

# DEEP CONVOLUTIONAL GAN (DCGAN)

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- proposed in 2015 and explored possibilities for using convolutional layers in GANs
- DCGAN is a generative model, which means its primary purpose is to generate new data that resembles a given dataset.
- DCGAN uses convolutional and convolutional transpose layers in the discriminator and generator respectively

# Need for DCGANs:

- Introduced to reduce the problem of mode collapse
- Mode collapse occurs when the generator got biased towards a few outputs and can't able to produce outputs of every variation from the dataset.
- DCGAN help improve the stability of GAN training

# MAJOR CHANGES

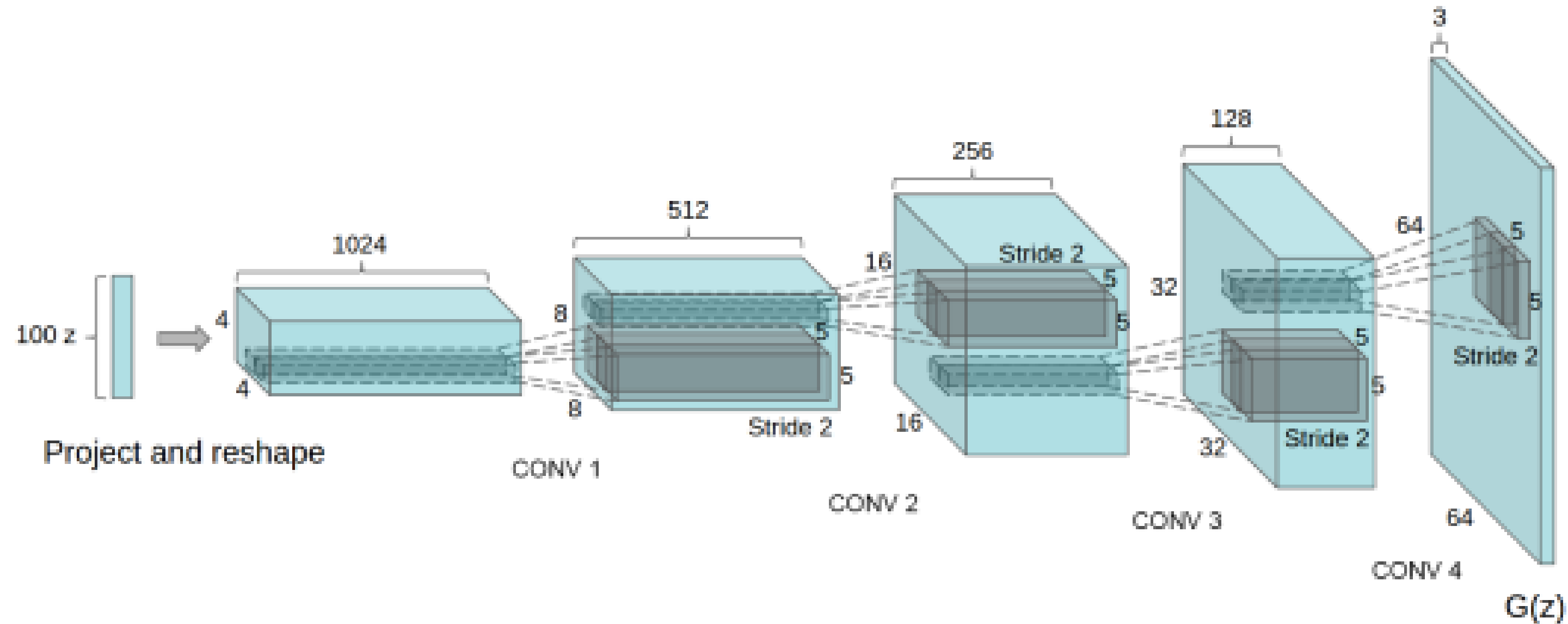
Minimizing fully connected layers

Applying Batch Normalization after every convolutional layer

The pooling layers were replaced by strided convolutions in the discriminator and transposed convolutions in the generator

The ReLU activation function is used in the generator, except for the last layer, which uses Tanh and LeakyReLU in the discriminator for all layer

# ARCHITECTURE



The generator takes in noise of 100 dimensions; the noise is projected and reshaped, and then is passed through transposed-convolutional layers.

