

# Deep Convolutional Generative Adversarial Networks

## The Introduction and Applications

GMO-Z.com Runsystem company  
Linh.DB – R&D Division

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## What is GAN?

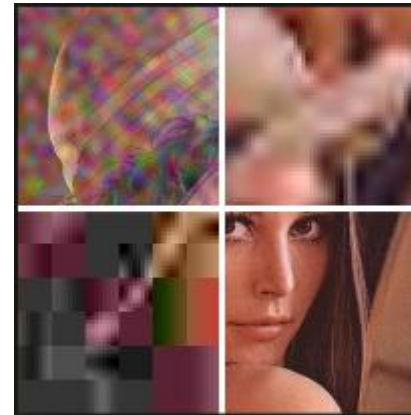
*Machine Learning Algorithms*



*Currently being actively researched*



*Huge potential in Digital image processing*



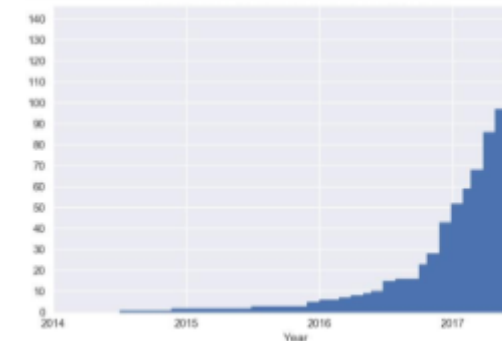
*Becoming very popular*



Google trend graph for the keyword 'Generative Adversarial Networks' from 3/2018 ~ 3/2019

### Resource

- GAN Zoo
  - <https://github.com/hindupuravinash/the-gan-zoo>
- Tricks: <https://github.com/soumith/ganhacks>
- Tutorial of Ian Goodfellow:  
<https://arxiv.org/abs/1701.00160>



Accumulate number of article of named GAN per month (2014-2018)

# What GAN can do

→ GAN is proving huge potential in image generating field



Small amount of information  
Or different types of information



OUTPUT

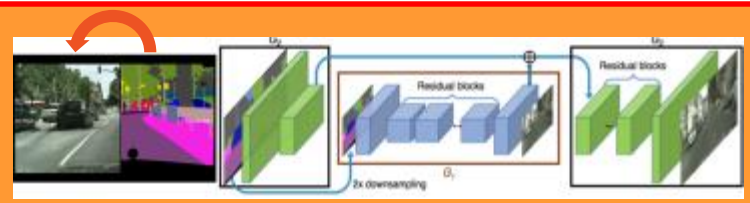
Generate new information



E-commerce application



Apply features to objects

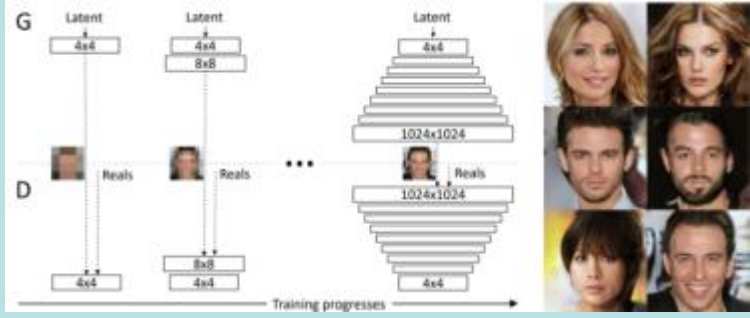


Generate fake data to help train AI  
(E.g: Self driving car)

"This flower has long thin yellow petals and a lot of yellow anthers in the center"



TEXT to IMAGE



Generate high resolution faces



Blurry picture → sharper picture

## ■ SmartOCR for handwriting documents

- Extract text from handwriting documents
- Applicable for hand-writing form (administrative documents, Bank, Insurance, etc..)
- Can be applied in free-format form



## ■ SmartOCR for Identify Card

- Extract information from Personal Identification documents
  - In Japan Market: Driver license, Insurance card, My-number card, Residence Card
  - In Vietnam market: CMND (old, new format), citizen ID card



