5/30/2020

Forward Pass: Propagation: All data travels forward through nodes to calculate the NN output

- Input Layer: Prepossessing are non-Linearity
  - Equation:
    - * input: $X \cdot W$ → data → weight input to hidden
    - * Output: activation function(input) → sigmoid ϕ are σ
- Hidden are output Layer: non-linearity / Linear
  - Equ:
    - * input: hidden output $\cdot W$ → output from hidden layer → weights from hidden to output layer
    - * output: activation / $1 \cdot$ input ← or

Back propagation: data travels in opposite direction to fix/adjust weights & bais

- Output layer:

Equ input:

Output error: $(y - \hat{y})$ ← target, output/prediction | label - prediction

Output error term: $(y - \hat{y}) f'(a_k)$ | label - prediction (error) * derative of activation function of output (gradient)

hidden layer:

hidden error: W_{jk} are W_{jk} → weight δ_k ← previous layer error term | Output layer term * weights hidden to output

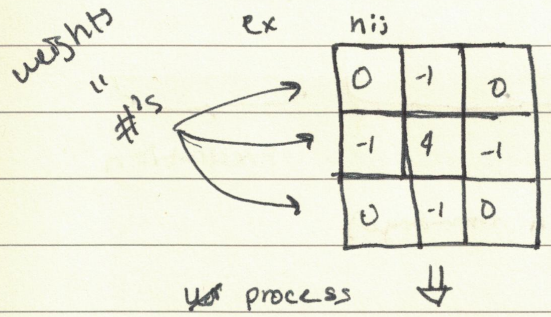
hidden error term: $\Sigma[W_{j,k} \delta_k] f'(h_j)$ | hidden layer error * derative of activation function of hidden output

[error] (gradient)

6/2/2020 cont.

Filters & Edges in CNNs:

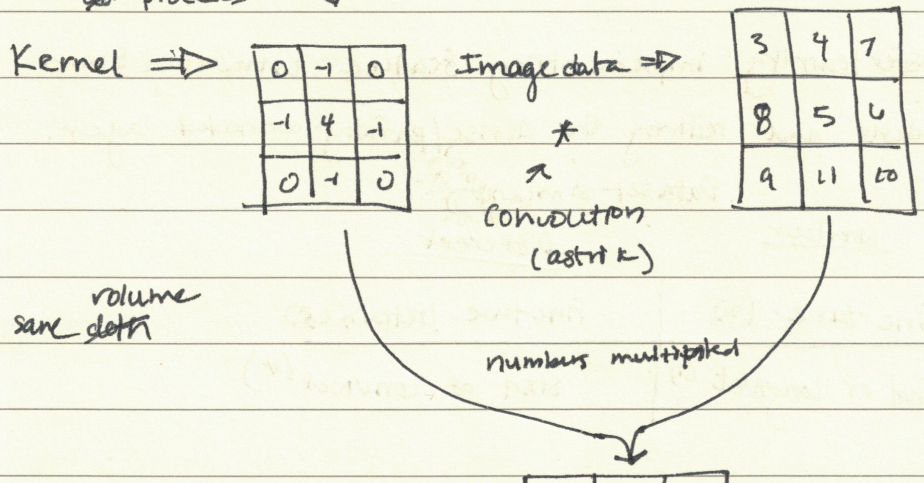
- low pass filters : block high frequencies (vice versa)
- using high pass filters - can block low pass freqs in image
  - used for edge detection
- convolutional kernal : edge detector filter



$\sum n_{ij} = 0$

$(-1)+(-1)+(-1)+(-1)+(+4)+0+0+0+0 = 0$

process



* main save volume data

Final

3	-4	0
-8	20	-6
0	-11	0

$\sum n_{ij} = -9$

$(-4)+(-6)+(-8)+(-11)+20 = -9$

Convolution Layer:

- applies many convolutional kernels
- stride the distance from pixel to pixel
  - 9 becomes center pixel value (5) in data image

Max pooling — used for decreasing complexity & overfitting

Avg Pooling

* Capsel Networks

6/2/2020 cont.

