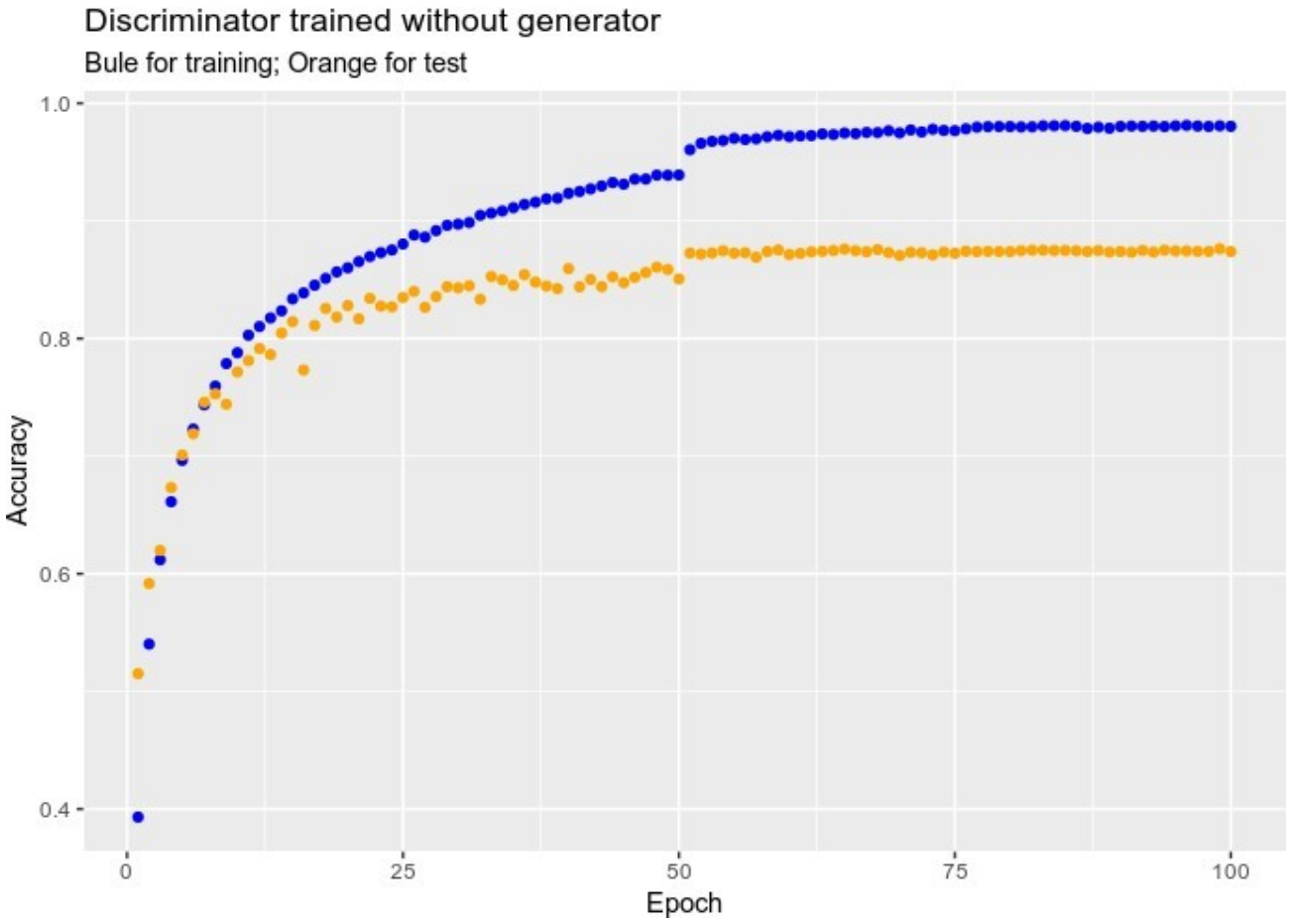
Part1

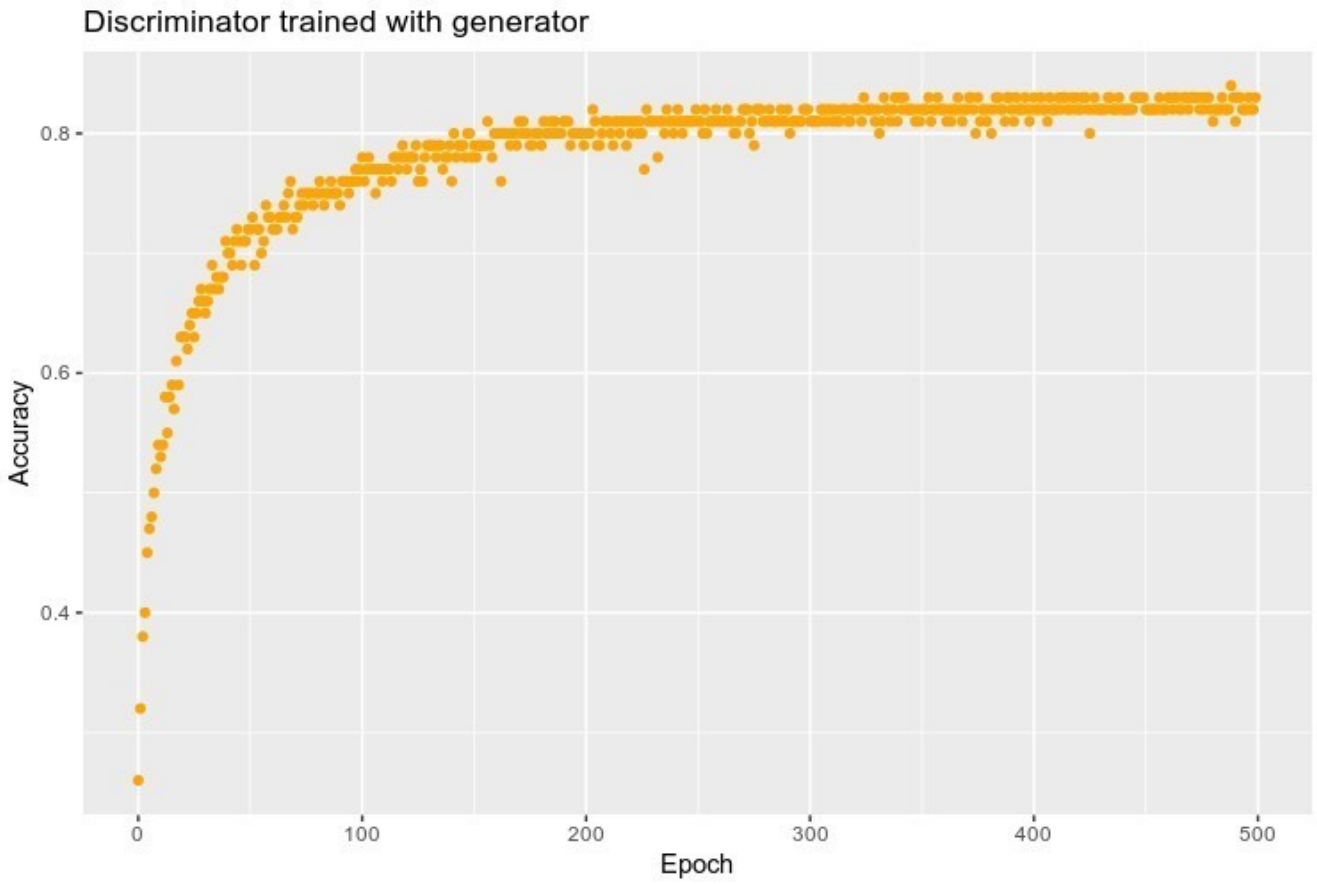
1. Trainthe discriminator without generator

After**100 epochs**, I finally get a**training accuracy of 98.04%**and a**test accuracy of 87.4%**. I use Adam optimizer. Initial learning rate is 10e-5 and it will decrease to 10e-6 after the 50th epoch and 10e-7 after the 75th epoch. For accelerate the computation, I set batch size to 128.



