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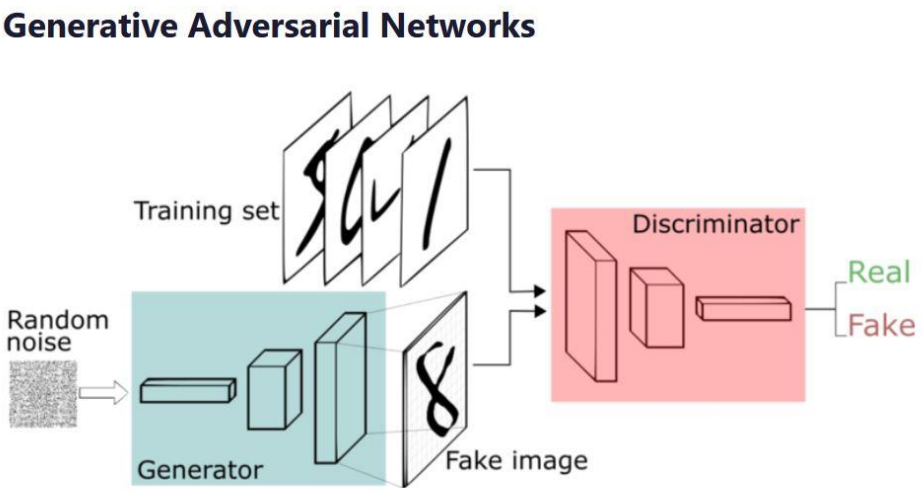
Cat GANs & Google Colab.

Sila. Pba, ML. Nov, 2021.

Cat GAN Exercise

In groups of 2-3.

The basic principle of a GAN is relative easy to understand.



Generative Adversarial Network framework.

A generator tries to produce output that can fool the discriminator into believing it (output) is real (good). While the discriminator/critic tries to be good at telling real (coming from a real training set) examples apart from fakes (generated by the generator).

Training the GAN has two parts.

Training of the discriminator:

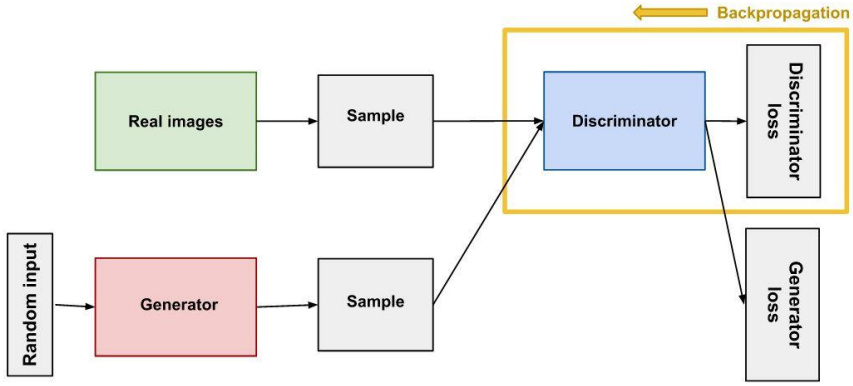


Figure 1: Backpropagation in discriminator training.

And training of the generator:

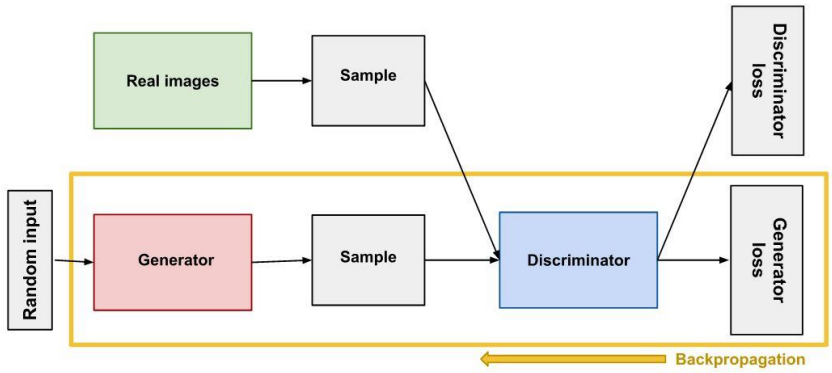


Figure 1: Backpropagation in generator training.

See:
https://developers.google.com/machine-learning/gan/discriminator

Setting this up is by no means an easy task.

