Haoming Cai

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Education

- **The Chinese University of Hong Kong (Shenzhen)** Shenzhen, China
  B.Sc. *in Computer Science and Engineering* *Sept.2017 - Sept.2022*
  Courses: *Linear Algebra, Artificial Intelligence, Machine Learning, Software Development, Medical Imaging*

Research Interest

- **Computer Vision, Image Processing, Image Quality Assessment, Network Interpretation.**

Publications

- Google Scholar Citation : **56** (till December.2021)

[1] **Haoming Cai**, Jingwen He, Yu Qiao, Chao Dong, "Toward Interactive Modulation for Photo-Realistic Image Restoration", accepted by **CVPR 2021, NTIRE workshop**. [PDF, Code]

[2] Jinjin Gu, **Haoming Cai**, Haoyu Chen, Xiaoxing Ye, Jimmy S. Ren, Chao Dong, "PIPAL : a Large-Scale Image Quality Assessment Dataset for Perceptual Image Restoration.", **ECCV, 2020**. [PDF, Project, Talk]

[3] Jinjin Gu, **Haoming Cai**, Chao Dong, Jimmy S. Ren, Yu Qiao, Shuhang Gu, Radu Timofte, et al., "NTIRE 2021 Challenge on Perceptual Image Quality Assessment", **CVPR 2021, NTIRE workshop**. [PDF, Challenge, Talk]

[4] Jinjin Gu, **Haoming Cai**, Chao Dong, Jimmy S. Ren, Yu Qiao, Shuhang Gu, Radu Timofte, et al., "NTIRE 2022 Challenge on Perceptual Image Quality Assessment", **CVPR 2022, NTIRE workshop**. [Challenge]

Manuscripts

[5] **Haoming Cai**, Jinjin Gu, Zhengwen Zhang, Yu Qiao, Chao Dong, "Understanding the Unreasonable Effectiveness of Deep Features as a Perceptual Metric", **prepare for NIPS 2022**.

[6] Jinjin Gu, **Haoming Cai**, Haoyu Chen, Xiaoxing Ye, Jimmy S. Ren, Chao Dong, "Image Quality Assessment for Perceptual Image Restoration: A New Dataset, Benchmark and Metric", **review by TPAMI**. [PDF, Code]

[7] Jinjin Gu, **Haoming Cai**, Chenyu Dong, Ruofan Zhang, Yulun Zhang, Wenming Yang, Chun Yuan, "Super-Resolution by Predicting Offsets: An Ultra-Efficient Super-Resolution Network for Rasterized Images". **review by SIGGRAPH**

Research Service

- **Workshop Co-organizer** - The Perceptual IQA Challenge in the 6th/7th NTIRE workshop at CVPR
- **Reviewer/Assistant Reviewer** - ICCV 2021, TPAMI, ACM TOMM, CVPR 2021&2022 NTIRE workshop,

Research Experience

Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences Shenzhen, China
Research Assistant *May 2020 - Present*

- **Supervised by Prof.Dong Chao and Prof.Qiao Yu, and work with Ph.D.candidate Jinjin Gu**
- **Image Quality Assessment Dataset, Benchmark, Metrics, and Challenge** *(September 2019 - Present)*

  ▶ Contribute a novel perceptual image similarity dataset called PIPAL with Elo rating system to study the new distortion brought by Generative Adversarial Network (GAN) technology. I take charge of dataset construction, statistical analysis, and model experiments. **[2][6]**

  ▶ Host the Perceptual Image Quality Assessment Challenge on the 6th New Trends in Image Restoration and Enhancement workshop (NTIRE) in conjunction with CVPR2021 based on our PIPAL dataset. I take charge of all processes beginning from establishing regulation to the conclusive report as a core co-organizer. **[3][4]**

  ▶ Statistically compare and study a variety of deep representation models that can be used as perceptual metrics to find the core characteristic, which dominates the performance of perceptual metrics. I delve into this topic from the explainable perspective as first author. **[5]**

- **Interactive Modulation for Image Restoration.** *(July 2020 - November 2020)*

  ▶ Propose Controllable Unet Generative Adversarial Network (CUGAN) which introduces continuous modulation enabling users to adjust the texture reconstruction and restoration strength freely. With fewer parameters, CUGAN achieves better performance on selected datasets and real-world images. **[1]**

- **Interpretability of Loss Function in Image Super-Resolution** *(April 2021 - Present)*

  ▶ Explore what characteristics of loss functions have a strong influence on models of image super-resolution (SR). Develop an iterative algorithm to search for a better combination of losses for a corresponding SR model. I delve into this topic from the explainable perspective as the first author.

Software Development

- **AI-Based Anime Image Toolbox iOS Application (Swift-based)**: We built an AI-based image toolbox named ReyeR, providing reverse anime image search, anime image tag recognition, photo cartoonization, and a human face to anime face. I take charge of interaction effects and the whole front-end. More in the exhibition web of ReyeR.

Skills Summary

- **Languages/Frameworks**: Python(PyTorch, Numpy, OpenCV, Caffe), MATLAB, Swift, LaTex, Markdown