

Class-627 AI-project

Generating Images of Faces using Deep Convolutional Generative
Adversarial Networks

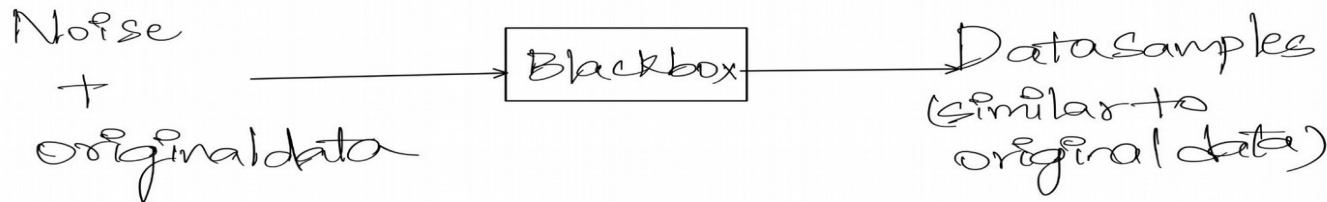


By
Yashwanth varre

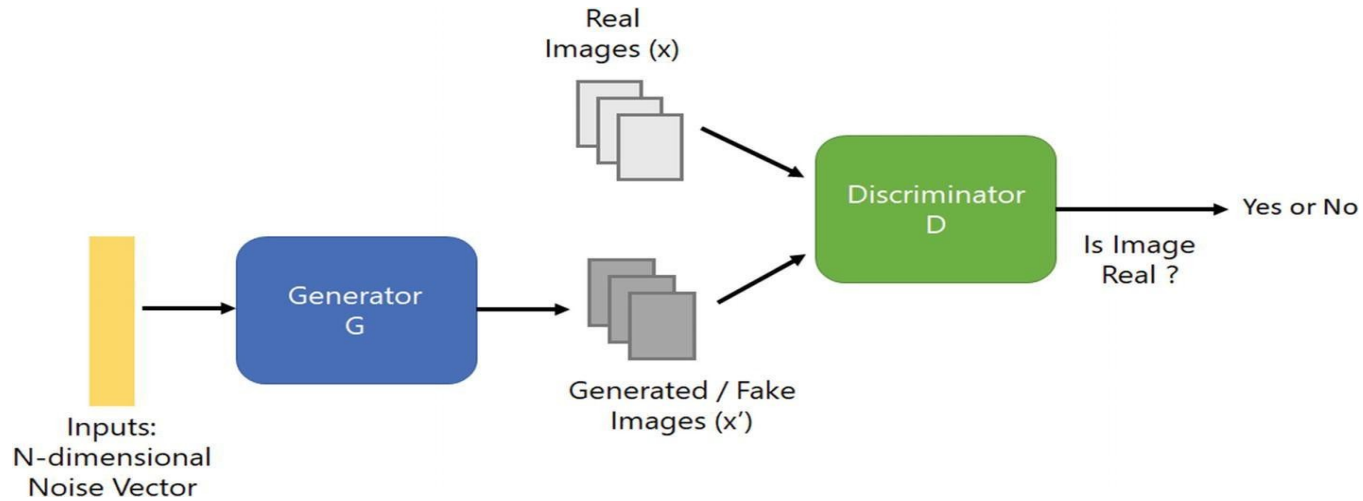


Introduction

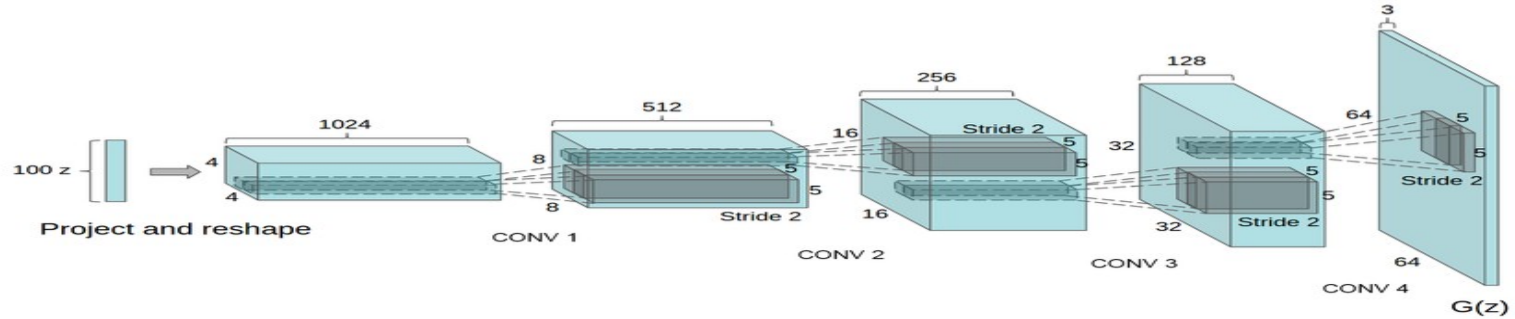
- Gans was designed by Ian Goodfellow in 2014.
- Gans are an approach to generative modelling.
- This is a combination of supervised and unsupervised algorithm.
- Overview:



Block Diagram

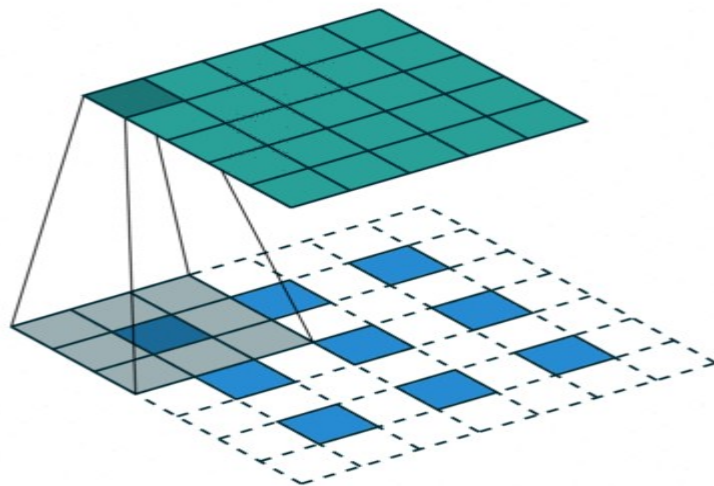


Generator:

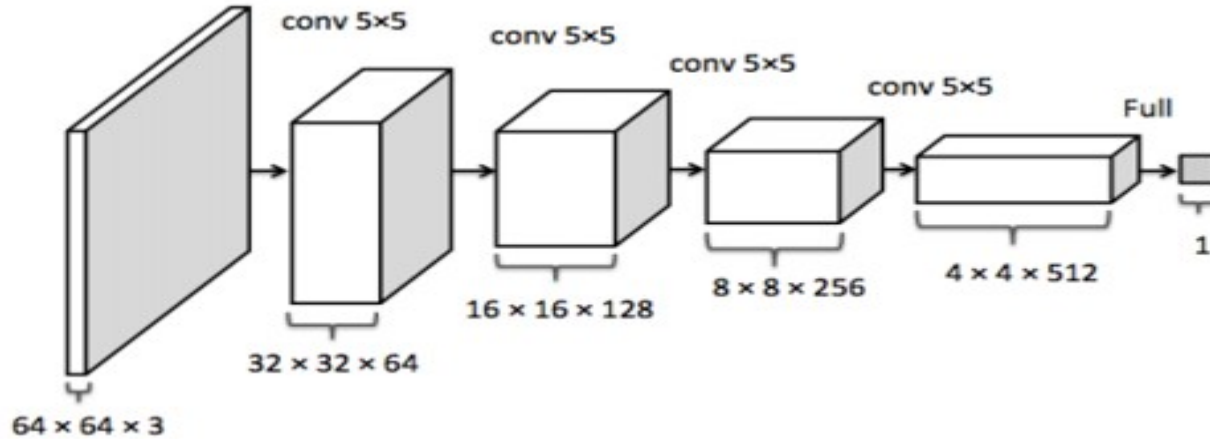


- Random noise is given as input[batch_size, 1,1,100]
- The input is passed through each layer where transpose convolution followed by batch normalization , leaky relu is performed.
- In the final layer the input is given to tanh activation function we get 64*64 image.