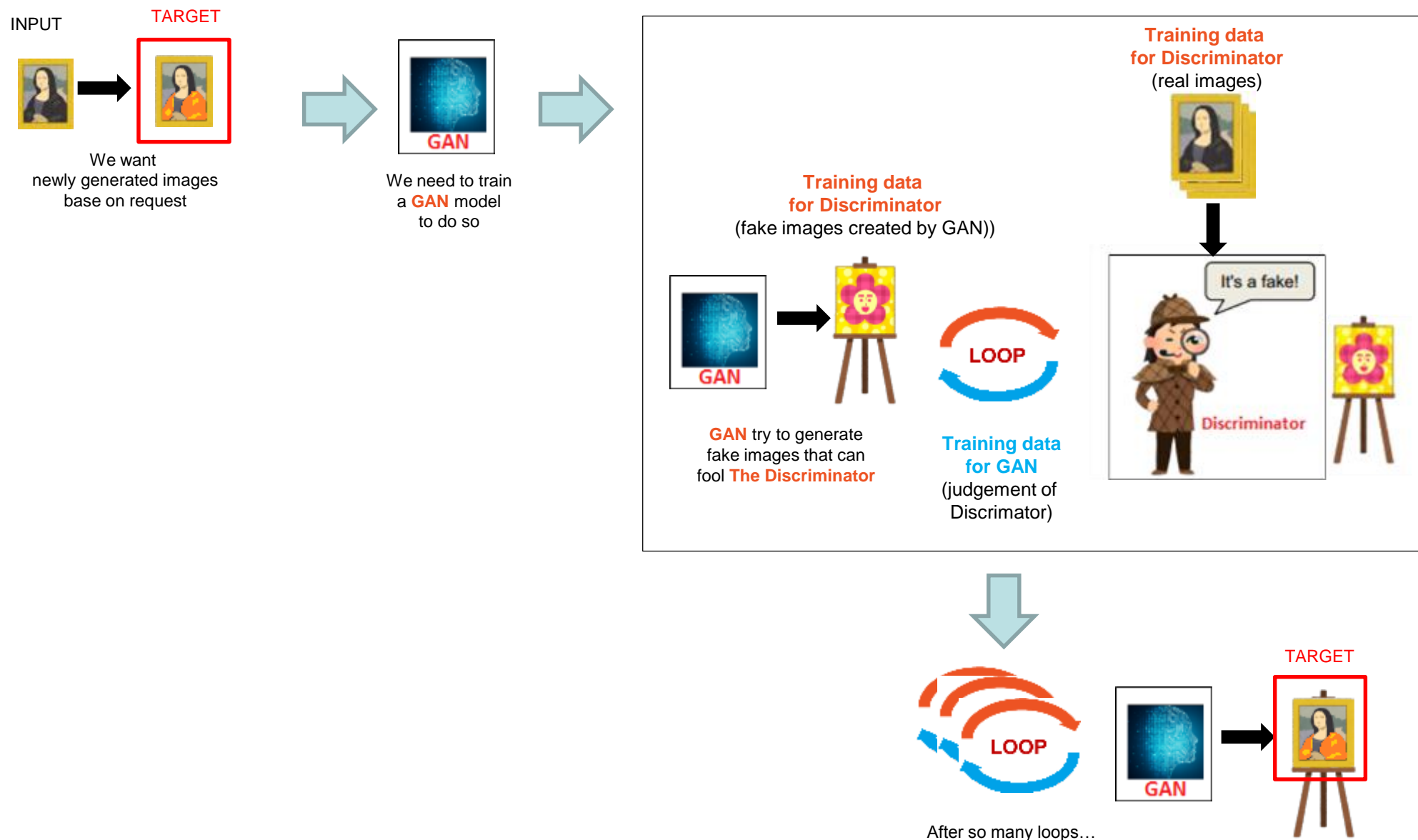
## ■ SmartOCR for Receipt

- Extract information from Receipts (in Supermarket, etc..)