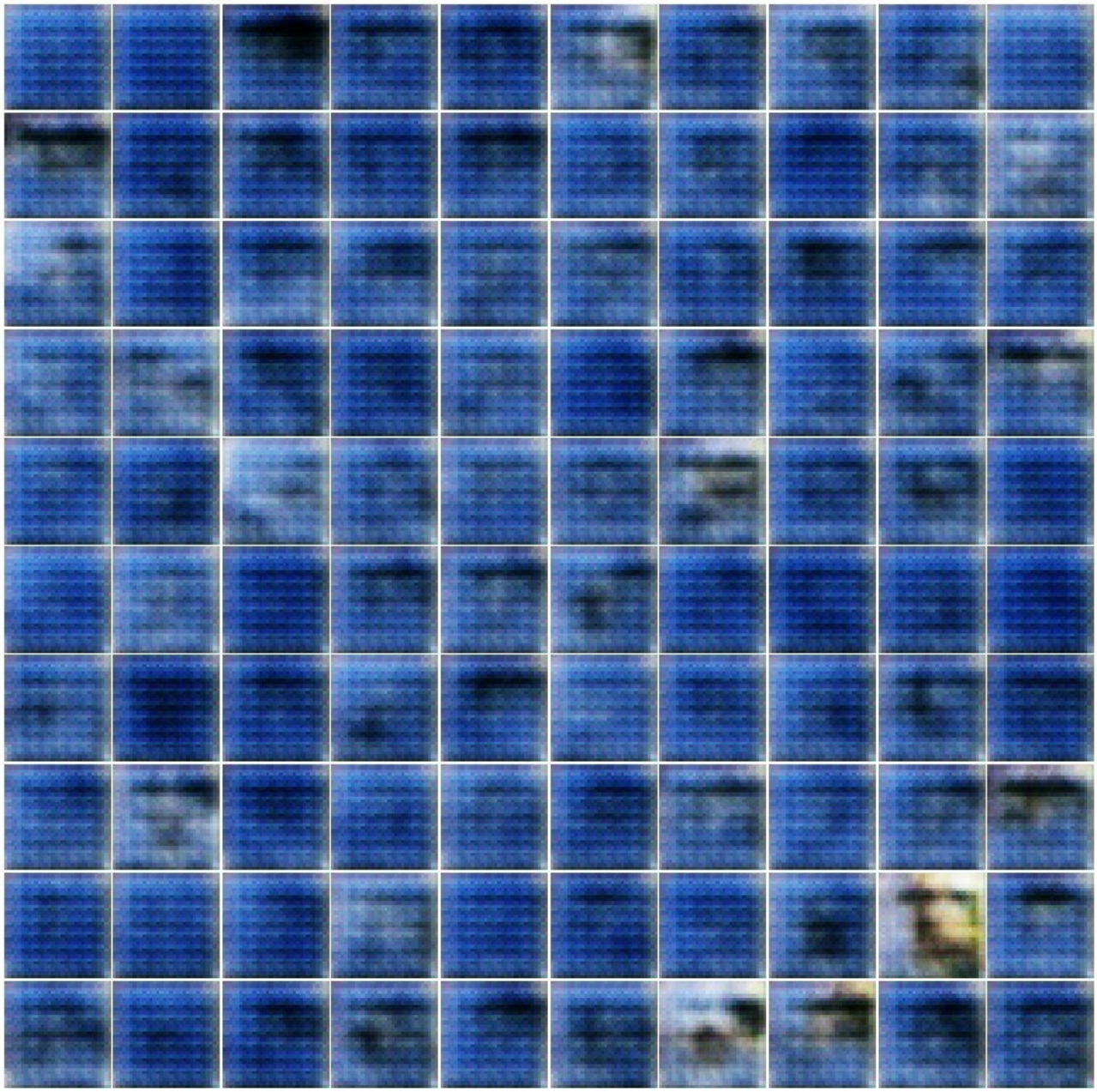
2. Trainthe discriminator with generator

In this part, the discriminator is trained for 500 epochs with batch size of 128. I finally get**the test accuracy of 82.57%**