# TRANSPPOSED CONVOLUTION

Input

0	1
2	3

Kernel

0	1
2	3

Transposed  
Conv  
(stride 2)

0	0		
0	0		

+

		0	1
		2	3

+

0	2		
4	6		

+

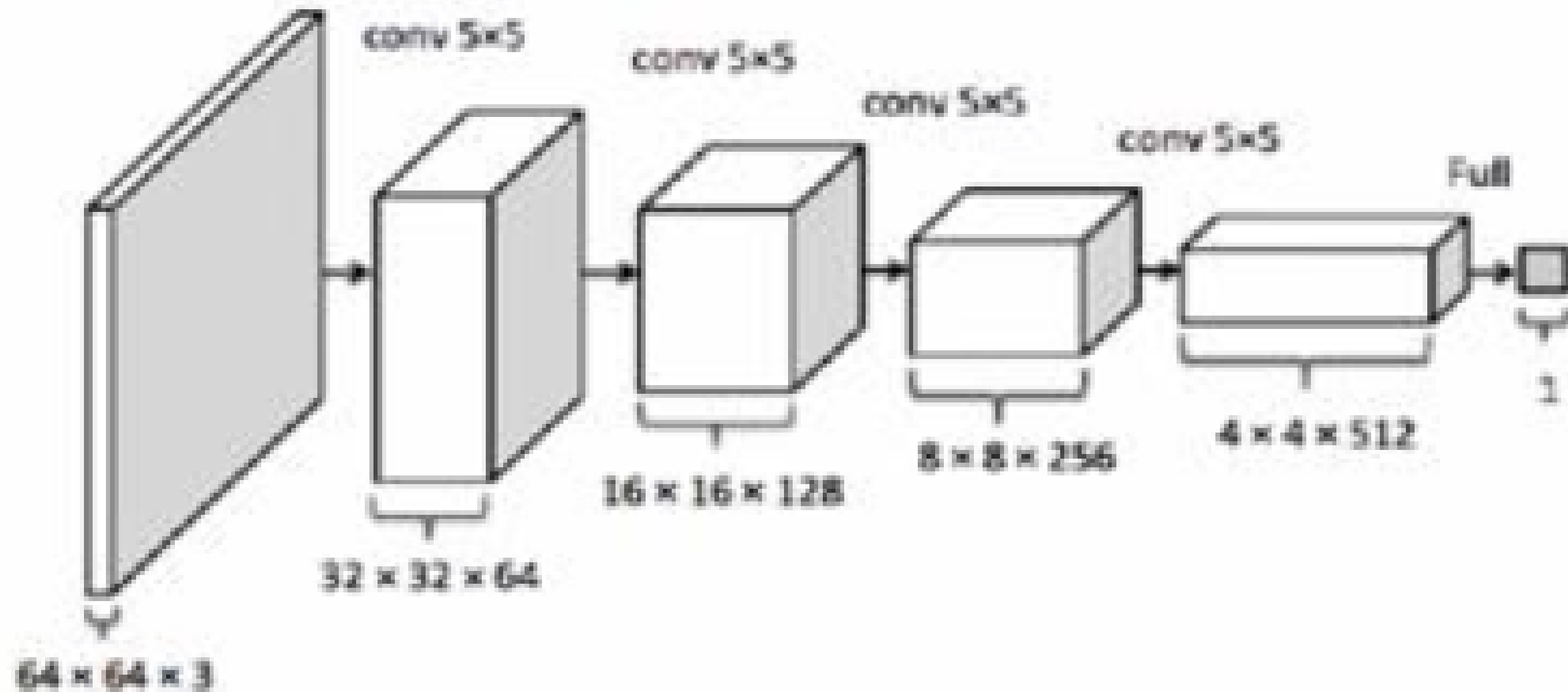
		0	3
		6	9

0	0	0	1
0	0	2	3
0	2	0	3
4	6	6	9

Output

- Also called fractionally-strided convolution
- It doubles the image dimension while reducing the number of output channels if stride is 2

# DISCRIMINATOR



- Input of discriminator is a single image from the dataset or generated image
- the output is a score that determines whether the image is real or generated..

# ADVERSARIAL TRAINING

- During training, the generator and discriminator engage in an adversarial process
- In each iteration, the generator produces fake data, and the discriminator evaluates both real and fake data.
- The discriminator is updated to become better at distinguishing real from fake data.
- Simultaneously, the generator is updated to produce data that is increasingly realistic and more likely to fool the discriminator.





# Thank You

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