Filters & Edges in CNNs:

- low pass filters : block high frequencies (vice versa)
- using high pass filters - can block low pass freqs in image
  - used for edge detection
- convolutional kernal : edge detector → filter

weights = #'s

ex nij

0	-1	0
-1	4	-1
0	-1	0

$\sum n_{ij} = 0$

$(-1)+(-1)+(-1)+(-1)+(+4)+0+0+0+0 = 0$

process ⇓

Kernel ⇒

0	-1	0
-1	4	-1
0	-1	0

Image data ⇒

3	4	7
8	5	6
9	11	10

* Convolution (astrik)

* main same volume data

numbers multiplied

Final ⇒

3	-4	0
-8	20	-6
0	-11	0

$\sum n_{ij} = -9$

$(-4)+(-6)+(-8)+(-11)+20 = -9$

Convolution Layer:

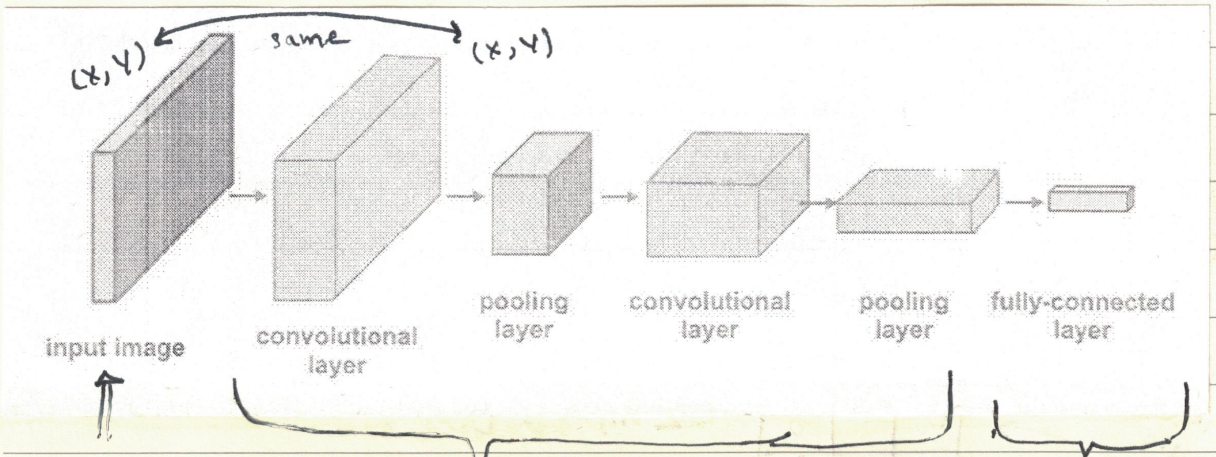
- applies many convolutional kernels
- stride the distance from pixel to pixel
  - -9 becomes center pixel value (5) in data image

Max pooling — used for decreasing complexity s/c overfitting

Avg Pooling

** Capsel Networks

6/2/2020 cont.



input — feature extraction (isolation information from image) — Prediction

6/3/2020

Transfer learning: implementing feature extraction from successful models and retraining the dense/fully-connected layer.

Dataset similarity

Dataset size	Similar	Different
large	Fine-tune (2)	Fine-tune / retrain (3)
small	End of ConvNet (1)	Start of convNet (4)

Cases:

1. Adjust end of ConvNet
   - ~~remove and replace end as~~ Dense layers (add) (not remove dense)
     - Randomize dense layer weights → update weights
     - Freeze weights in pretrained network - don't update weights
       ↳ prevent overfitting