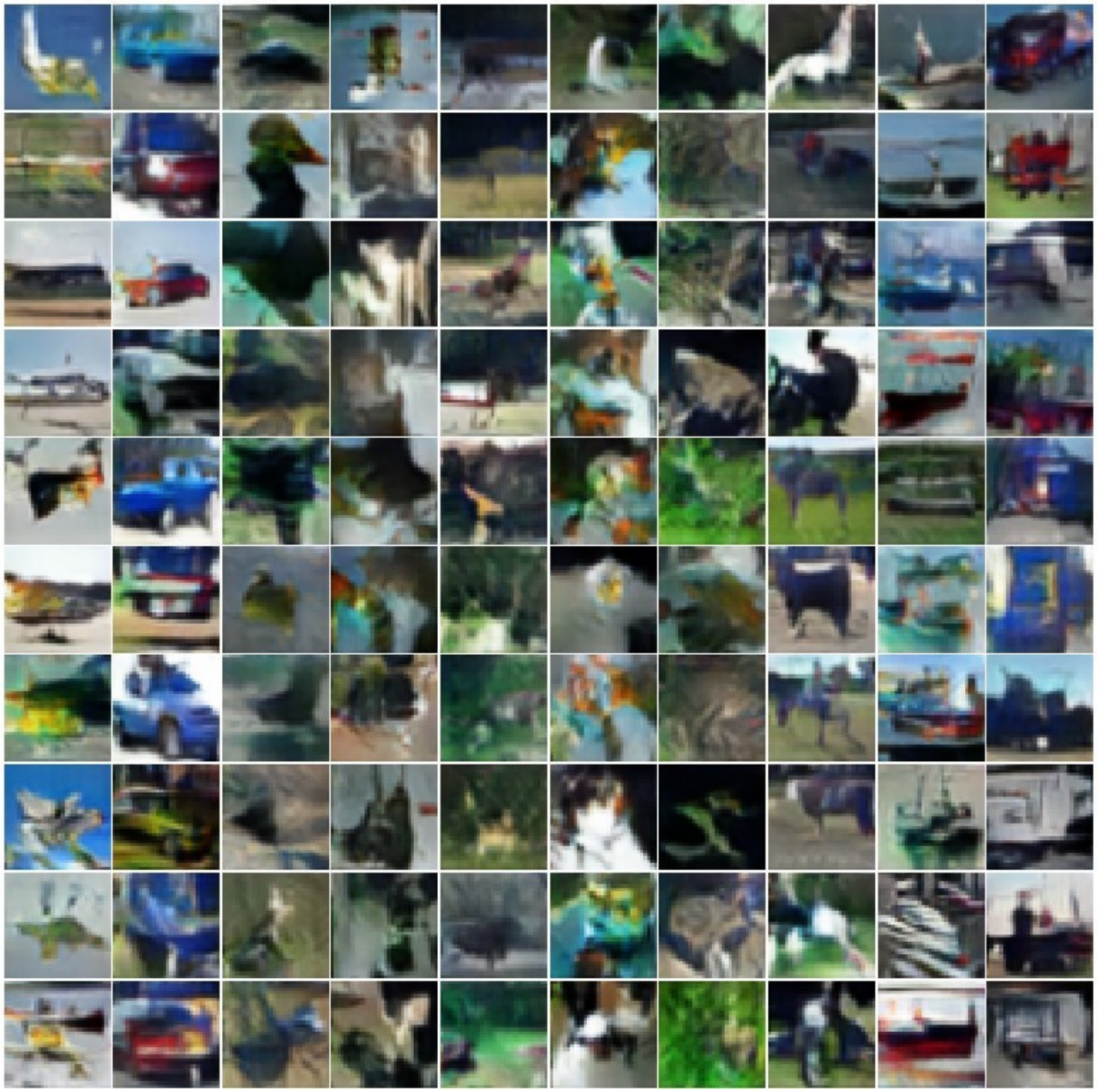


3. Generatedimages

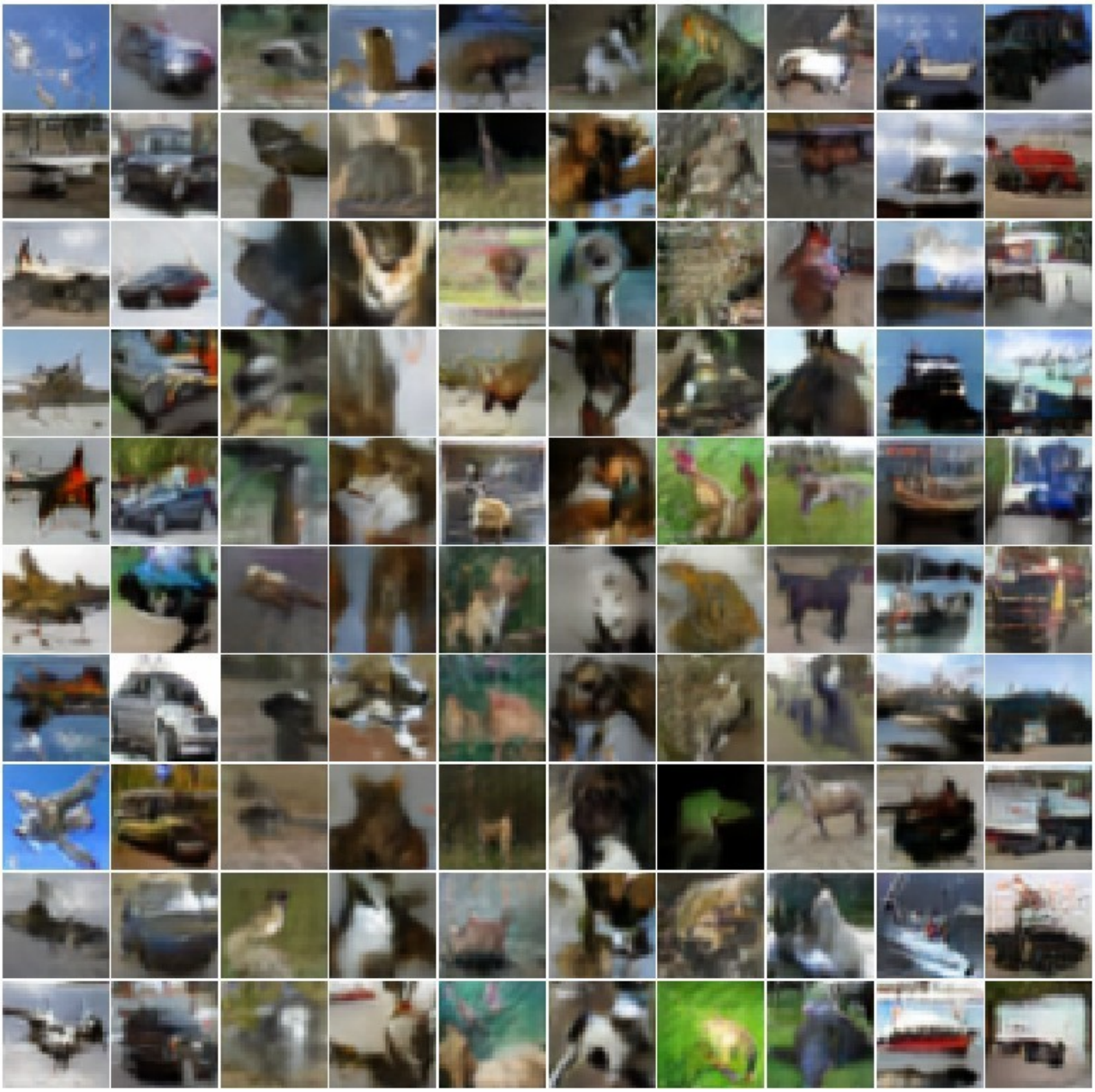
epoch 0



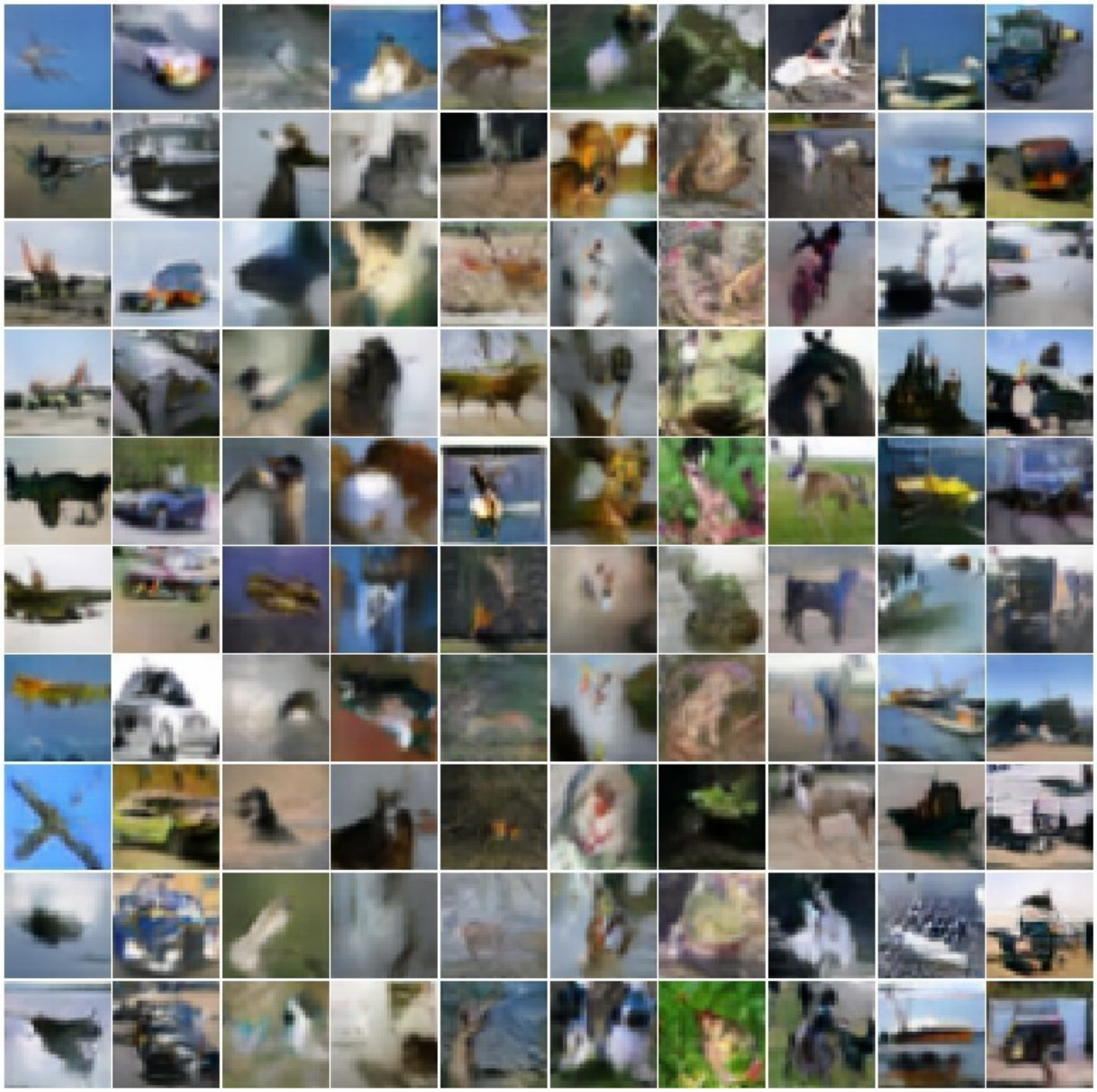
epoch 100



epoch 200

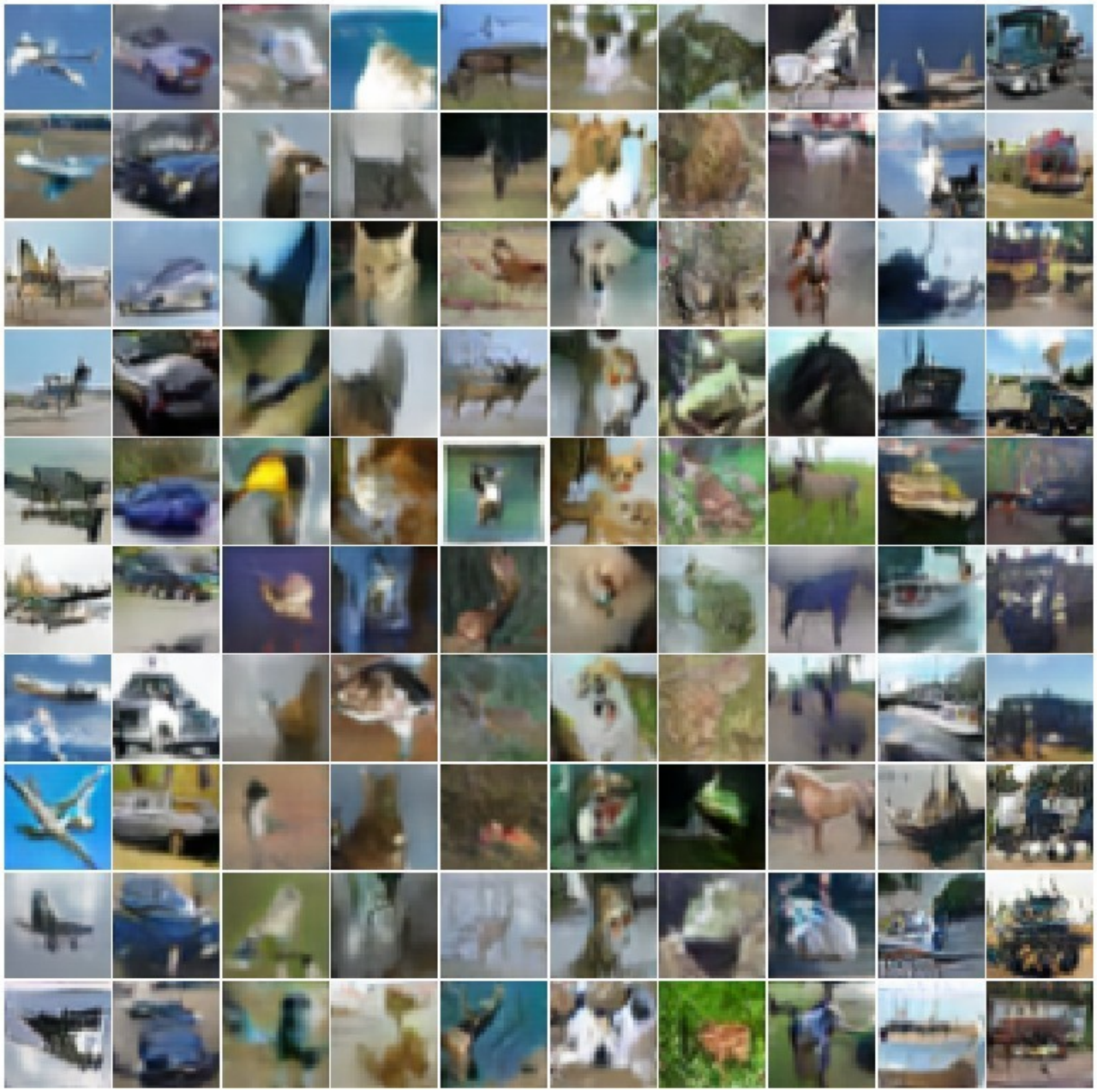