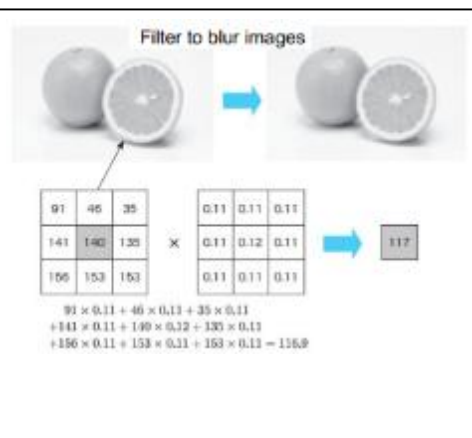




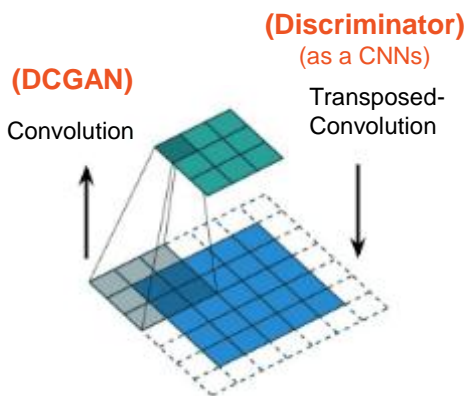


→ DCGAN is a successful branch of GAN that received good outcome recently

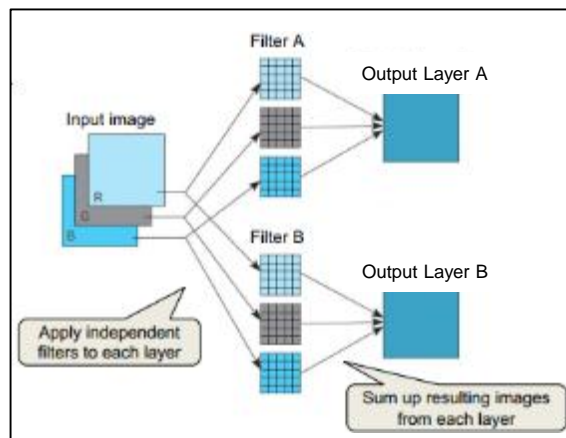
## Convolutional filters concept



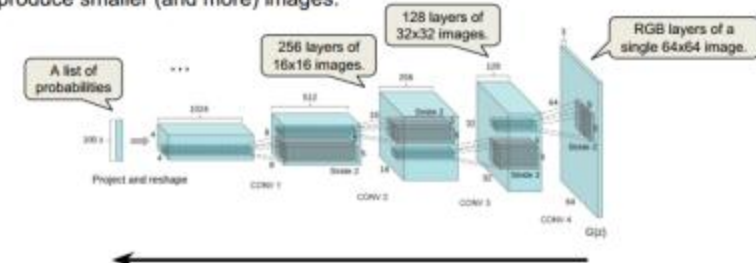
(Discriminator)



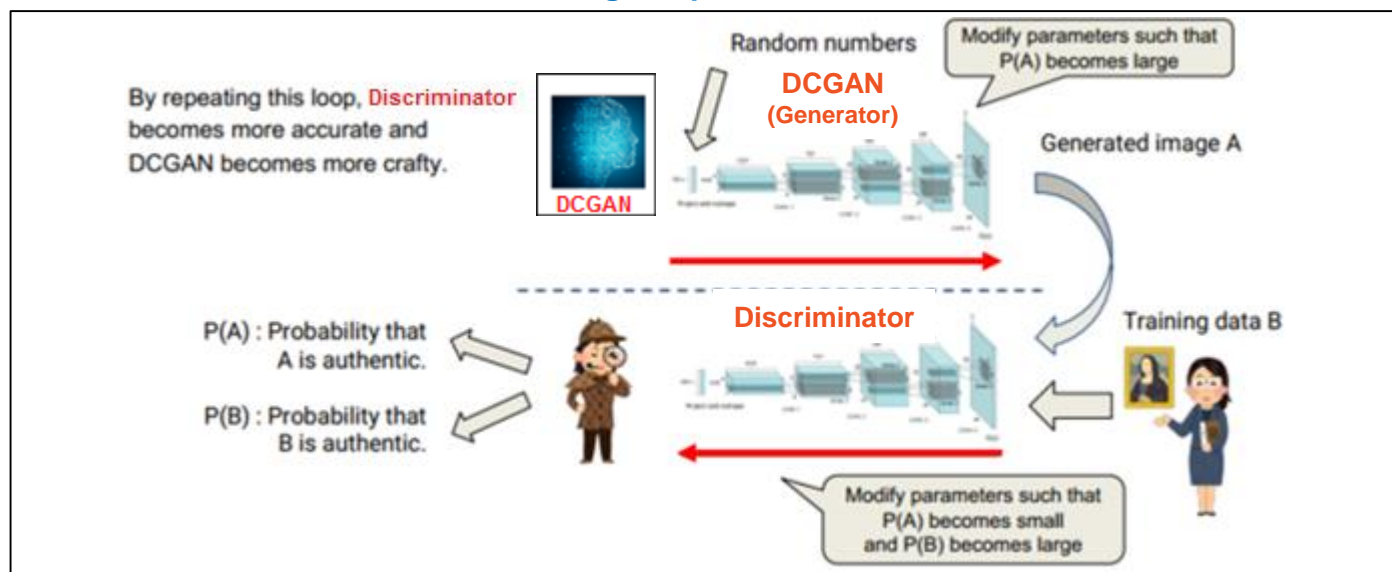
## Convolution Operation



- Starting from a single RGB image on the right, multiple filtering layers are applied to produce smaller (and more) images.