Transpose Convolution

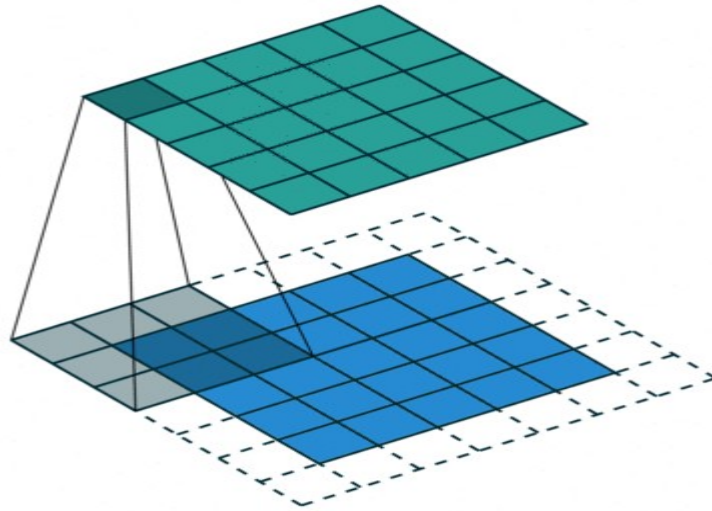


Discriminator

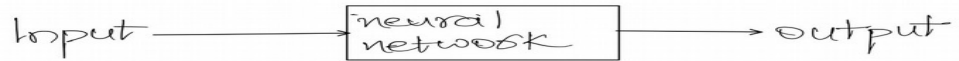


- Every layer of the discriminator contains a Convolutional layer, followed by batch normalization and relu activation function.
- Using discriminator network the real and fake images are trained.

Convolution

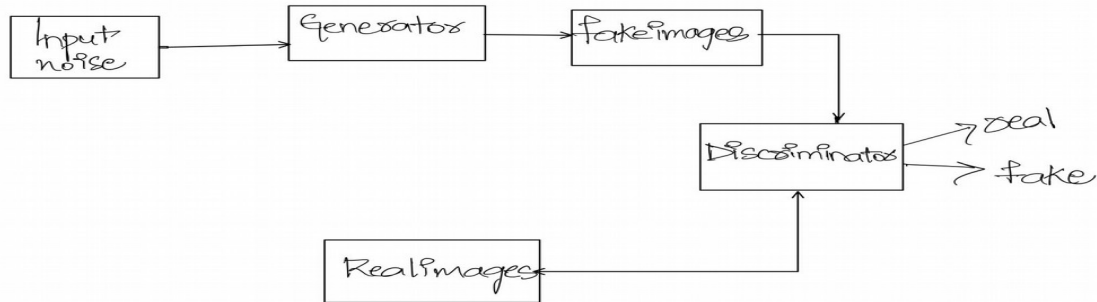


Loss Function



For example we define the loss function as $|y - x|^2$

The main goal of the neural network is to reduce the loss.



Loss function

Generator $\rightarrow P(\text{fake}) \uparrow$

Discriminator $\rightarrow P(\text{real}) \uparrow, P(\text{fake}) \downarrow$

P represents probability

$$\begin{aligned} \text{Loss function } (L) &= \log(D(\text{real})) \uparrow + \log(D(\text{fake})) \uparrow \downarrow \\ &= \log(D(\text{real})) \uparrow + \log(1 - D(\text{fake})) \uparrow \downarrow \end{aligned}$$

$$\max_D \min_G L = \sum_N \log(D(\text{real})) + \log(1 - D(\text{fake}))$$

Code Overview

Using Cloud platform

- Login to AWS using your credentials.
- Search EC2 in the search .
- Select EC2 and create a new instance and select ubuntu 18.04.
- Select the necessary requirements for your project.
- While creating an instance create a new key pair which generates a pem file. This is used to generate private keys for connecting client and the server.
- Use putty to generate a ssh private key it will help you to connect to the server.
- Use winScp to copy your code and install the necessary dependencies for your project.And deploy the code in the terminal.

