A Lightweight Blind Image Quality Assessment (BIQA) Method

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DATE 5 Apr, 2023 (Wed)
TIME 2:30 PM - 3:30 PM
VENUE Y6405, CS Seminar Room, Yellow Zone,
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ABSTRACT

The design of a lightweight machine learning model for blind image quality assessment (BIQA) is presented. BIQA is a task that predicts the perceptual quality of images without a reference. BIQA research attracts growing attention due to the increasing number of user-generated images and emerging mobile applications where reference images are unavailable. The problem is challenging due to the wide range of content and mixed distortion types in the images. Many existing methods use neural networks to achieve high performance. However, their large model sizes hinder their applicability in edge or mobile devices. We propose a novel BIQA method with a small model, low computational complexity, and high performance to solve the problem. The proposed method, called GreenBIQA, has five steps: 1) image cropping, 2) unsupervised feature generation, 3) supervised feature selection, 4) distortion-specific prediction, and 5) regression and decision ensemble. The experiments on four IQA datasets demonstrate that GreenBIQA can achieve performance competitive with state-of-the-art BIQA methods while demanding a much smaller model and lower computational complexity.

BIOGRAPHY

Dr. C.-C. Jay Kuo received his Ph.D. from the Massachusetts Institute of Technology in 1987. He is now with the University of Southern California (USC) as William M. Hogue Professor, Distinguished Professor of Electrical and Computer Engineering and Computer Science, and Director of the Media Communications Laboratory. His research interests are in visual computing and communication. He is a Fellow of AAAS, ACM, IEEE, NAI, and SPIE and an Academician of Academia Sinica. Dr. Kuo has received a few awards for his research contributions, including the 2010 Electronic Imaging Scientist of the Year Award, the 2010-11 Fulbright-Nokia Distinguished Chair in Information and Communications Technologies, the 2019 IEEE Computer Society Edward J. McCluskey Technical Achievement Award, the 2019 IEEE Signal Processing Society Claude Shannon-Harry Nyquist Technical Achievement Award, the 72nd annual Technology and Engineering Emmy Award (2020), and the 2021 IEEE Circuits and Systems Society Charles A. Desoer Technical Achievement Award. Dr. Kuo was Editor-in-Chief for the IEEE Transactions on Information Forensics and Security (2012-2014) and the Journal of Visual Communication and Image Representation (1997-2011). He is currently the Editor-in-Chief for the APSIPA Trans. on Signal and Information Processing (2022-2023). He has guided 165 students to their Ph.D. degrees and supervised 31 postdoctoral research fellows.

All are welcome!