Luckily, for the task of creating a cat GAN, you are given code that does all the hard work for you.

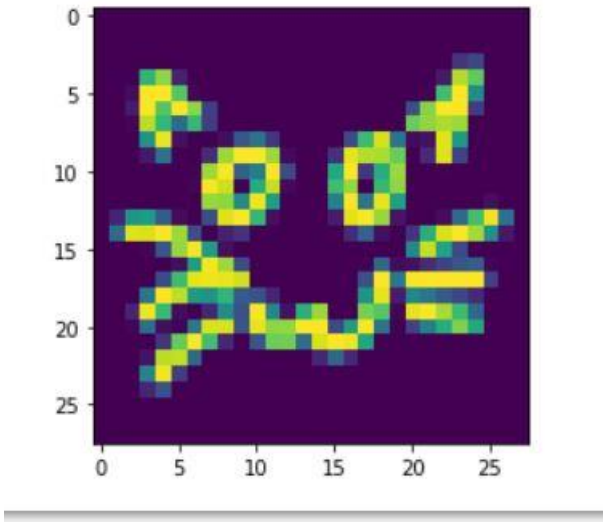
You are only asked to run it…

A)
Training examples of cat (doodles) are found in the file cats.npy (Canvas)
If you are running on Colab, then this file must be uploaded to your Google drive.

B)
And mounted to your (Google colab) notebook.
Use Unix commands ls, cd and pwd to make sure that you navigate to the right folder,
where your cats are located (notice that the notebook uses a % sign before Unix commands).

```
from google.colab import drive
drive.mount("/content/drive") # Don't change this

# Commented out IPython magic to ensure Python compatibility.
# %ls

# Commented out IPython magic to ensure Python compatibility.
# %cd drive

# Commented out IPython magic to ensure Python compatibility.
# %cd MyDrive/

# Commented out IPython magic to ensure Python compatibility.
# %ls

# Commented out IPython magic to ensure Python compatibility.
# %pwd

cat_doodles = np.load('/content/drive/My Drive/cats.npy')
```

A cat doodle from the training set:



C)

The notebook is found in the file CatDoodlesGAN.ipynb on Canvas.

Reset “sample interval“ to 1, and reset “epochs“ (from 100) to 5.

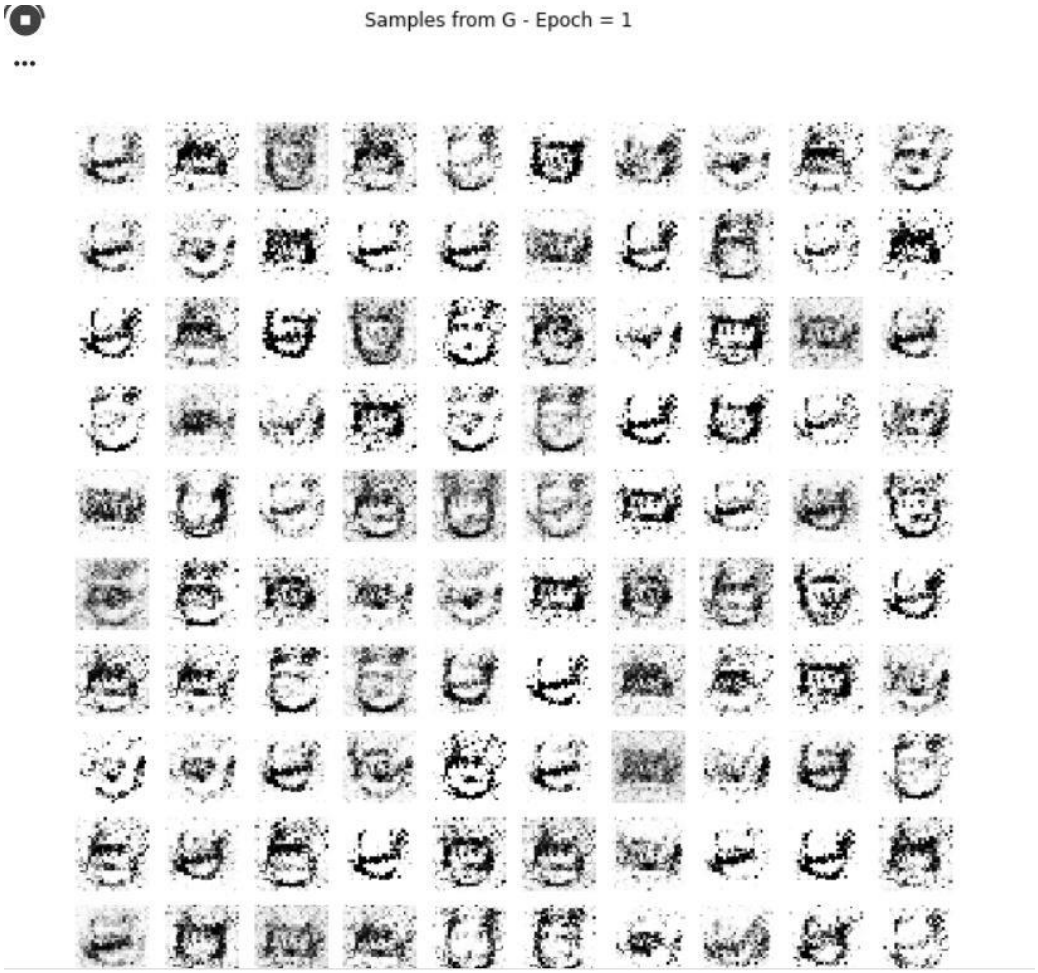
You can also remove the comment in the method train

