

NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY

CED16: ARTIFICIAL INTELLIGENCE

PROJECT REPORT



IMAGE COMPLETION

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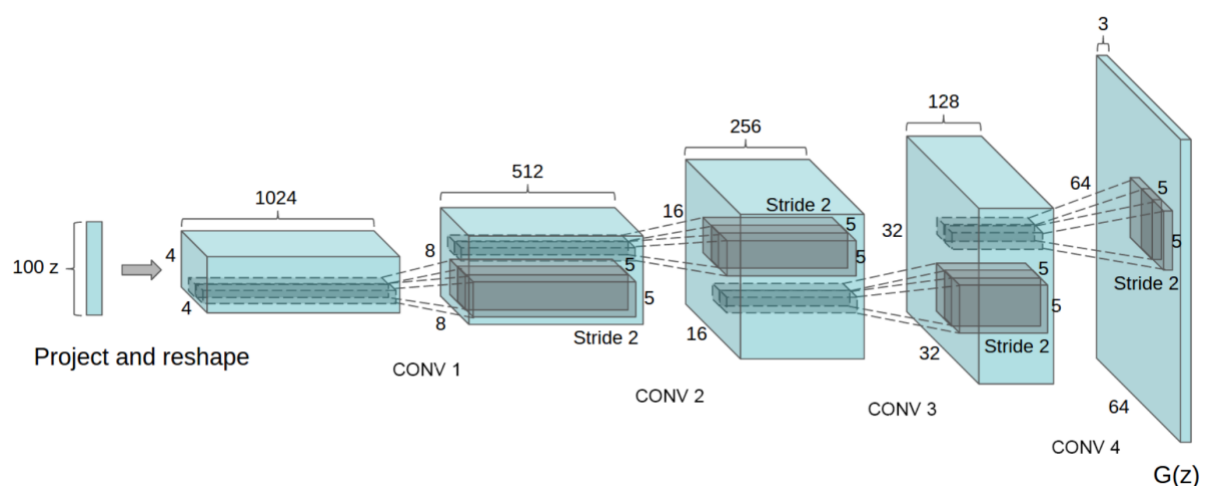
ABOUT THE PROJECT

In this project, we will be completing incomplete images via GAN.

The input will be an image (of 512 pixels) with missing pixels and the output image will be a completed image with missing pixels filled with the help of GAN.

KEY COMPONENT:

DCGAN (Deep Convolutional Generative Adversarial Network) is one of the popular and successful network design for GAN. It mainly composes of convolution layers without max pooling or fully connected layers. It uses convolutional stride and transposed convolution for the downsampling and the upsampling. The figure below is the network design for the generator.



AI Techniques used:

- 1) Deep Learning
- 2) CNN (Convolutional Neural Networks)
- 3) GAN (Generative Adversarial Networks)
- 4) DCGAN (Deep Convolutional Adversarial Networks)

APPROACH:

- 1) We'll first interpret images as being samples from a probability distribution.
- 2) This interpretation lets us learn how to generate fake images.
- 3) Then we'll find the best fake image for completion.

The model was trained on CASIA-WebFace and FaceScrub datasets.

We also collected some data using Google forms. We prepared the form and circulated it in the college, family and friends to collect the images to train the model. We were able to collect a handful of images for the training of the model

FILES:

- 1) complete.py
- 2) model.py
- 3) ops.py
- 4) simple-distribution.py
- 5) train-dcgan.py
- 6) utils.py

DEPENDENCIES AND SYSTEM REQUIREMENTS:

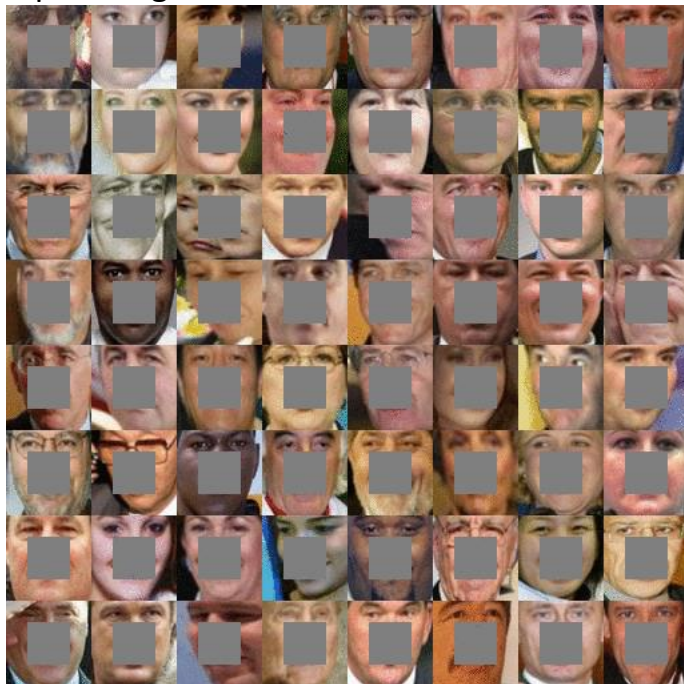
- 1) Python
- 2) OpenCV
- 3) dlib
- 4) TensorFlow
- 5) pip
- 6) Numpy
- 7) Keras

OUTPUT:

The process of image filling is stored in a GIF named "completion.gif".

That shows the transformation of input image to output image over the iterations.

Input image:



Output image:



CONCLUSION:

We were able to fill the pixels of the incomplete image and transform it into a complete image.

APPLICATION AND FURTHER RESEARCH:

GAN is a very promising and futuristic field. While doing this project, we got to know how this technology works. As it is a fairly new technology in the field of AI (introduced in 2014), people are still exploring its applications and how can it be used in more and more applications.

Some applications that we think will be perfect for this project are:

- 1) Criminal Identification:- There are a lot of cases where we get an incomplete image of a criminal or a suspect in a case. Using this, we would be able to better visualise how the suspect looks like and it would become a lot easier in catching him.
- 2) Photoshop:- We can remove certain items from an image by using this. Suppose we want to remove a bench from a park, we would just supply the image of the park by erasing the bench, and as an output we would get a complete image of the park without the bench, as the model would fill it in correct proportions.
- 3) Music Generations:- The technology of GAN can be further extended to create music and other things. Why should we limit ourselves to images, right? By training a model over thousands of songs and correct knowledge of music scales and chord progressions, we may be able to create a model that completes an incomplete song or even create a new song from scratch!

It is a wide field and a very good and promising area for research.