VIDEO QUALITY ASSESSMENT BASED ON TEMPORAL DECOMPOSITION

Tsung-Jung Liu[1], Weisi Lin[2], and C.-C. Jay Kuo[1]

[1]Ming Hsieh Department of Electrical Engineering, University of Southern California, Los Angeles, USA

[2]School of Computer Engineering, Nanyan Technological University, Singapore

USC Viterbi
School of Engineering

**Ming Hsieh** Department
of Electrical Engineering

Abstract

❖ In this work, an input video clip is first decomposed into smaller units along the temporal domain, called *temporal decomposition units (TDUs)*.

❖ Next, for each TDU that consists of a small number of frames, we adopt a proper video quality metric (e.g., the MOVIE index in this work) to compute the quality scores of all frames.

❖ Based on the sociological findings, choose the **worst scores** of TDUs for data fusion.

❖ Finally, a **regression** approach is used to fuse selected worst scores from all TDUs to get the ultimate quality score of the input video.

❖ Conduct extensive experiments on the LIVE video database, and show that the proposed approach indeed improves MOVIE and is also competitive with other state-of–the-art video quality metrics.

Proposed Video Quality Assessment (VQA) Methods

❑ TD_MOVIE
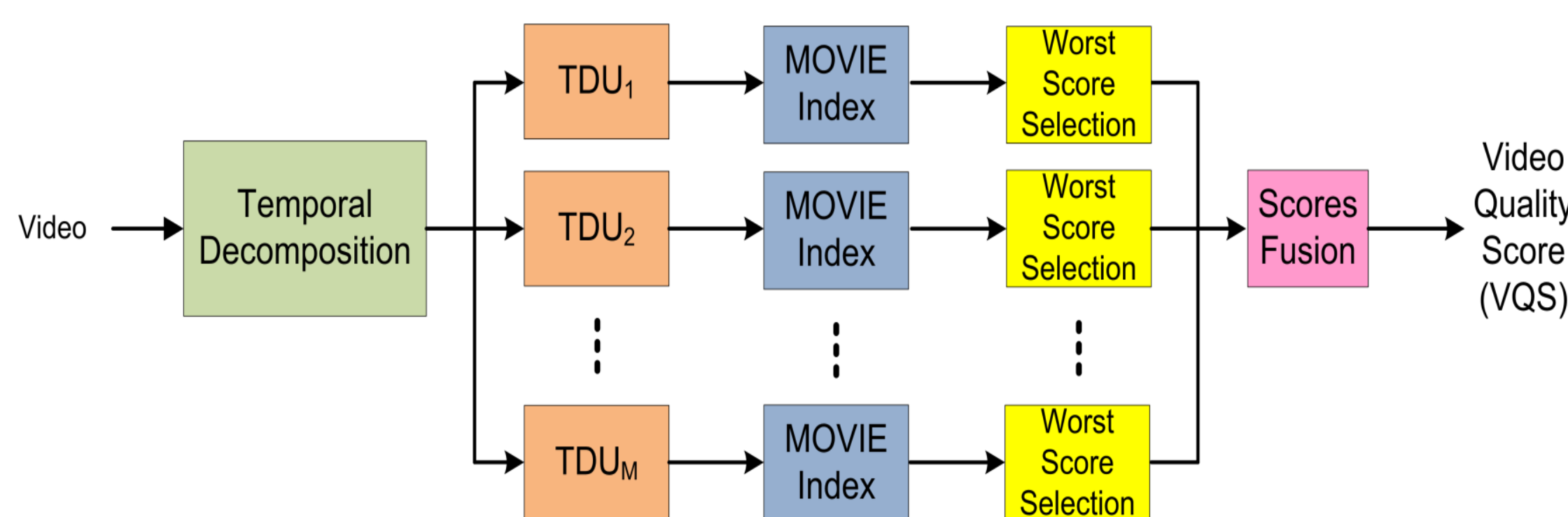
❑ CA-TD_MOVIE
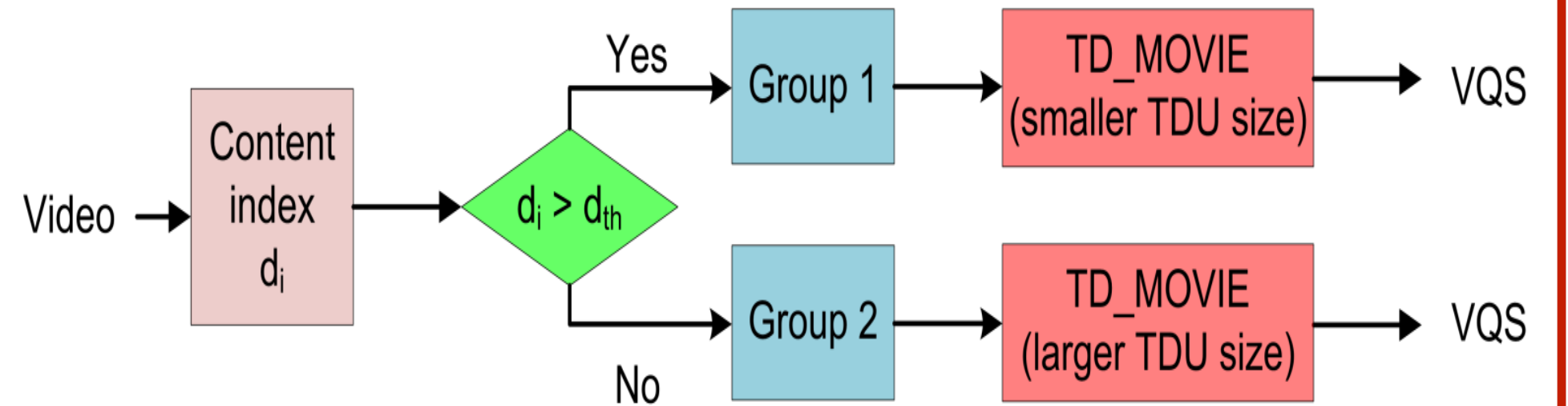
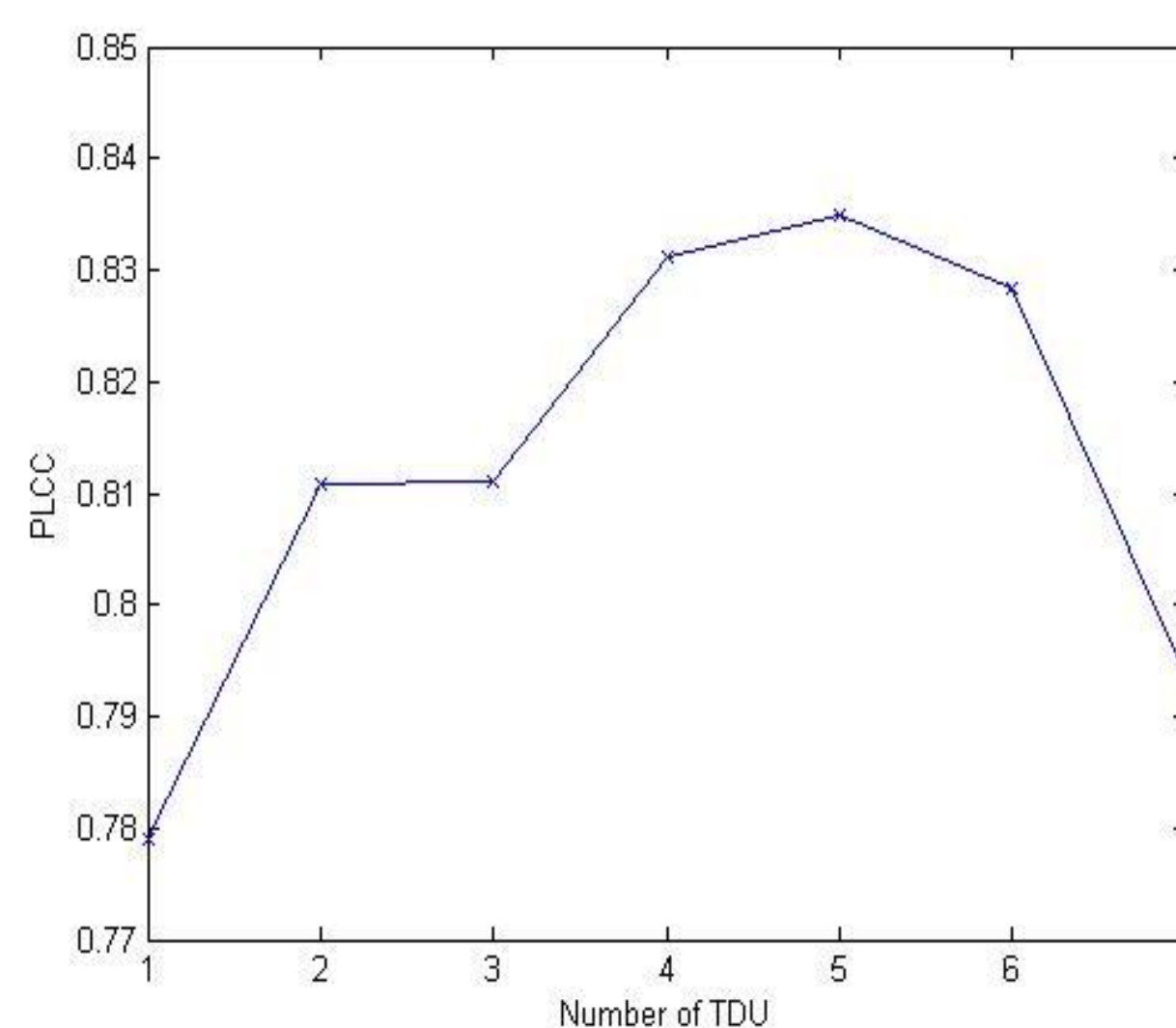## Experiments and Performances