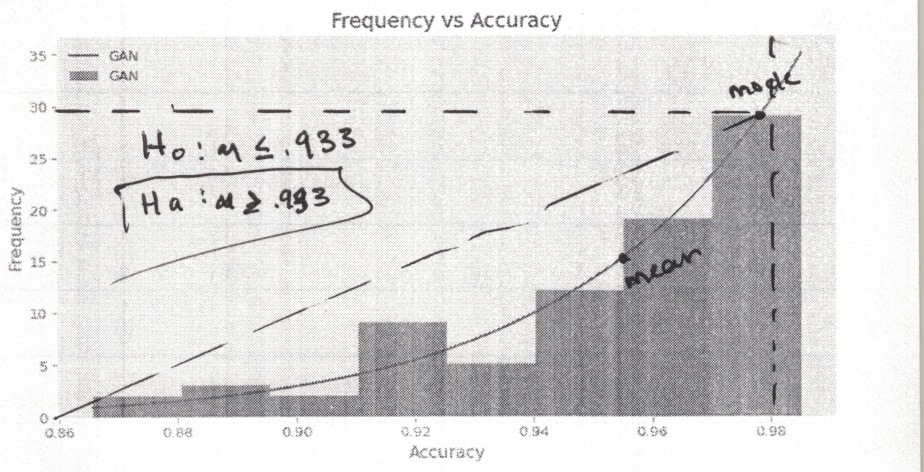
1/16/21

$\bar{X} = 0.9498$

$\sigma_x = 0.0293$

$t = \frac{0.9498 - 0.933}{0.0293/\sqrt{149}} = 6.99$ ave

$P = 1.08\,e^{-10}$



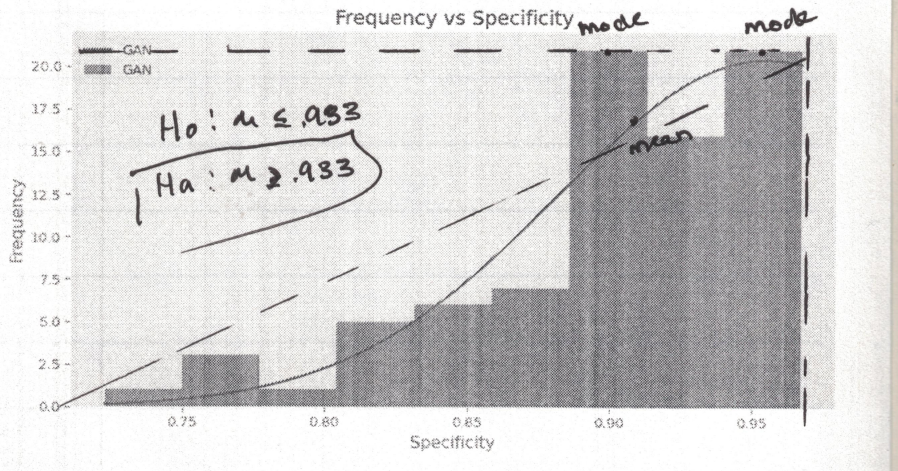
The discriminators are subjected to the test, could show that it is stable in performance,

$\bar{X} = 0.9030$ ave

$\sigma_x = 0.0547$

$t = \frac{0.903 - 0.933}{\frac{0.0547}{\sqrt{149}}} = -6.69$

$P = 1.65\,e^{-10}$



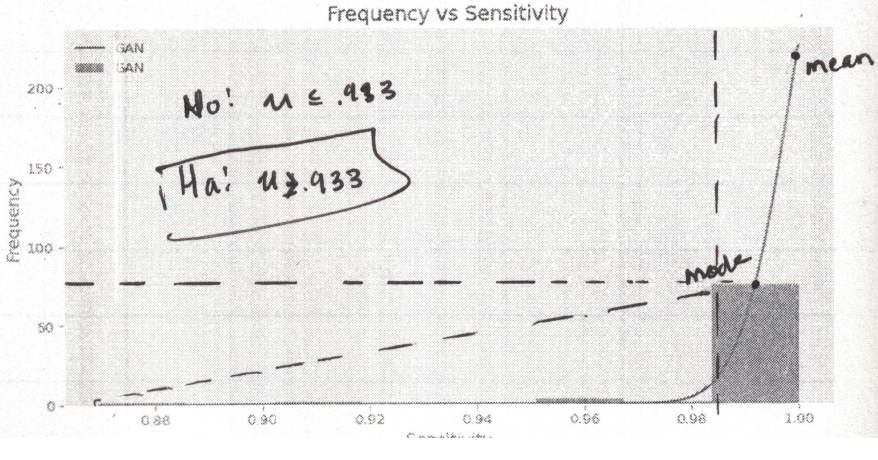
Sensitive is Maximized b/c we want to have all potential anomalies detected