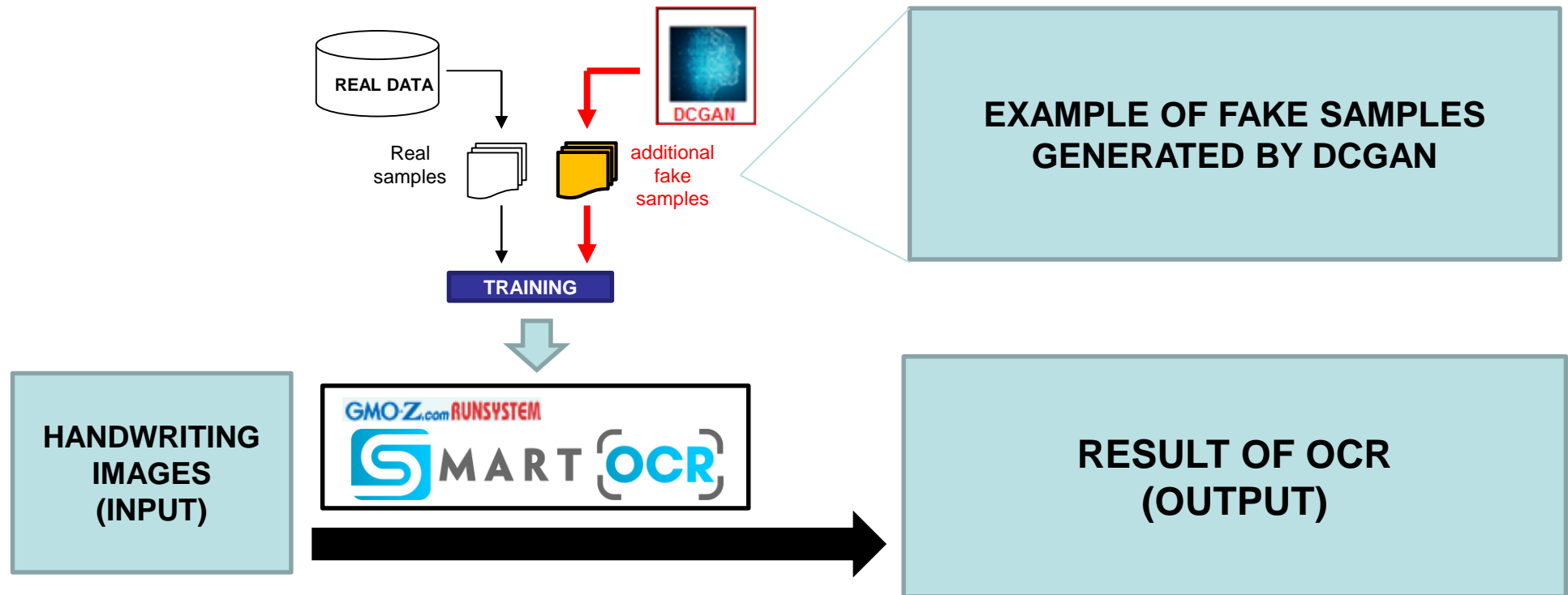
## Training Loop of DCGAN



# Integrate of DCGAN in GMO product

- DATA is becoming more and more important in Deep learning
- However, acquiring Labeled DATA for Deep learning is time consuming and costly (sometimes even impossible for some application fields)
- *DCGAN can be the answer for a quick, economic way in building training data!*

## APPLYING IN GMO's PRODUCT



**WE SAVED 30% OF MONEY & 60% OF TIME COMPARED TO COLLECTING REAL DATA!!!**



- DCGAN is a very effective solution to generate dataset for training Deep learning models.
- Have more and more potential in near future.
- Becoming a trendy research fields over the world.

**THANK YOU FOR YOUR ATTENTION !**  
**ANY QUESTIONS?**