❑ Test Database

LIVE Video Quality Database
➢ YUV 4:2:0 formats
➢ spatial resolution: 768x432 pixels

❑ Performance Measure of TD_MOVIE vs. number of TDUs

❑ Performance of TD_MOVIE

Type of Score Measure	Min.	Mean	Max.
PLCC	0.6990	0.8015	0.8350
SROCC	0.6581	0.7814	0.8233
RMSE	7.8504	6.5649	6.0397

❑ Performance Comparison of VQA models

Measure VQA Model	PLCC	SROCC	RMSE
PSNR	0.5465	0.5205	9.1929
V-SSIM	0.6058	0.5924	8.7337
VQM	0.7695	0.7529	7.0111
MOVIE	0.8116	0.7890	6.4130
TD_MOVIE	0.8350	0.8233	6.0397
CA-TD_MOVIE	0.8494	0.8420	5.7932

Conclusions

❑ We proposed a methodology (TD_MOVIE) to enhance the performance of MOVIE by using
  ▪ Temporal decomposition
  ▪ Worst scores for fusion
❑ The results can be improved further via CA-TD_MOVIE by using
  ▪ Adaptive TDU size selection based on a content aware mechanism
❑ Experimental results show that they both outperform MOVIE as well as other state-of-the-art video quality metrics by a significant margin

Email: [1]liut@usc.edu, [2]wslin@ntu.edu.sg, [1]cckuo@sipi.usc.edu

Ming Hsieh Institute
Ming Hsieh Department of Electrical Engineering