AOLIN FENG

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EDUCATION

University of Southern California Los Angeles, USA
Ph.D. Candidate in Electrical Engineering Aug. 2022 - Now

University of Science and Technology of China Hefei, China
Master of Engineering in Information and Communication Engineering July 2019 - June 2022

University of Science and Technology of China Hefei, China
Bachelor of Engineering in Electronic Information Engineering Aug. 2015 - June 2019

RESEARCH INTERESTS

I'm broadly interested in image/video processing. Currently, my research focuses on related topics in the fields of **image/video coding**, and **machine learning**.
Advisor: Prof. C.-C. Jay Kuo

PUBLICATIONS

- **Aolin Feng**, Kang Liu, Dong Liu, Li Li, and Feng Wu. "Partition map prediction for fast block partitioning in VVC intra-frame coding," IEEE Transactions on Image Processing, 2023.
- **Aolin Feng**, Changsheng Gao, Li Li, Dong Liu, and Feng Wu. "CNN-based depth map prediction for fast block partitioning in HEVC intra coding," IEEE International Conference on Multimedia and Expo (ICME Oral), 2021.
- **Aolin Feng**, Yefei Wang, Dong Liu, Xining Wang, Yihang Chen. "Geometric operation and adaptive quad-tree partition of the input image for NIC," IEEE DCSC FVC-SG (Proposal Accepted).
- Qingyang Zhou, **Aolin Feng**, Tsung-Shan Yang, Shan Liu, C.-C. Jay Kuo. "BPQA: A blind point cloud quality assessment method," IEEE International Conference on Image Processing (ICIP), 2023.

RESEARCH EXPERIENCES

Partition Map-Based Block Partitioning in VVC/H.266 Intra Coding Feb. 2021 – July 2021
- Proposed the partition map to represent the quadtree with multi-type tree partition structure of VVC standard on the basis of the depth map, facilitating joint prediction of correlated partition decisions.
- Designed a progressive attention-based convolutional neural network (CNN) that emulated the rate-distortion optimization (RDO) process to predict the partition map.
- Designed a post-processing algorithm that standardized the CNN output and further promoted the prediction accuracy with 2% on average and 10% at the maximum.
- Achieved adjustable acceleration ($1.61\times$ to $8.64\times$) that partially or entirely replaced the recursive partition RDO process, and the best tradeoff is $3.89\times$ acceleration with 2.77% BD-rate increase, which is state-of-the-art.

Depth Map-Based Block Partitioning in HEVC/H.265 Intra Coding Sept. 2020 – Dec. 2020
- Proposed the depth map to represent the quadtree partition structure of HEVC standard, which converted a tree structure into a matrix.
- Designed a CNN to predict the depth map, in which the structure and loss function were adapted to the local consistency of the depth map; used depth map prediction to replace the partition RDO process.
- Achieved 65% encoding complexity reduction with negligible compression efficiency loss for the HEVC encoder, and the method is being integrated to a programmable chip of Audio Video coding Standard 3 (AVS3).

Encoding Optimization for NIC (Neural Image Coding) Dec. 2021 – Feb. 2021
- Integrated geometric operation-based RDO to promote compression efficiency of the intelligent end-to-end image coding-NIC and brought 1.9% bit-rate saving.
- Contributed to IEEE DCSC: Future Video Coding Study Group (FVC-SG), which aims to develop the deep learning-based image compression solutions.

AWARDS AND SKILLS

Award   Outstanding Undergraduate of University of Science and Technology of China, 2019
Skill   C/C++, Python, MATLAB; Pytorch; Image/Video Coding Standard: JPEG, H.264, H.265, H.266

OTHER EXPERIENCES

Teaching Assistant   Data Structure and Algorithm, Fall 2020;
Calculus for Functions of Several Variables, Spring 2019
President   Student Union of School of Information Science and Technology, May 2017 – Apr. 2018
Co-Founder   USTC Tactical Regiment (Student Association), Summer 2017