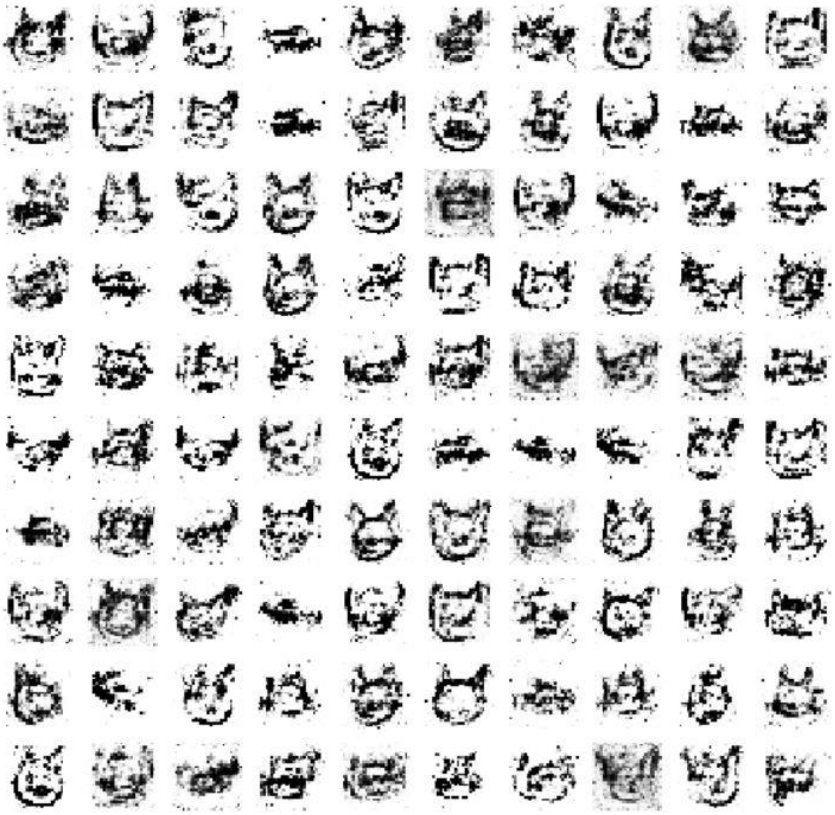
```
print ("EPOCH:", epoch, "D LOSS", d_loss, "G LOSS:", g_loss)
```

in order to get more information while training.

