**SS584: Runtime remote video quality assessment**

Description:

Interactive video communication over limited bandwidth channel and variable user end configuration has concern of video quality. Different VSAT terminals may have different computing resources i.e. RAM, graphics card, local network issues, not properly optimized VSAT setup affecting BER, Receive power etc. In situation like distributed video content delivery, video quality checks during runtime becomes problematic for having lack of reference video at remote or remote video at central transmitting end. The assessment of video quality across remote nodes distributed geographically thus becomes challenging. Solution needs to be developed to assess the quality of captured videos at different remote VSAT terminals. Video for transmitting end and few remote receiving ends will be provided. The solution must not directly use both side videos to access quality. For datasets and additional information, please visit <https://vedas.sac.gov.in/en/sih2022.html>

Test challenge:

Solution is expected to propose a framework of remote video quality assessment without direct availability of reference video. The developed software should provide automated Video Quality Measure (VQM) of remote video at every fixed interval of 30 seconds.

About dataset:

* A video dataset, having 60 number of videos captured at remote receiving ends and 10 number of reference videos, is provided.
* Structural Similarity Index Measure (SSIM)[1] is taken as reference measure. SSIM is calculated for each frame of remote receiving end videos and matching frame of reference videos using below mentioned ffmpeg command.

*ffmpeg.exe -i "* *Video001M1001.ts" -i "* *Video001.mp4" -lavfi [0:v]settb=AVTB,setpts=PTS-STARTPTS[main];[1:v]trim=start=45.4,settb=AVTB,setpts=PTS-STARTPTS[ref];[main][ref]ssim='stats\_file=logfile.txt' -f null –*

* To generate the ground truth, Mean values of SSIM were calculated for every 30 seconds of video frames.

Evaluation Method:

* For evaluation, another video dataset (Evaluation Dataset) will be provided on the day of internal hackathon. Developed solution will be evaluated against that evaluation dataset. For more clarity, refer the evaluation example later in this document.
* As the output of the team’s solution, VQM should be produced for every 30 seconds of remote receiving end videos. The values of VQM should be in range of (-1,1], similar to SSIM range as detailed in the paper “Understanding SSIM” [2].
* “Mean Absolute Error” (MAE) and processing time will be used as evaluation metrics.
* “Absolute Error” will be calculated between mean of SSIM values (provided as Ground truth for Evaluation dataset) and produced VQM (in range of (-1, 1] ) using solution, for every 30 seconds. Further, “Mean Absolute Error” (MAE) will be calculated by averaging Absolute Errors of all 30 seconds segments in evaluation dataset.
* The entire solution should be an automated solution. Processing time will be calculated from execution of first line of the code to generation of csv result file for evaluation dataset. This time will include pre-processing or feature generation time (if any).
* Solution with lowest MAE will rank first. In unlikely event of same MAE of two or more teams, the team with lowest processing time will be ranked first.
* Maximum 2 runs will be accepted per team for final evaluation. Each submitted run must comprise of one csv result file and one text file containing processing time taken in seconds.

Submission File Description:

1. CSV result file:

Filename format: ss584\_<teamid>\_<runnumber>\_VideoQC.csv

Data format: For each receiving end video in the evaluation set, team must find video quality matric value for each 30 seconds. The file should contain a header and have the following format:

*refVideo,captureVideo,startFrame,endFrame,avgSSIM,VQM,AbsoluteError*

*Video001.mp4,Video001M7001.ts,135,884,0.988831,0.854678,0.134153*

*Video001.mp4,Video001M7001.ts,885,1634,0.989215,0.997932,0.008717*

*Video001.mp4,Video001M7001.ts,1635,2384,0.985285,0.879654,0.105631*

*……..*

1. Processing time file:

Filename format: ss584\_<teamid>\_<runnumber>\_time.txt

Data format:

*<processing\_time\_in\_seconds>*

Evaluation example: Mean Absolute Error will be calculated up to six decimal point as shown in below example. Final results will be calculated over entire evaluation dataset.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| refVideo | captureVideo | startFrame | endFrame | avgSSIM | VQM | AbsoluteError |
| Video001.mp4 | Video001M7001.ts | 135 | 884 | 0.988831 | 0.854678 | 0.134153 |
| Video001.mp4 | Video001M7001.ts | 885 | 1634 | 0.989215 | 0.997932 | 0.008717 |
| Video001.mp4 | Video001M7001.ts | 1635 | 2384 | 0.985285 | 0.879654 | 0.105631 |
|  |  |  |  |  | MAE | 0.082834 |

References:

1. *Wang, Z., Bovik, A.C., Sheikh, H.R. and Simoncelli, E.P., 2004. Image quality assessment: from error visibility to structural similarity. IEEE transactions on image processing, 13(4), pp.600-612.*
2. *Nilsson, J. and Akenine-Moller, T., 2020. Understanding ssim. arXiv preprint arXiv:2006.13846.*