epoch 300



epoch 400

epoch 500

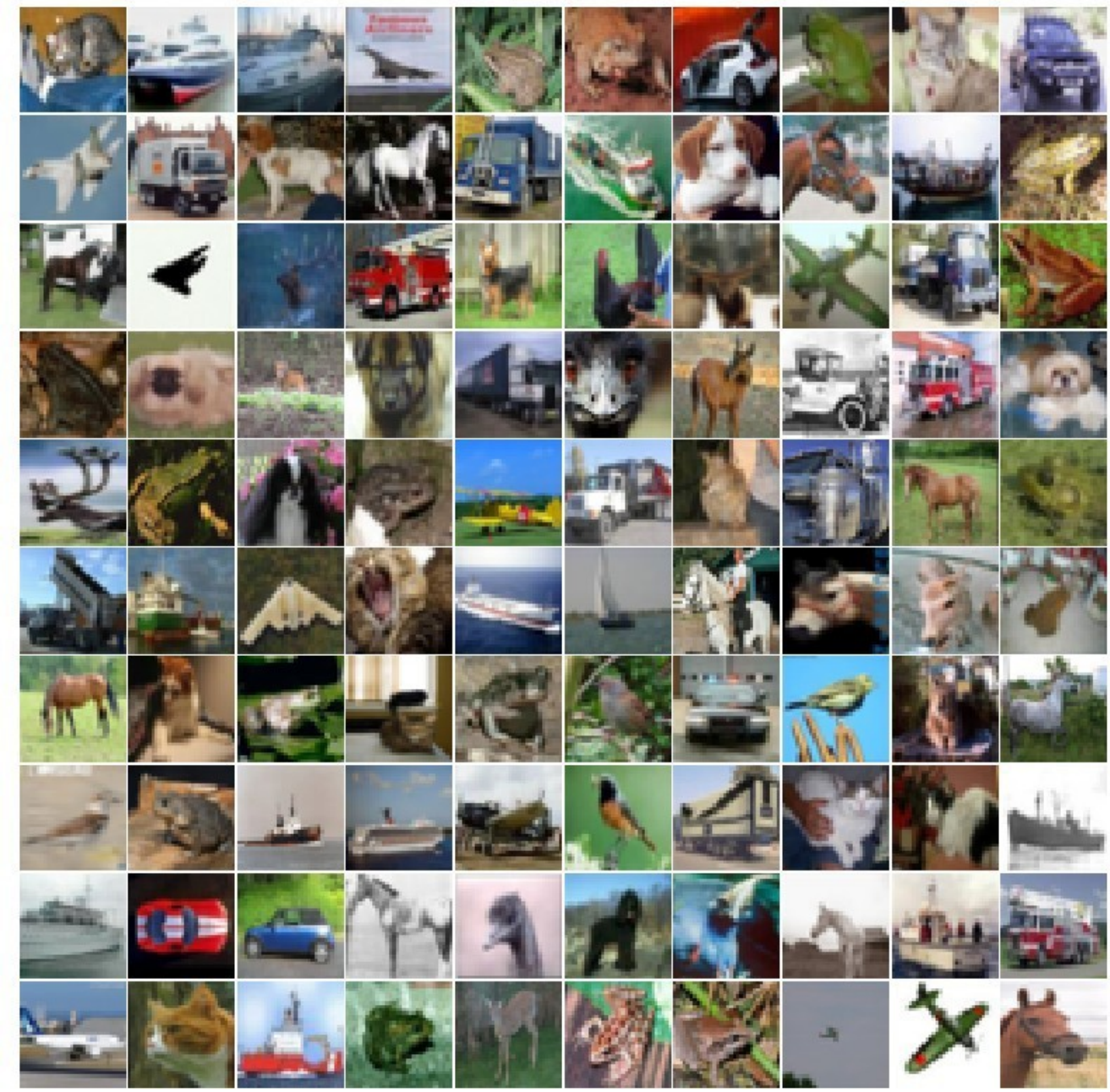


Part 2

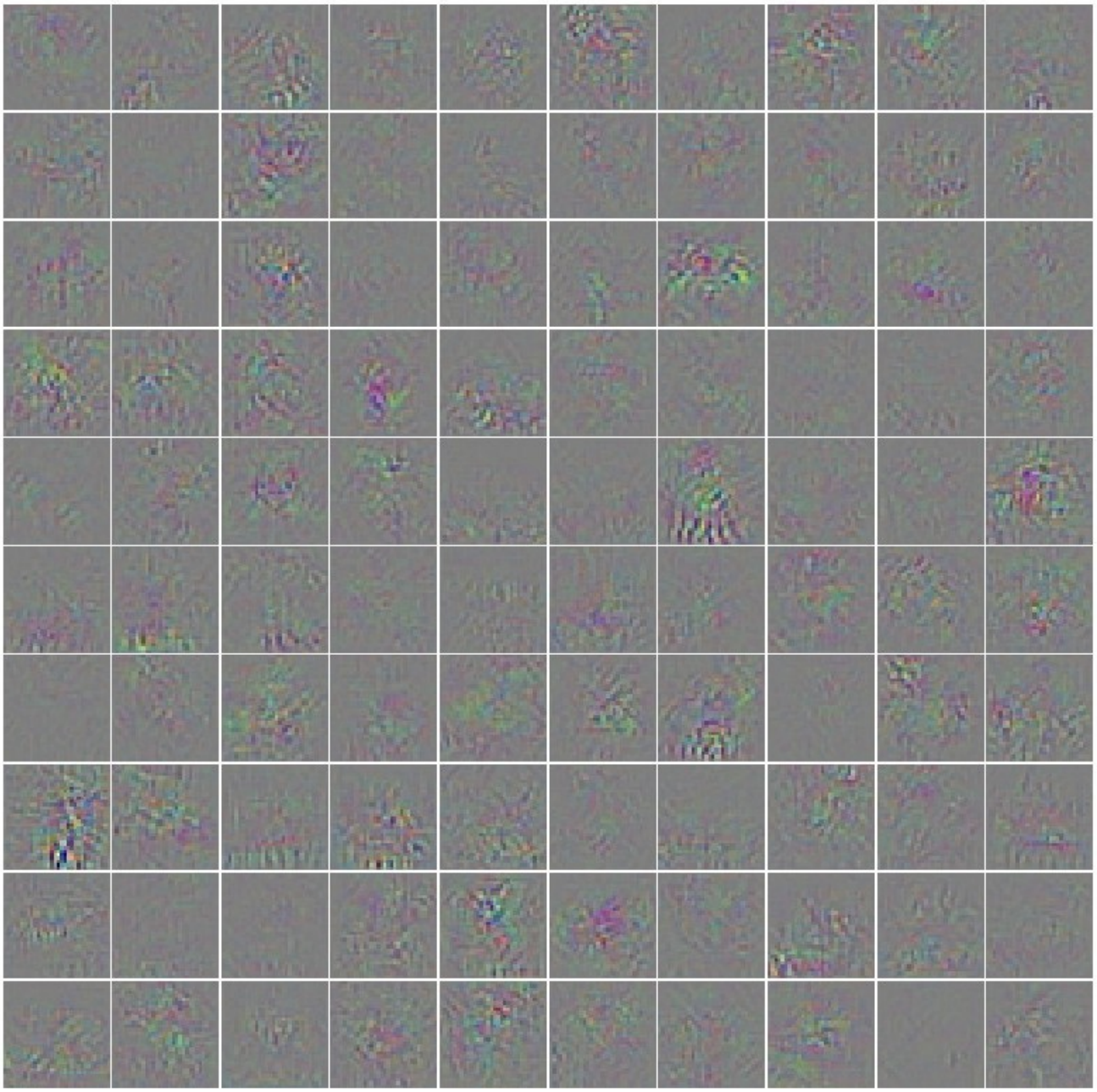
1. Perturb RealImages

The classification accuracy is**92.19% on real