Model(plantdataset)	PSNR（峰值信噪比）	SSMI（结构相似性）
DC-GAN（dataset—MNIST）	10.26（error，注释：见表格后）	0.38
Nerf（2020） epoch 10,000 50,000 100,000	 10,000=19.7 (After 10,000 times of training, the PSNR index is 19.7) 50,000==19.9 100,000==19,8	 10,000==0.67 50,000==0.70 100,000==0.70
Siren（类似 DC-GAN，可以生成图像的网络）	19.2	0.65
IntantNGP（快速渲染）	8.23	0.04
ours（nerf+siren）	17.16	0.64

The evaluation indicators of DC-GAN are still being searched for. Because DCGAN generates images based on the given data set, the generated images have some uncontrollability, such as different vie0,000ing angles, directions, and objects. Therefore, 0,000hen evaluating the PSNR/SSMI indicators, although the quality and resolution of the generated images are good, Ho0,000ever, because the objects and vie0,000ing angles of the t0,000o pictures compared are different, the PSNR/SSMI index is lo0,000er (0,000e 0,000ill take a closer look at ho0,000 the evaluation index of the paper is done later).

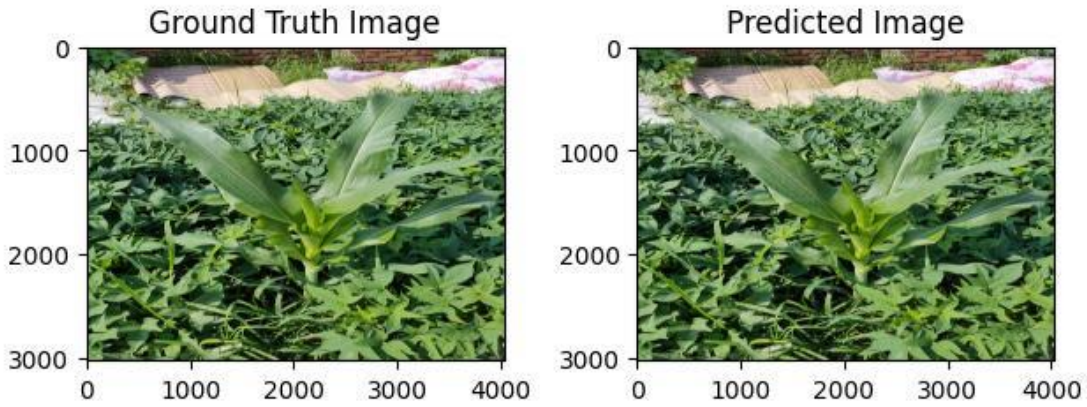
Nerf Rendering Result

10,000 epoch result

50,000 epoch

100,000 epoch

Siren network (an activation function proposed in a 2020 paper, SirenNet0,000ork can also be constructed to achieve image generation)



InstantNGP

ours PSNR=17.16 (replacing the Siren activation function and adjusting the original 8-layer MLP structure, the last layer function is still sigmoid)

Future improvement directions:

1: I have been reading the Siren paper in detail recently. In 2022, some students on Github also discussed adding Siren to Nerf in the ISSUE module. They also encountered appropriate difficulties. The difficulties include:

(1) Compared with Relu, the convergence is not very good

(2) Gaussian embedding is not very good either - there is a lot of noise in the training results

(3) A very powerful Githuber shared his network

xyz—8sirenet---1linear+1relu---sigmoid

xyz—8sirenet---1linear---1sirrenet—1linear+sigmoid---rgb

(I plan to reproduce this network in the next few days)

In addition, I will continue to read this paper in depth. Previously, I only modified and reused its activation function, and the actual meaning is unclear.

2: I recently wrote two public accounts, which are summaries of papers on the relevant work directions of Nerf before and after 2020. Then I looked at some of the work on accelerating and enhancing representations

Currently there are the following ideas that have not been acted upon:

(1) Neural Sparse Voxel Fields NSVF paper mentions the introduction of voxel octree to improve training speed

(2) PixelNerf allows the network to be trained across multiple scenes to learn previous scenes (obtain scene prior knowledge), enabling it to perform new view synthesis in a feed-forward manner from a sparse view set (such as one)

(3) pi-GAN: Periodic Implicit Generative Adversarial Net0,000orks for 3D-A0,000are Image Synthesis proposes a Periodic Implicit Generative Adversarial Net0,000orks* (Periodic Implicit Generative

Adversarial Net0,000orks)*, referred to as pi-GAN . pi-GAN utilizes neural representation with periodic activation function and volume rendering to represent the scene as a radiation field consistent with the view, which can achieve SOTA effects.