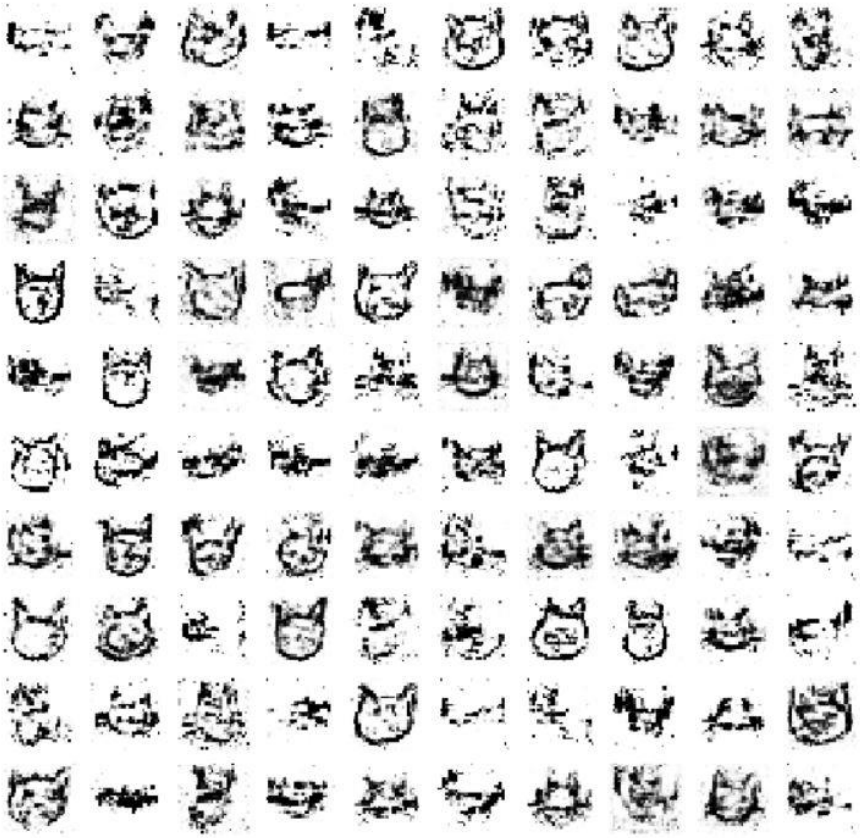
And then you are ready to train (5 epochs…).

Here are outputs if you let it train for a little longer:

