Shuwei Shi (石书玮)

Master Student in IIGROUP and XPixel Group

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Education

Shenzhen Institutes of Advanced Technology (SIAT), Chinese Academy of Science

Research Assistant. Supervised by Prof. Chao Dong and Prof. Yu Qiao Jul. 2021 – Present

Tsinghua University

Master in Electronic and Information Engineering. GPA: 3.52/4. Supervised by Prof. Yujiu Yang Aug. 2020 – Present

Harbin Engineering University

Bachelor (with honor degree) in Computer Science and Technology. GPA: 3.60/4.0. Ranking: 3/189 Sep. 2016 – Jun. 2020

Research Interests

I am mainly working on low-level vision tasks, including ***image/video restoration and quality assessment***, especially in image/video super-resolution.

Projects

Rethinking Alignment in Video Super-Resolution Transformers Nov. 2021 – May. 2022

Accepted by NIPS 2022. First Author. Advised by Prof. Chao Dong

- We rethink the role of alignment module in VSR Transformers. We find VSR Transformers can directly utilize multi-frame information from unaligned videos and sometimes the existing alignment methods are harmful to VSR Transformers.
- We construct sliding window-based and recurrent-based VSR Transformers with different alignment modules to study how they affect the VSR Transformers.
- Based on the findings and analysis, we proposed patch alignment module which is appropriate for the VSR Transformer. The proposed model PSRT-recurrent achieves SOTA performance with a simple design and fewer parameters.

Region-Adaptive Deformable Network for Image Quality Assessment Dec. 2020 – May. 2021

Accepted by CVPRW 2021. First Author. Advised by Prof. Yujiu Yang

- We proposed RADN, a patch-based IQA model which leverages the patch-level information to model the relationship between different regions.
- We propose reference-oriented deformable convolution module to process the GAN-based distortion in PIPAL dataset with image restoration results.
- We propose patch-level attention to facilitate the interaction between different patches.

Multi-dimension Attention Network for No-Reference Image Quality Assessment Dec. 2021 – Mar. 2022

Accepted by CVPRW 2022. Third Author. Advised by Prof. Yujiu Yang

- We proposed MANIQA, a Transformer-based NR-IQA model which leverages the spatial and channel information to model the relationship between different regions.
- To solve the overfitting problem, We use pre-trained ViT to extract feature from input image. After that, we propose a transposed attention block to boost the channel information interaction. We conduct a scale swin transformer block to further process the features in local window and use patch-weighted quality prediction strategy.
- Our model achieve superior performance than the existing NR-IQA methods.

Attention-based Hybrid Image Quality Assessment Network Dec. 2021 – Mar. 2022

Accepted by CVPRW 2022. Third Author. Advised by Prof. Yujiu Yang

- We proposed AHIQ, a CNN and Transformer hybrid FR-IQA model which combines local features extracted by CNNs and global features extracted by Transformer.
- We use the features of reference image extracted by ViT to predict the offsets of deformable convolution. Guided by these, the features extracted by CNNs are processed by deformable convolution and fused with the features processed by ViT followed by the patch-prediction module.
- Our model achieve superior performance than the existing FR-IQA methods.

Publications

Shuwei Shi, Jinjin Gu, Liangbin Xie, Xintao Wang, Yujiu Yang, Chao Dong: Rethinking Alignment in Video Super-Resolution Transformers. Accepted by NIPS 2022

Shuwei Shi, Qingyan Bai, Mingdeng Cao, Weihao Xia, Jiahao Wang, Yifan Chen, Yujiu Yang: Region-Adaptive Deformable Network for Image Quality Assessment. Accepted by CVPRW 2021

Shanshan Lao, Yuan Gong, **Shuwei Shi**, Sidi Yang, Tianhe Wu, Jiahao Wang, Weihao Xia, Yujiu Yang: Attentions Help CNNs See Better: Attention-based Hybrid Image Quality Assessment Network. Accepted by CVPRW 2022

Sidi Yang, Tianhe Wu, **Shuwei Shi**, Shanshan Lao, Yuan Gong, Mingdeng Cao, Jiahao Wang, Yujiu Yang: MANIQA: Multi-dimension Attention Network for No-Reference Image Quality Assessment. Accepted by CVPRW 2022

Jiahao Wang, Mingdeng Cao, **Shuwei Shi**, Baoyuan Wu, Yujiu Yang: Attention Probe: Vision Transformer Distillation in the Wild. Accepted by ICASSP 2022

Competitions

NTIRE 2022 Perceptual Image Quality Assessment: Track 1 Full-Reference Challenge *leaderboard*
Developed a attention-based hybrid network (AHIQ) for full reference image quality assessment. 1th Place

NTIRE 2022 Perceptual Image Quality Assessment: Track 2 No-Reference Challenge *leaderboard*
Developed a multi-dimension attention network (MANIQA) for no reference image quality assessment. 1th Place

NTIRE 2022 Super-Resolution and Quality Enhancement of Compressed Video: x4 SR Challenge *leaderboard*
Developed a bidirectional recurrent transformer for video restoration. 5th Place

NTIRE 2021 Perceptual Image Quality Assessment Challenge *leaderboard*
Developed a region adaptive deformable network (RADN) for full reference image quality assess. 4th Place

Research Internship Experience

Huawei, 2012 Lab Shenzhen, China
Research intern (Video Super-Resolution) Apr. 2021 – Jul. 2021

Awards

National Scholarship in Tsinghua University Oct. 2022
China National Scholarship (0.2%), CHINA Nov. 2018
Merit student in Heilongjiang Province (1%) May. 2018
Honorable Mention in ICM Apr. 2018
Seven times first-class scholarships for outstanding students by Harbin Engineering University 2016-2020
Outstanding graduate of Harbin Engineering University, Harbin Jun. 2020

Technical Skills

Programming: Python, C/C++, Matlab
DL/Ml frameworks: PyTorch/Torchvision, Scikit-learn, NumPy, Pandas, MatplotLib
English: CET-6: 547

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