NCHU EE 1131 4269

Deep Learning

Term Project – Image Inpainting (Due 01/09/2025 6:00pm)

Link for Image Inpainting models:

[1] CR-Fill: Generative Image Inpainting with Auxiliary Contextual Reconstruction (ICCV 2021)

https://github.com/zengxianyu/crfill

[2] Image Inpainting by End-to-End Cascaded Refinement with Mask Awareness (IEEE TIP 2021)

https://github.com/MADF-inpainting/Pytorch-MADF

[3] LaMa: Resolution-robust Large Mask Inpainting with Fourier Convolutions (WACV 2022)

https://github.com/advimman/lama

[4] AOT-GAN: Aggregated Contextual Transformations for High-Resolution Image Inpainting (IEEE TVCG 2022)

https://github.com/researchmm/AOT-GAN-for-Inpainting

[5] Bridging Global Context Interactions for High-Fidelity Image Completion (CVPR 2022)

https://github.com/lyndonzheng/TFill

[6] Keys to Better Image Inpainting: Structure and Texture Go Hand in Hand (WACV 2023)

https://github.com/SHI-Labs/FcF-Inpainting

Reference Paper:

[1] Yu Zeng, Zhe Lin, Huchuan Lu, and Vishal M. Patel. Cr-fill: Generative image inpainting with auxiliary contextual reconstruction. In *Proceedings of the IEEE International Conference on Computer Vision*, pp. 14164-14173, 2021.

[2] Manyu Zhu, Dongliang He, Xin Li, Chao Li, Fu Li, XiaoLiu, Errui Ding, and Zhaoxiang Zhang. Image inpainting by end-to-end cascaded refinement with mask awareness. *IEEE Transactions on Image Processing*, 30:4855–4866, 2021.

[3] Roman Suvorov, Elizaveta Logacheva, Anton Mashikhin, Anastasia Remizova, Arsenii Ashukha, Aleksei Silvestrov, Naejin Kong, Harshith Goka, Kiwoong Park, and Victor Lempitsky. Resolution-robust large mask inpainting with Fourier convolutions. In *Proceedings of the IEEE/CVF winter conference on applications of computer vision*, pp. 2149 – 2159, 2022.

[4] Yanhong Zeng, Jianlong Fu, Hongyang Chao, and Baining Guo. Aggregated contextual transformations for high-resolution image inpainting. *IEEE Transactions on Visualization and Computer Graphics*, 2022.

[5] Chuanxia Zheng, Tat-Jen Cham, Jianfei Cai, and Dinh Phung. Bridging global context interactions for high-fidelity image completion. In *Proceedings of the IEEE/CVF conference on computer vision and pattern recognition*, pp. 11512-11522, 2022.

[6] Jitesh Jain, Yuqian Zhou, Ning Yu, and Humphrey Shi. Keys to better image inpainting: Structure and texture go hand in hand. in *Proceedings of the IEEE/CVF winter conference on applications of computer vision*, pp. 208 – 217, 2023.

DataSet:

- **Training dataset (data.7zip)**
  - **1000 images with size 256 × 256 from Place2.**
  - **1000 images with size 256 × 256 from CelebA.**
  - **1000 mask images with size 256 × 256 (mask ratio 1~60%)**
- **Validation dataset (data.7zip)**
  - **500 images with size 256 × 256 from Place2.**
  - **500 images with size 256 × 256 from CelebA.**
  - **500 mask images with size 256 × 256 (mask ratio 1~60%)**
- **Testing dataset (test.7zip)**
  - **300 images with size 256 × 256 from CelebA.**
  - **300 images with size 256 × 256 from FFHQ.**
  - **300 images with size 256 × 256 from Paris.**
  - **300 images with size 256 × 256 from Place2_chruch_indoor.**
  - **300 images with size 256 × 256 from Place2_chruch_outdoor.**
  - **300 images with size 256 × 256 from ShanghaiTech.**
  - **300 mask images with size 256 × 256 (mask ratio 1~60%)**
- **For convenience, you can download all above datasets from:**
  Training & Validation set:
  https://drive.google.com/file/d/1pwkuX5Oy2IRfFY-JooWwhex8yBVQJZGO/view?usp=drive_link
  Testing set: https://drive.google.com/file/d/1-5iaqRzkkjg0Uv2bt-eRJML5iJS7wGIl/view?usp=drive_link

Table 1

Dataset	Index	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CelebA (300)	PSNR						
	SSIM						
	LPIPS						
FFHQ (300)	PSNR						
	SSIM						
	LPIPS						
Paris (300)	PSNR						
	SSIM						
	LPIPS						
Place2_chruch_indoor (300)	PSNR						
	SSIM						
	LPIPS						
Place2_chruch_outdoor (300)	PSNR						
	SSIM						
	LPIPS						
Shunghaitech (300)	PSNR						
	SSIM						
	LPIPS						

Fig. 1 Qualitative comparison on Places2.

Task:

Using the above **image inpainting** models to do the **inpainting** for above datasets.

Setting 1:

Training on the **Place2** 1000 images with the provided 1000 mask images, validating on the **Place2** 500 images with the provided 500 mask images, and testing on **CelebA, FFHQ, Paris, Place2_chruch_indoor, Place2_chruch_outdoor, ShanghaiTech** with respective 300 images and 300 mask images.

Setting 2:

Training on the **CelebA** 1000 images with the provided 1000 mask images, validating on the **CelebA** 500 images with the provided 500 mask images, and testing on **CelebA, FFHQ, Paris, Place2_chruch_indoor, Place2_chruch_outdoor, ShanghaiTech** with respective 300 images and 300 mask images.

(1) For above 2 settings, choose at least 3 image inpainting models mentioned above to perform the training and testing for comparison. And compare your results for each model in **Table 1 (**i.e., you have to **show the Table 1 results for each setting, respectively)**. Higher scores will be given when you compare more **inpainting** models with **correct** results.

(2) For above 2 settings, show qualitative comparison of inpainting results for each model in the **CelebA, FFHQ, Paris, Place2_chruch_indoor, Place2_chruch_outdoor, ShanghaiTech** testing datasets, respectively (at least choose 1 image for comparison from above six datasets. Refer to **Fig. 1**).

(3) Show the complexity comparison (e.g., # of parameters, FLOPs) for all models.

Grading:

(1) Written Report (50%)

Including the following parts.

a. Title of the topic and your name 封面、題目及姓名

b. Introduction 主題簡介

c. Method description 敘述各個方法(方法如有修改亦在此敘述)

d. Results comparison & discussion 結果比較及討論

e. Conclusion 心得及結論

f. References 參考文獻

Report format:

- At least 10 pages (not including the title page) in A4 size
- Fonts: English (Times New Roman), Chinese (標楷體), size 12pts

- Line spacing: single
- Margin: 2 cm for top, bottom, left, and right

(2) Implementation and simulation (10%)

Including codes, ReadMe files (such as how to run your program)

Submission:

- Please zip all your files (including the written report in MS word file, and codes) into one file named "DL_TermProject_YourName". Then upload your term project files via iLearning course website before 01/09/2025 6:00 pm.