Nomination
IEEE Signal Processing Society Young Author Best Paper Award

Kalpana Seshadrinathan
for the paper
"Motion Tuned Spatio-Temporal Quality Assessment of Natural Videos"
IEEE Transactions on Image Processing, vol. 19, no. 2, pp. 335-350, Feb. 2010.

We heartily endorse Kalpana Seshadrinathan for the paper "Motion Tuned Spatio-Temporal Quality Assessment of Natural Videos" published in the *IEEE Transactions on Image Processing* in February, 2010 for the IEEE Signal Processing Society's **Young Author Best Paper Award**. The paper's lead and main contributor, Kalpana Seshadrinathan, was under the age of 30 when the paper was submitted. This paper is an important contribution to the field of image and video quality assessment and is a pioneering work on the use of motion perception models in quality assessment. The exceptional performance of the algorithm presented in the paper known as MOVIE has been demonstrated in several papers. MOVIE was shown to be the best performing algorithm against state-of-the-art competitors on both large publicly available databases – the LIVE Video Quality Database and the VQEG FRTV Phase I dataset. Further, the performance of MOVIE was shown to be statistically significantly better than all other state-of-the-art quality assessment algorithms tested in the large human study ("Study of Subjective and Objective Quality Assessment of Video" published in *IEEE Transactions on Image Processing* in April, 2010) which is now publicly available as the LIVE Video Quality Database. This result is all the more impressive in the face of how difficult the video quality assessment problem is, how limited motion perception models were previously and how difficult it is to design human studies for performance validation.

The paper that is being nominated for this award is in the Top 5 cited papers in the *IEEE Transactions on Image Processing* published since and including 2010. Kalpana has made the open source software for MOVIE freely and publicly available and it has been downloaded by 200+ researchers worldwide over the past year. While citation counts are not an absolute measure of a paper's quality, the significance of her work can also be found in its cross-disciplinary nature and the inclusion of novel computational models from vision science in MOVIE. The "Study" paper mentioned above may be viewed as a companion to this paper, and it also is among the Top 5 cited papers published in TIP since and including 2010. Prior to the publication of this paper, VQA algorithms focused primarily on modeling spatial aspects of video quality with little attention paid to temporal aspects of video quality. Movement perception is a critical computation that is performed by the human visual system which is crucial for survival, navigation and collision avoidance. Humans are quite sensitive to distortions that affect this critical function of visual processing and Kalpana's paper clearly demonstrates the importance and performance gains that are possible by incorporating meaningful models of movement perception in quality assessment. In particular, the idea of using computational models of neurons in extra-cortical area MT/V5 (medial temporal cortex) of the brain, which are known to play an important role in motion perception, for the purpose of improving automatic video quality assessment algorithms is unique. Visual area MT receives inputs from initial processing performed in Area V1 of the striate cortex, then performs more complex movement processing that has been associated with specific functions such as integrating local motion information into a global percept of motion, guidance of some eye movements and segmentation. Although the response properties of neurons in area MT/V5 are well studied in primates and detailed models of motion sensing have been proposed in the visual neuroscience literature since the 90's, Kalpana's work is the first to utilize these models successfully in perceptual video quality assessment.

We present this paper as a compelling candidate for the IEEE Signal Processing Society Young Author Best Paper Award. We endorse the author, Kalpana Seshadrinathan, for her important contributions to the field of video quality assessment. We also believe that the paper being nominated is quite noteworthy and deserving of this recognition.