images**and**10.94% on fake images.**These images are shown below.

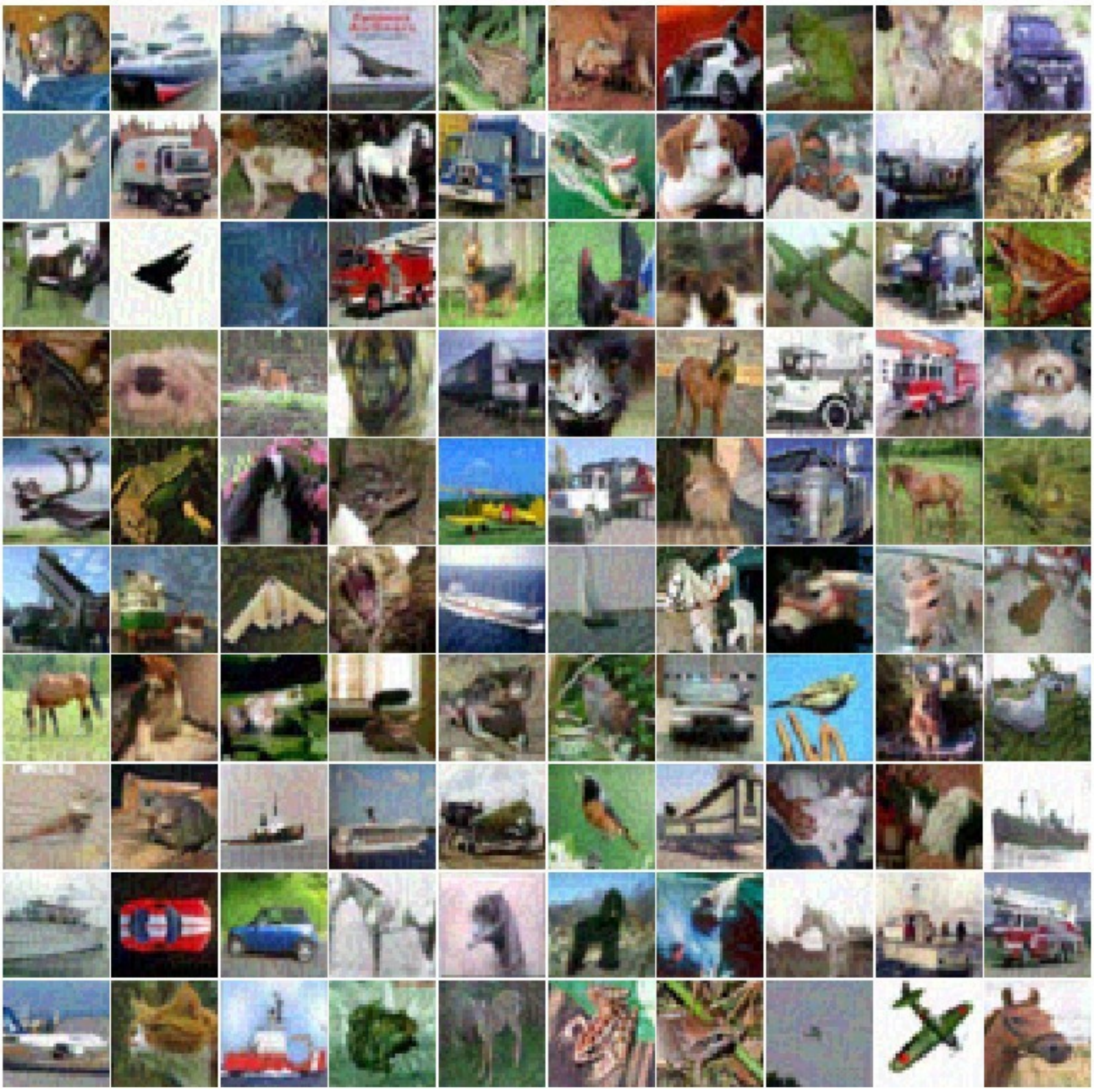
(1) RealImages



(2) GradientImages

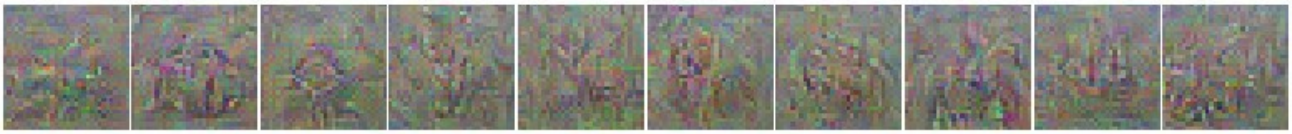


(3) JitteredImages:



2. Synthetic Images Maximizing ClassificationOutput

(1) Discriminator trained without thegenerator

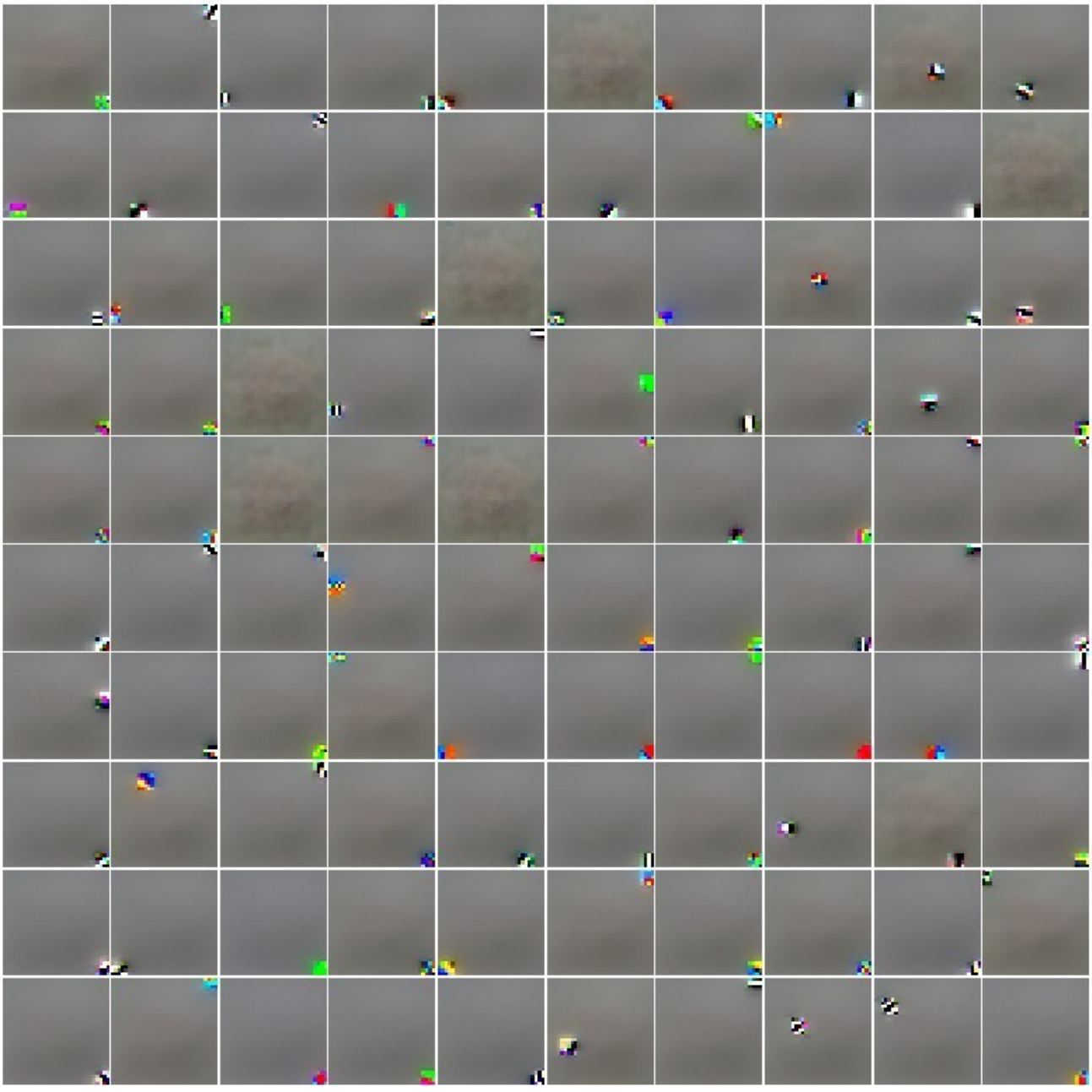


(2) Discriminator trained with thegenerator

3. Synthetic Features Maximizing Features atVariousLayers

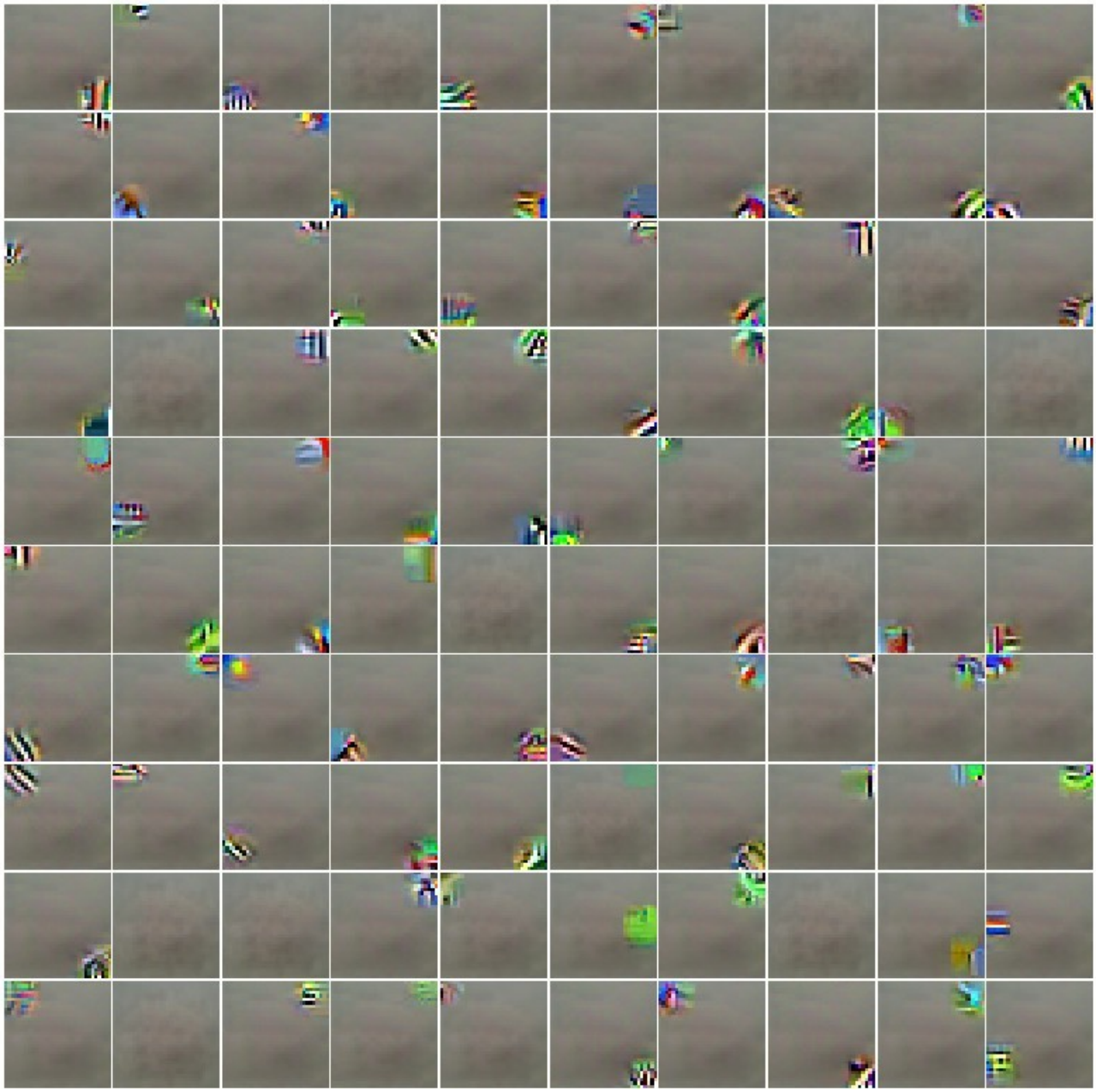
(1) Discriminator trained with thegenerator