Output

The screenshot displays the AWS Management Console interface in Google Chrome. The browser's address bar shows the URL: `us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#instances:sort=statusChecks`. The console's left-hand navigation pane is open, showing the 'Instances' section under the 'EC2 Dashboard' category. The main content area features a table of EC2 instances. The table has columns for Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, and Public DNS (IPv4). Two instances are listed: 'gans' (stopped) and 'i-069308cec65da1be4' (running). Below the table, a message states 'Select an instance above'. The bottom of the console shows the footer with copyright information and links to Privacy Policy and Terms of Use.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
gans	i-0a046a9ff6c22de3a	t2.micro	us-east-2b	stopped		None	
	i-069308cec65da1be4	t2.micro	us-east-2a	running	2/2 checks passed	None	ec2-18-224-59-131.us-east-2.compute.amazonaws.c

Select an instance above

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Activities | WinesCP | Sun 13:27

Generating images | Untitled presentation | Instances | EC2 Manag | +

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#instances:sort=status:Checks

Services | yashwanth | Ohio | Support

New EC2 Experience | Launch Instance | Connect | Actions

EC2 Dashboard | Filter by tags and attributes or search by keyword | 1 to 2 of 2

Instances | Name | Instance ID | Instance Type | Availability Zone | Instance State | Status Checks | Alarm Status | Public DNS (IPv4)

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
gens	i-0a045a980c	t2.micro	us-east-2b	stopped	2/2 checks passed	None	
	i-069308acc2	t2.micro	us-east-2a	running	2/2 checks passed	None	ec2-18-224-69-131.us-east-2.compute.amazonaws.com

Select an instance above

08 of 45.18 in 0 of 7 | 08 of 30.1.18 in 0 of 16 | 0.22.21

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Activities | Terminal | Sun 13:28

Generating images | Untitled presentation | Instances | EC2 Manag | +

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#instances:sort=status:Checks

Services | yashwanth | Ohio | Support

New EC2 Experience | Launch Instance | Connect | Actions

EC2 Dashboard | Filter by tags and attributes or search by keyword | 1 to 2 of 2

Instances | Name | Instance ID | Instance Type | Availability Zone | Instance State | Status Checks | Alarm Status | Public DNS (IPv4)

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
gens	i-0a045a980c	t2.micro	us-east-2b	stopped	2/2 checks passed	None	
	i-069308acc2	t2.micro	us-east-2a	running	2/2 checks passed	None	ec2-18-224-69-131.us-east-2.compute.amazonaws.com

Select an instance above

08 of 45.18 in 0 of 7 | 08 of 30.1.18 in 0 of 16 | 0.22.21

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```
ubuntu@ip-172-31-8-30:~/DCGANS$ python3 train.py
b: false
WARNING:tensorflow:From practice_1.py:173: The name tf.summary.scalar is deprecated. Please use tf.compat.v1.summary.scalar instead.
summary Tensor("summaries/loss:8", shape=(), dtype=string)
built model
starting to train
calling saved model
WARNING:tensorflow:From /home/ubuntu/.local/lib/python3.6/site-packages/tensorflow/python/training/saver.py:1276: checkpoint_exists (from tensorflow.python.training.checkpoint_management) is deprecated and will be removed in a future version.
Instructions for updating:
Use standard file APIs to check for files with this prefix.
restored model
Successfully ran model
ubuntu@ip-172-31-8-30:~/DCGANS$
```

Final output



Advantages:-

- GANs generate data that looks similar to original data.
- They can generate different versions of text, video and audio,

Disadvantages:-

- You need to provide different types of data continuously to check if it works accurately or not.
- Generating results from text or speech is very complex

Applications:-

- Can help predict next frame in the video.
- Enhancing the resolution of images.

References

- A. Radford, L. Metz, and S. Chintala. Unsupervised representation learning with deep convolutional generative adversarial networks. arXiv preprint arXiv:1511.06434, 2015.
- P. Isola, J.-Y. Zhu, T. Zhou, and A. A. Efros. Image-to-image translation with conditional adversarial networks. arXiv preprint arXiv:1611.07004, 2016.
- M. Arjovsky, S. Chintala, and L. Bottou. Wasserstein gan. arXiv preprint arXiv:1701.07875, 2017.
- I. Goodfellow, J. Pouget-Abadie, M. Mirza, B. Xu, D. Warde-Farley, S. Ozair, A. Courville, and Y. Bengio. Generative adversarial nets. In Advances in neural information processing systems, pages 2672–2680, 2014.
- [https://www.kaggle.com/jessicali9530/celeba-dataset\(dataset\)](https://www.kaggle.com/jessicali9530/celeba-dataset(dataset))