NTIRE 2025 Real-World Face Restoration Challenge Factsheet -MPSR-

Yun Zhang
Xiaomi Inc.
China
zhangyun9@xiaomi.com

Zhuofan Zheng
Xiaomi Inc.
China
zhengzhuofan@xiaomi.com

1. Team details

- Team name: MiPortrait
- Team leader name: Yun Zhang
- Team leader address, and email:
  Shanghai, China. zhangyun9@xiaomi.com
- Rest of the team members:
  Zhuofan Zheng, Yuyue Liu, Shizhen Tang, Zihao Zhang, Yi Ning, Hao Jiang
- Affiliation: All of the members are affiliated with Xiaomi Technology Co., Ltd
- User names and entries on the NTIRE 2025 Codalab competitions (development/validation and testing phases)
  user name: laoji
  entries: 4(validation), 1(testing)
- Best scoring entries of the team during the test phase
  entry 1, file name: MPSR.zip
- Link to the codes/executables of the solution(s)
  gitURL

2. Method details

2.1. Method Name

MPSR

2.2. Introduction

Today, Stable Diffusion shows unrivaled detail generation capabilities in the field of image generation. We utilize Diffbir[3] as our algorithm backbone, which adopts a two - stage framework. In the first stage, a restoration module, such as SwinIR[2], is used to remove most of the degradations in the image, such as noise and blurring. In the second stage, it takes advantage of the powerful generative ability of Stable Diffusion.

Due to the severe degradation of the images, we found that SwinIR in stage 1 could not provide sufficient facial details for stage 2. Therefore, SwinIR[2] is replaced by PiSA-SR[5], a fast one-step SD network with high fidelity.

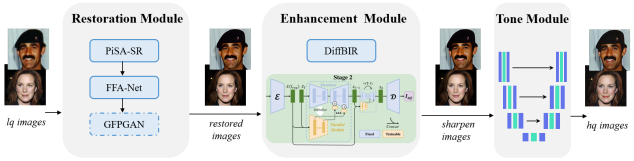

Figure 1. Workflow of MPSR

Furthermore, in the Wider-test and Webphoto-test images, the faces are so severely degraded that they are barely recognizable even to the human eye. To address this challenge, we incorporate GFPGAN[7] at the end of Restoration Module to render these faces more human-like. However, GFPGAN[7] has a tendency to reduce the consistency with the original image. Thus, we decide to apply it only to images of extremely low quality. CLIPIQA[6] and MUSIQ[1] are employed as thresholds to determine whether GFPGAN[7] should be activated.

All the processes described above are designed to enhance image sharpness. Meanwhile, tone and clarity are also crucial factors in Image Aesthetic Assessment. Due to rephotographing, sunlight exposure, and air oxidation, the color of many old photos has deteriorated. To address this, the dehaze network FAA-Net[4] is implemented to mitigate the whitening effect. At the end of the entire process, a skin-tone-specific UNet is utilized. This application aims to render the face more natural-looking and ensure it better aligns with our aesthetic criteria. The workflow of the proposed algorithm is illustrated in Figure 1.

2.3. Experiment Results

The following scores are obtained by running the eval.py on the highest test submission, and keep three decimal places.

CLIPIQA	MUSIQ	MAIQA	QAILGN	NIQE	FID
0.978	78.272	0.776	4.610	5.819	64.336

2.4. Results Link

https://drive.google.com/drive/folders/1BlOYcqMi6gAyvWkvQog3dJvbt1XKBukg

References

[1] Junjie Ke, Qifei Wang, Yilin Wang, Peyman Milanfar, and Feng Yang. Musiq: Multi-scale image quality transformer, 2021. 1

[2] Jingyun Liang, Jiezhang Cao, Guolei Sun, Kai Zhang, Luc Van Gool, and Radu Timofte. Swinir: Image restoration using swin transformer, 2021. 1

[3] Xinqi Lin, Jingwen He, Ziyan Chen, Zhaoyang Lyu, Bo Dai, Fanghua Yu, Wanli Ouyang, Yu Qiao, and Chao Dong. Diffbir: Towards blind image restoration with generative diffusion prior, 2024. 1

[4] Xu Qin, Zhilin Wang, Yuanchao Bai, Xiaodong Xie, and Huizhu Jia. Ffa-net: Feature fusion attention network for single image dehazing, 2019. 1

[5] Lingchen Sun, Rongyuan Wu, Zhiyuan Ma, Shuaizheng Liu, Qiaosi Yi, and Lei Zhang. Pixel-level and semantic-level adjustable super-resolution: A dual-lora approach, 2024. 1

[6] Jianyi Wang, Kelvin C. K. Chan, and Chen Change Loy. Exploring clip for assessing the look and feel of images, 2022. 1

[7] Xintao Wang, Yu Li, Honglun Zhang, and Ying Shan. Towards real-world blind face restoration with generative facial prior, 2021. 1