Layer 2



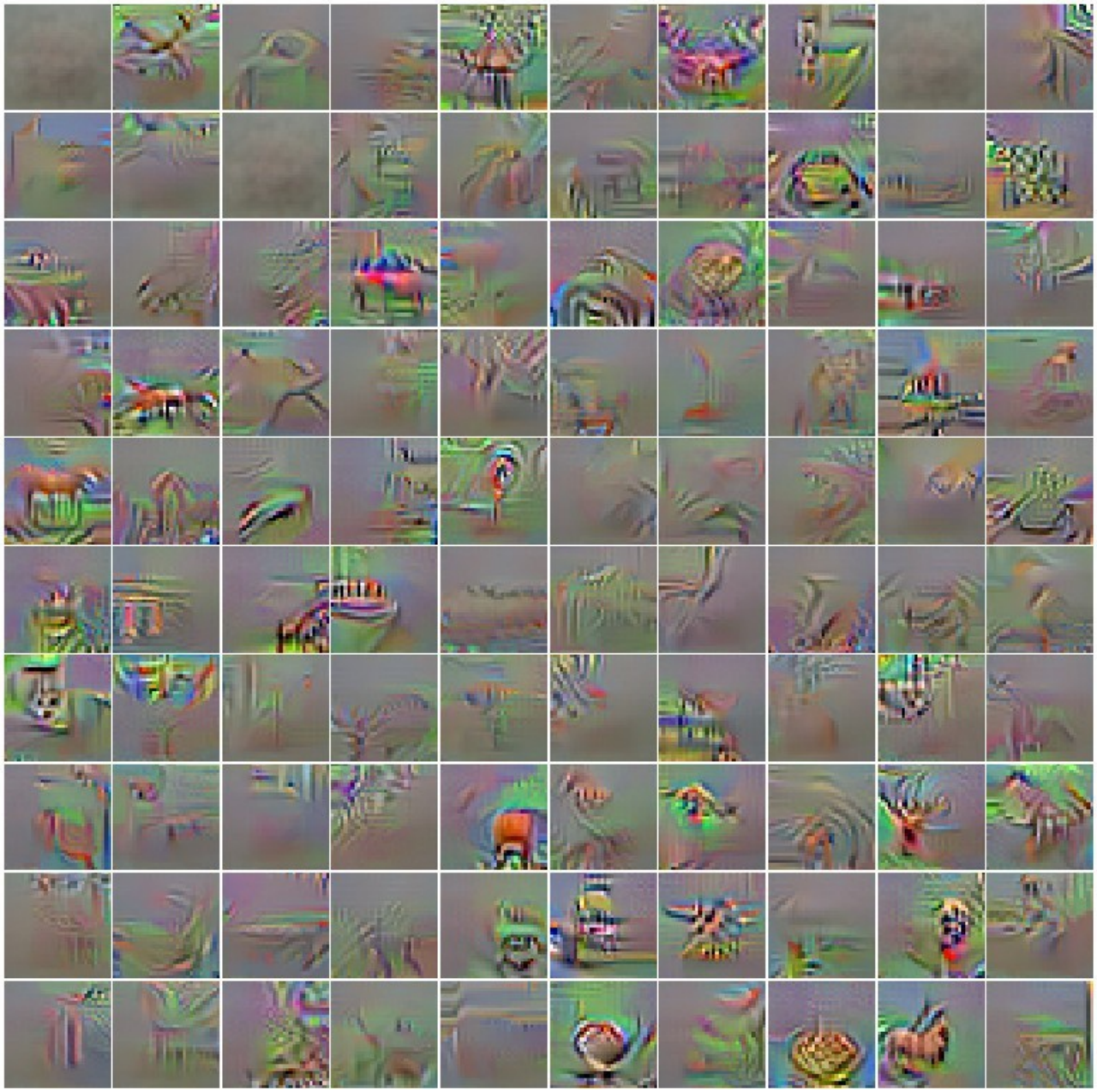
Layer3

layer4



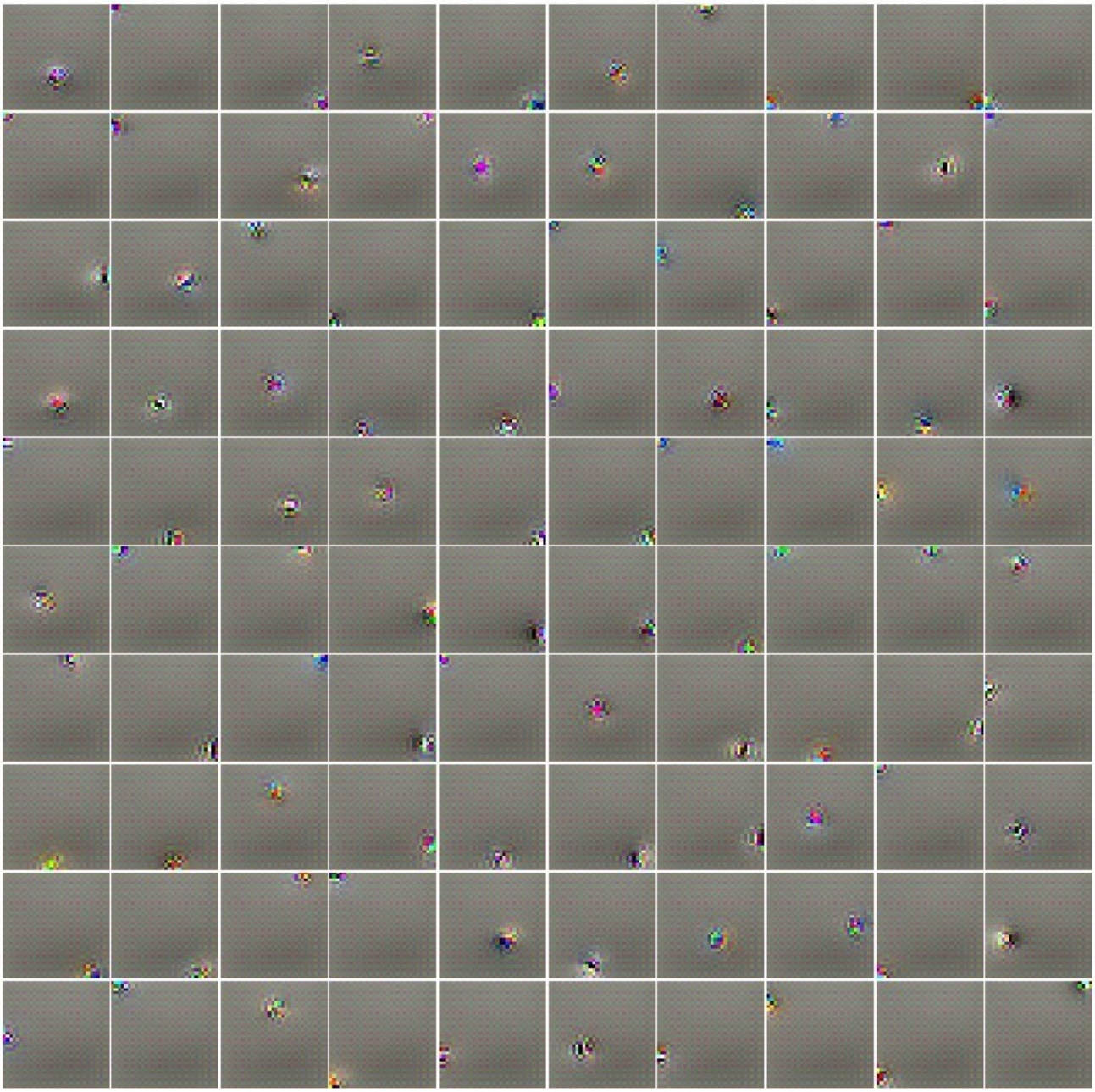
layer6

layer8

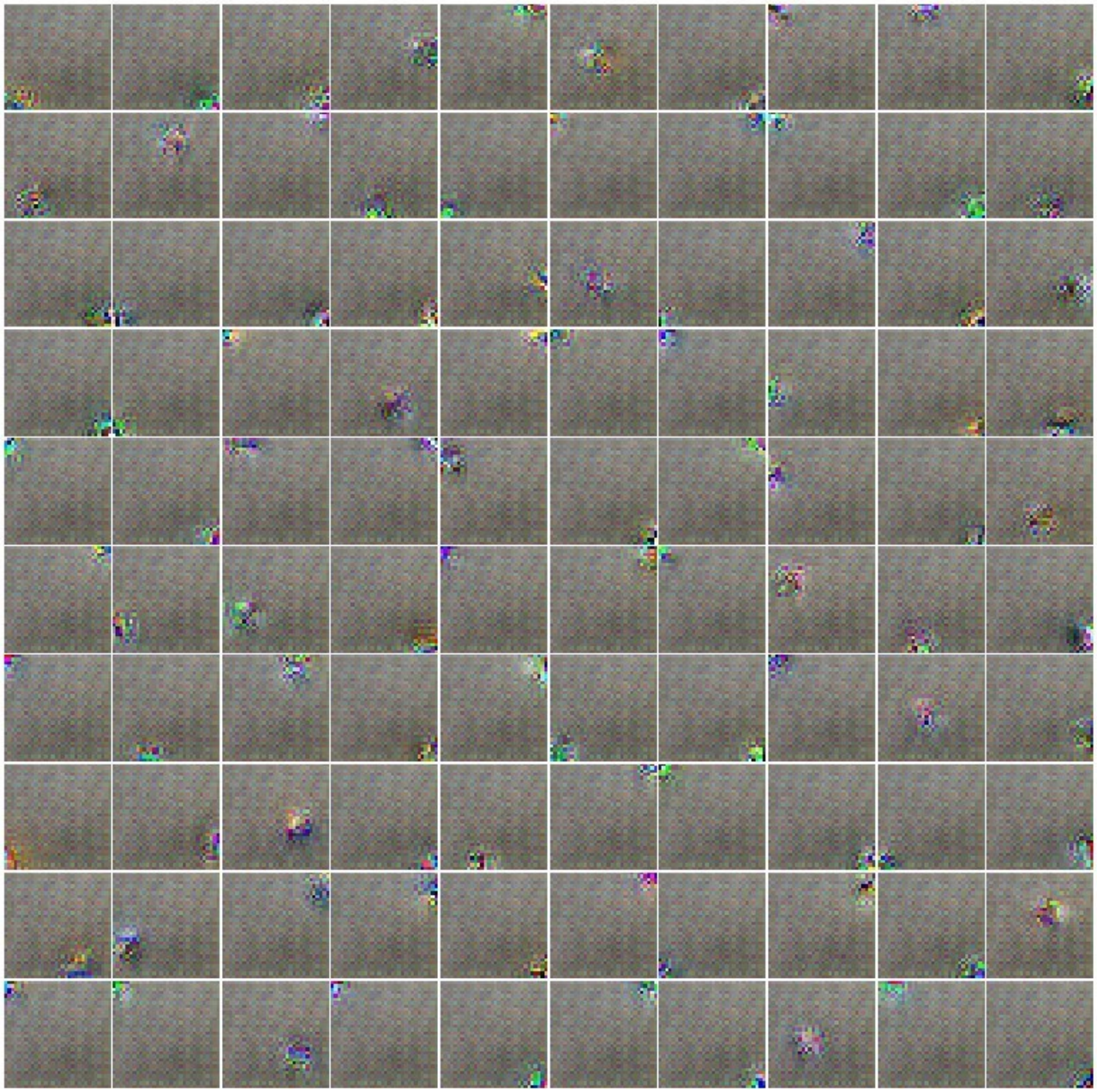


