

Bird Image Generation With Deep Convolutional Generative Adversarial Network

Zhiling Huang

Problem Description

The goal of the project is to learn how to generate images of birds, through unsupervised Deep Convolutional Generative Adversarial Network (DCGAN).

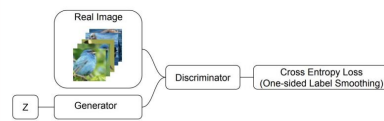
Data & Preprocessing

Caltech-UCSD Birds 200 (CUB-200), which includes 11776 images of birds. There are in total more than 200 types of birds.

Preprocessing:

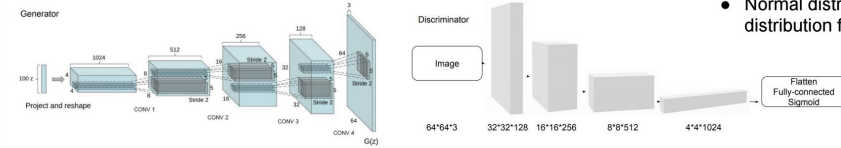
- Crop out only the bounding box.
- Resize to 64*64.

Deep Convolutional Generative Adversarial Network



Tricks to train DCGAN:

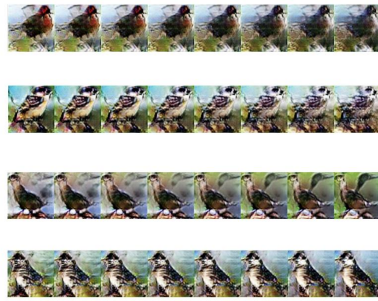
- Use non-saturated cost function for generator
- 2 updates for Discriminator/1 update for generator
- Virtual batch normalization for generator and regular batch normalization for discriminator
- One-sided label smoothing
- LeakyReLU for discriminator and ReLU for generator
- Normal distribution, not uniform distribution for Z



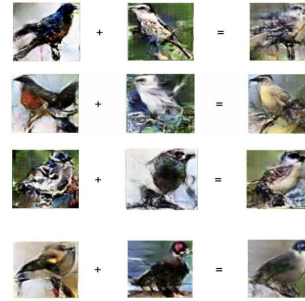
Sample Generated Images



Incrementing Z Vectors



Averaging Z Vectors



Future Steps

- Increase the size of training images by 2 or 3 times. 11776 images are not enough, considering the diversity of birds, for example, their physical shapes, the background, and their pose (whether flying, floating or standing).
- Use center cropping instead of resizing to avoid distorting birds and make them look fat.
- Use pre-trained bird detector model to classify 1000 generated images and see what is the percentage of generated images being classified as birds. So that I have a quantifiable metric for evaluation.

Acknowledgements

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