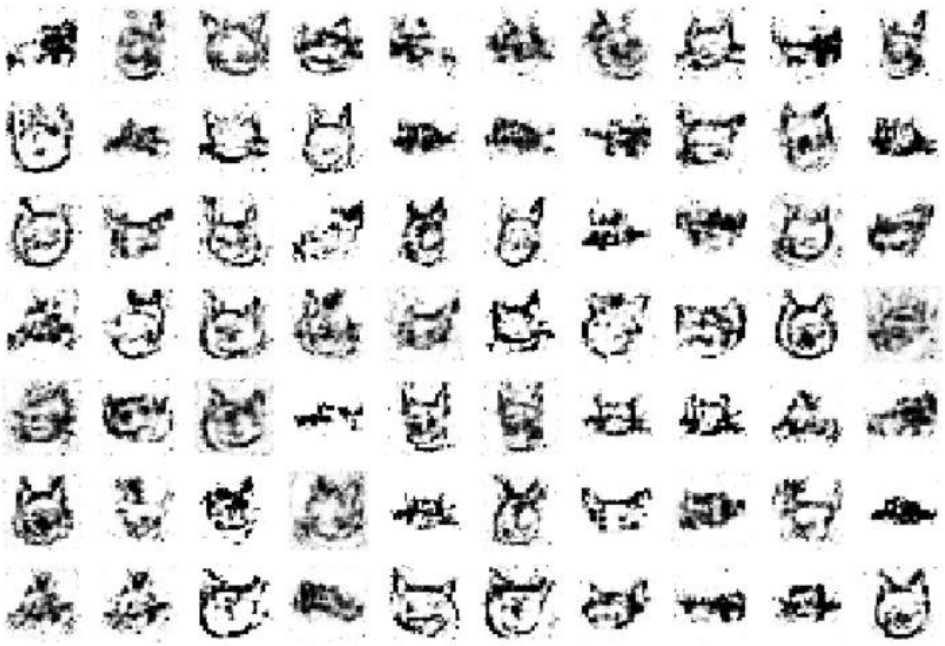




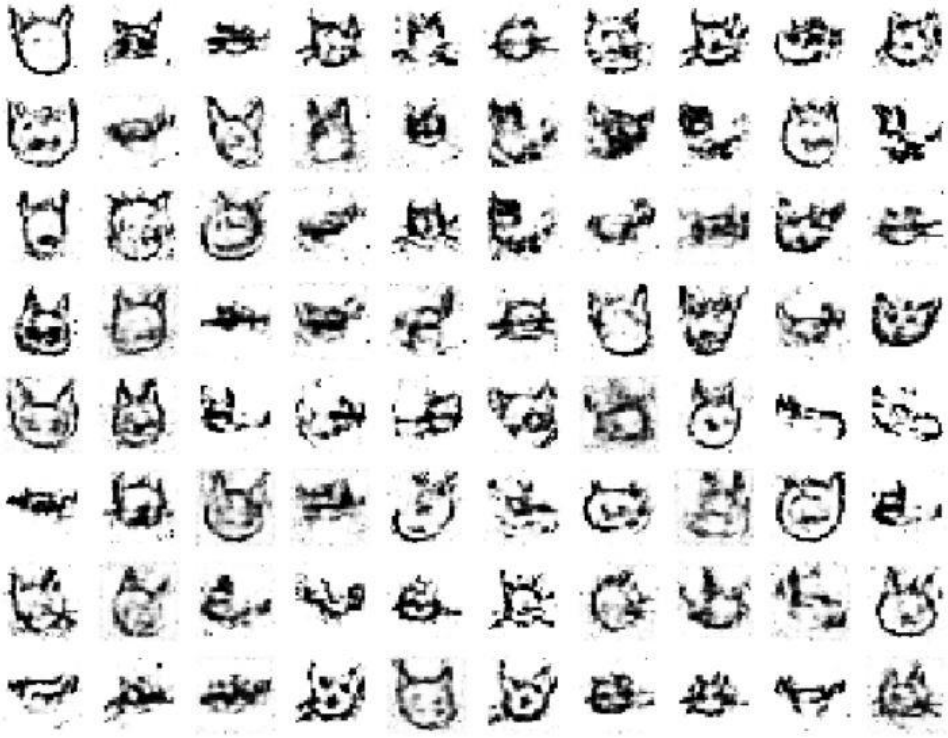
Samples from G - Epoch = 14



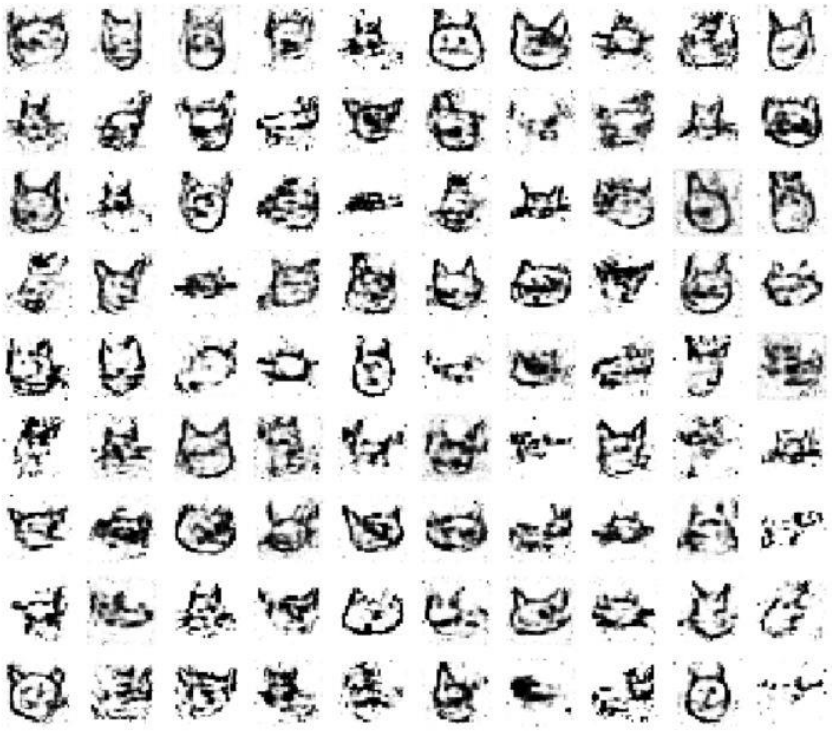
Samples from G - Epoch = 22



Samples from G - Epoch = 27



Samples from G - Epoch = 45



Samples from G - Epoch = 48

Samples from G - Epoch = 54

Samples from G - Epoch = 59

While it trains the GAN, take a closer look at the code and identify the discriminator and generator training code. Notice the relatively simple design of the generator and discriminator (how many convolutions are used in the design….?).

D)

If you have time then run the GAN training for 100 epochs or more. You might consider using another colab account for this, in order to always have an account that Googles lets you run colab from.