$\bar{X} = 0.9952$

$\sigma_x = 0.0197$

$t = \frac{0.9952 - 0.933}{\frac{0.0197}{\sqrt{149}}} = 38.5$

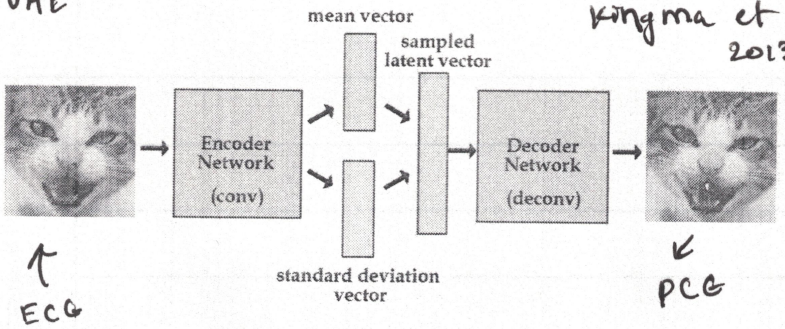
$P = 1.54\,e^{-77}$



2/1/21

VAE

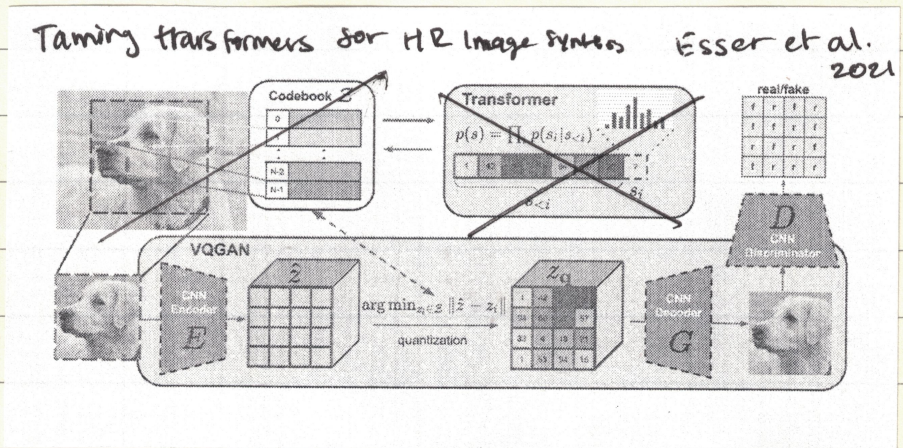
Kingma et al. 2013



State of the art ~~autoencoder~~ autoencoder which is seq to seq

used for reconstructing sequences ex images

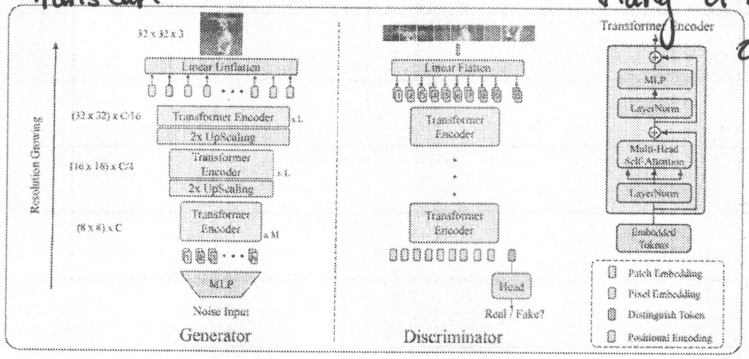
Taming transformers for HR Image Synthesis Esser et al. 2021



State of the art seq to seq for images

uses transformer & CNN for latent representation (codebooks)

TransGan Jiang et al. 2021



State of the art transGans (uses transformers for G & D)