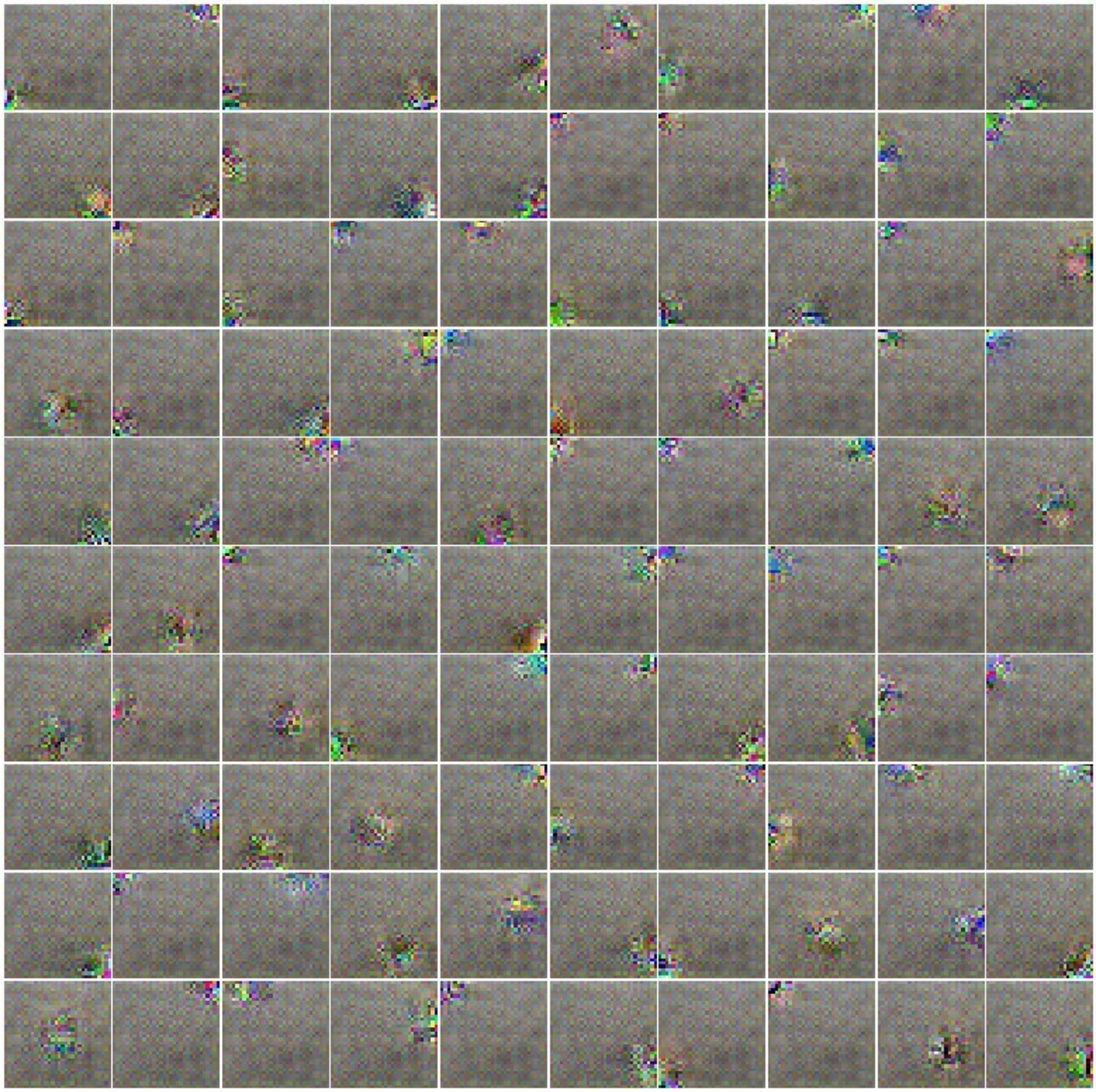
(2) Discriminator trained without thegenerator

layer2

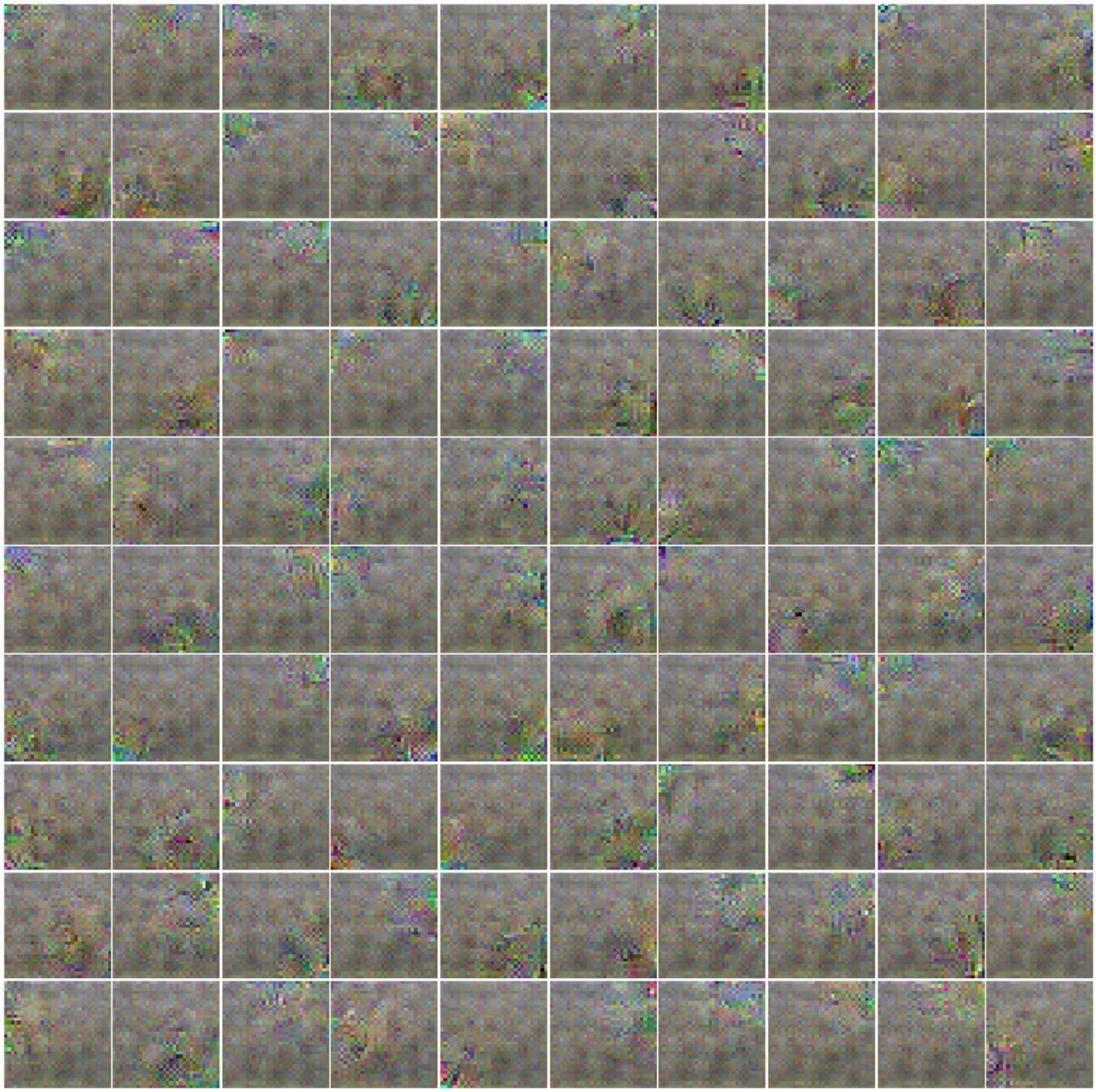


layer3





layer6



layer8