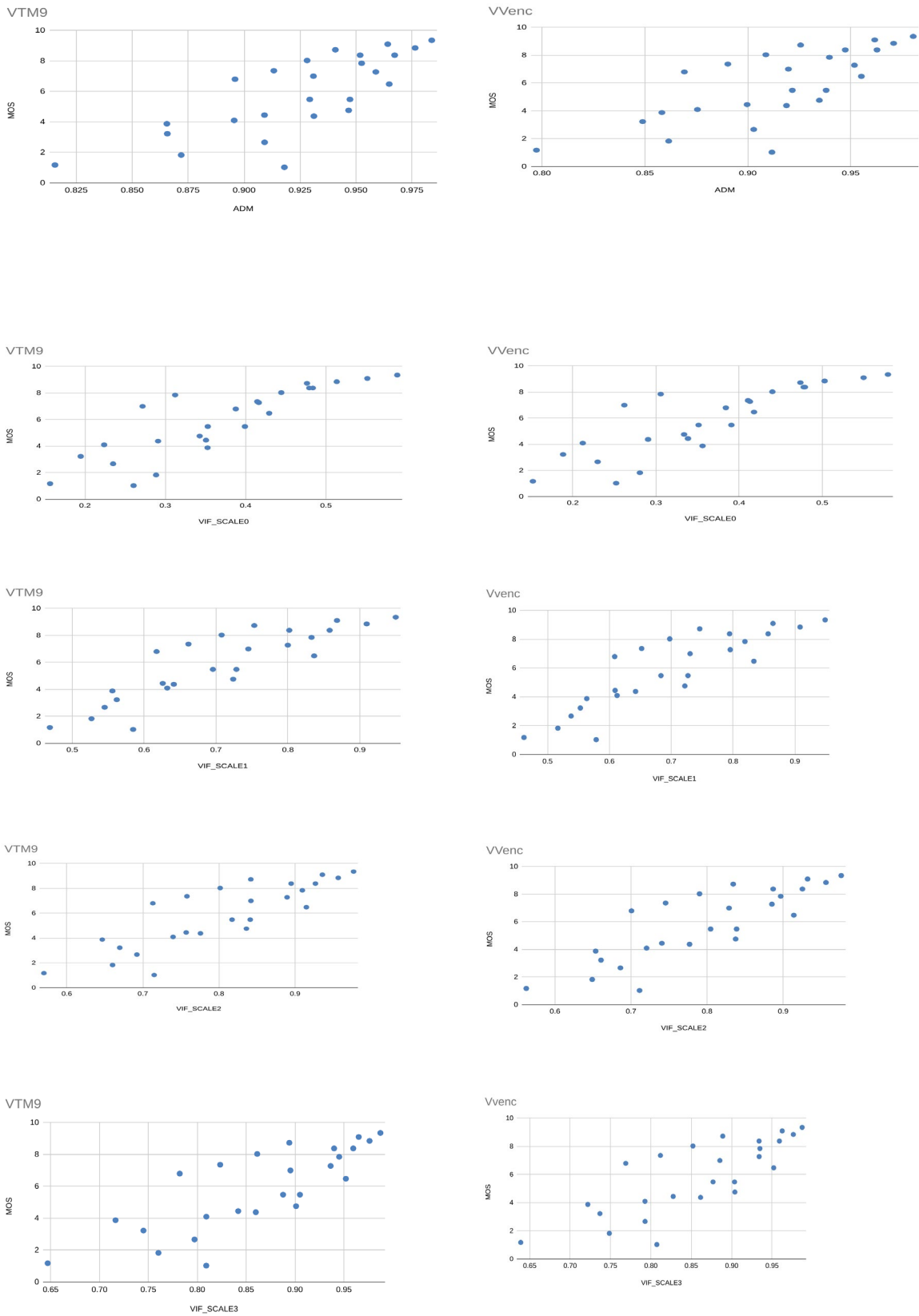


Figure 1: MOS vs different VMAF features (ADM, VIF different scales) for UHD Test sequences

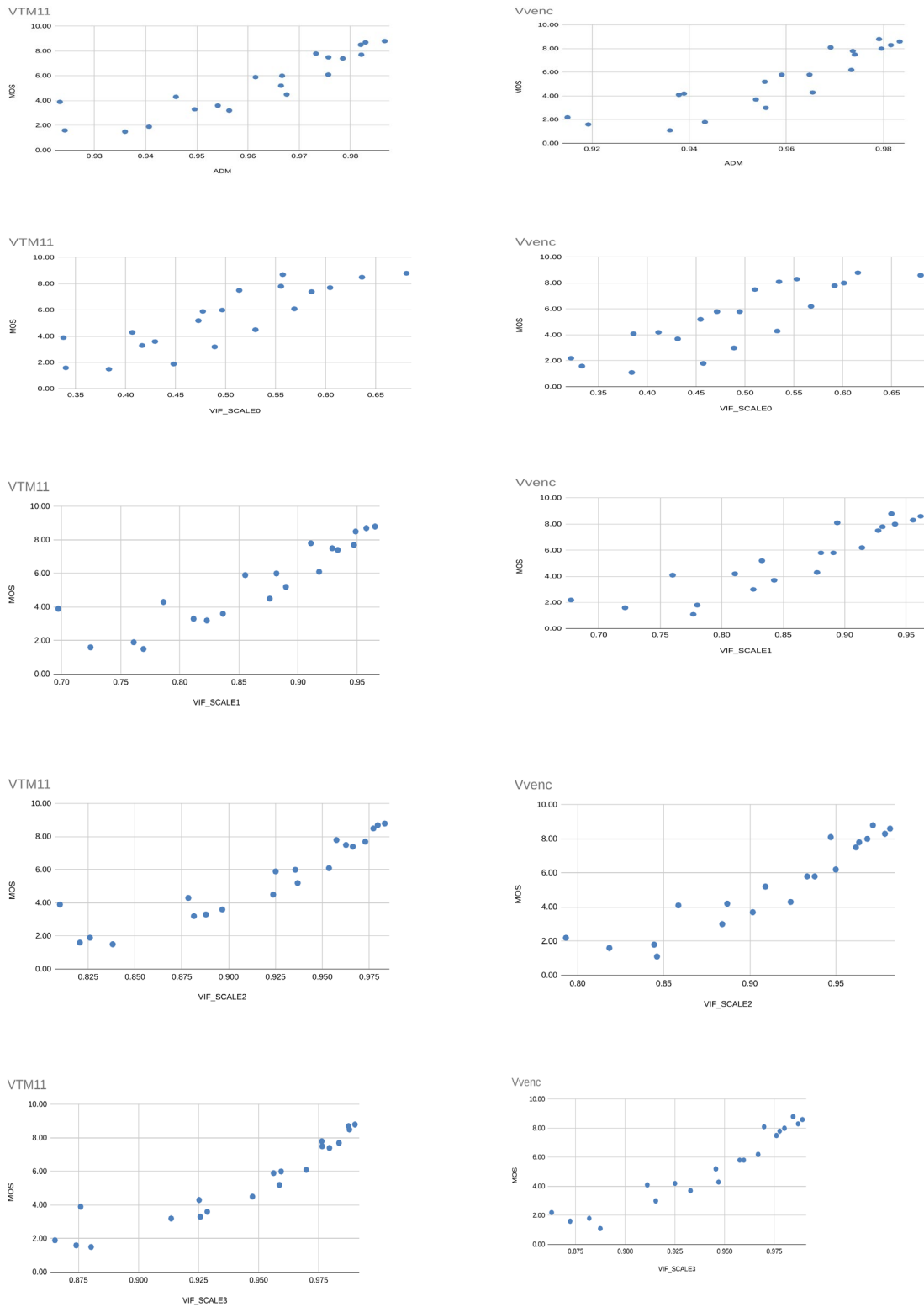


Figure 2: MOS vs different VMAF features (ADM, VIF different scales) for HD Test sequences



II – PUBLICATION(S) DURING YOUR FELLOWSHIP

1. Chhipa, P.C., Chippa, M.S., **De, K.**, Saini, R., Liwicki, M. and Shah, M., 2024. M²obius Transform for Mitigating Perspective Distortions in Representation Learning. *ECCV 2024*

III – ATTENDED SEMINARS, WORKHOPS, CONFERENCES

1. International Conference on Computer Vision 2023, Paris October 2-6 2023
2. MPEG Meeting 145, Hannover

IV – RESEARCH EXCHANGE PROGRAMME (REP)

Attended laboratory of Prof. Francois Bremond from INRIA STARS from October 9-13 2023 where we had a discussion on problems used to self-supervised representation learning and I gave a presentation on my research topics on self-supervised learning.