Jan 28, 2021
Welcome To CMPE 258 I
First Day of the Class
Harry LI, github/hualili/opencv/deep-Learning-2020S
20-2021S Email: huali@sjsu.edu
Office Hours M.W. 4:30~5:30 PM.
    Zoom Based
(650) 400-1116 Text Only
On-Line Material { github/hualili
          { CANVAS { Homework Assignment
                      { Collect/Submission of Homework

HANDS-ON:
Programming. Python
① OpenCV, T.F. (Tensor Flow) Keras API
google Colab
Action 1: Installation of OpenCV.
        Version 4.2
  Note: Use/Adopt Linux Ubuntu
                    18.04
Virtual Box
2nd O.S.   U.B. (Free)

                Native O.S.

Note: Python 3. Python Virtual
     Enviroment
3 major Areas { ① Handwritten Neurals Recognition. MNIST
               ② Time Series Prediction LSTM
&
Subjects

③ Face Net, ResNet
④ Deep Reinforcement Learning
              DRL
Ation — Policy — Reward

Work to be done:
1. Programming/Code Development
   from Repo.
2. Write/Submit Pseudo Code
   (Brief Summary)
   Report   1 page
   Note, Post a
   Sample on github
   Latex
3. Homework Submission
4 Submission (Including
Semester Long team Projects).

Action 2: Form 4-person Team
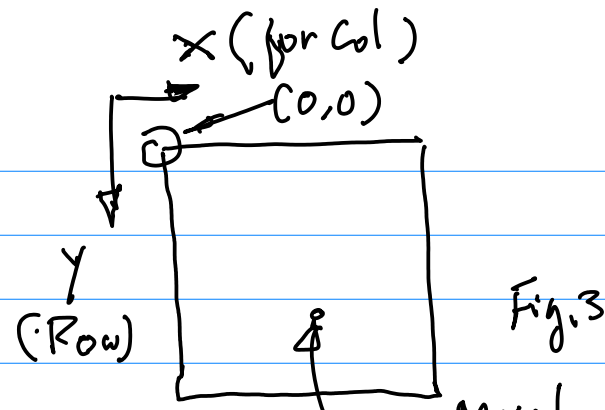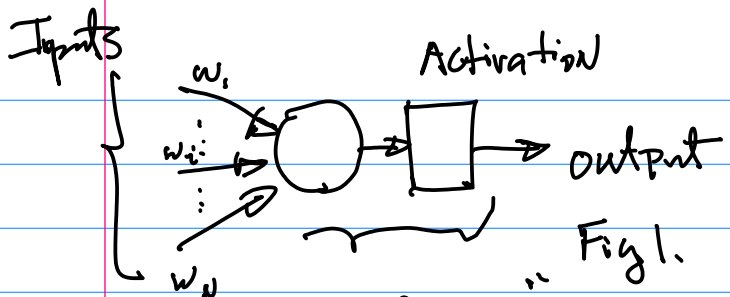By Feb 14 week; Work has to
Individual/Encourage team
Discussion.
Grading Policy: { Mid: 30%
             { Homework: 30%
             { Final: 40%

* Introduction
   Neural Nets
   Biological System
C.V. RoI. Human Brain
{ Deep NN Neurons (Cells)

Inputs

w_1

w_{ij}

w_N

Activation → output

Fig 1.

Prof. Carvard Mead — "Silicon Brain"

Intel Processor ~1992–94, "Father of VLSI"

~1994–95

Autonomous System ← OpenCV 1997

2005–2006
Stanford Group + Google
Self Driving Market Huge

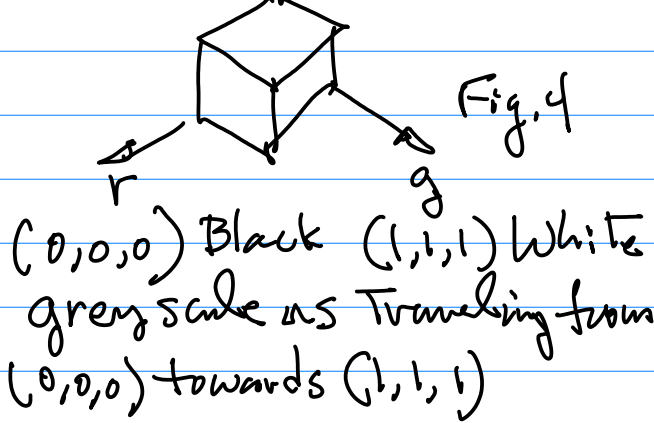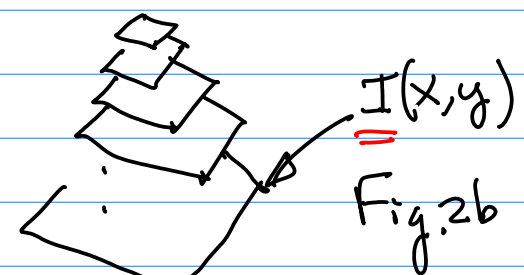2013 Alex Net ("Deep Convolutional Neural Network")

NVDA GPU Architecture

Recently: FaceNet, ResNet
Time Series Analysis (LSTM)
Deep Reinforcement

Computer Vision

Retina — multiple Layers of Photo Receptors
~10 layers.
110~120 million P.R.
Eye Optic N. (Brain Cells)
~1 million

Fig. 2a

Image Pyramid

$I(X,Y)$

Fig. 2b

x (for Col)
(0,0)
y (.Row)

Fig. 3

M×N
↑
Resolution

Note:
1° "Scanning" ~
From L to R, top to B
"L2R, T2B"

2° Resolution 1024×768
No. of colum   No. of Row

M × N → 1024×768
M = Colum X
N = Row y

3° Color Image   Vector
Color Space (r,g,b)
Primitive Color
r — red;
g — green;
b — blue

Color Cube

Fig. 4

$(0,0,0)$ Black $(1,1,1)$ White
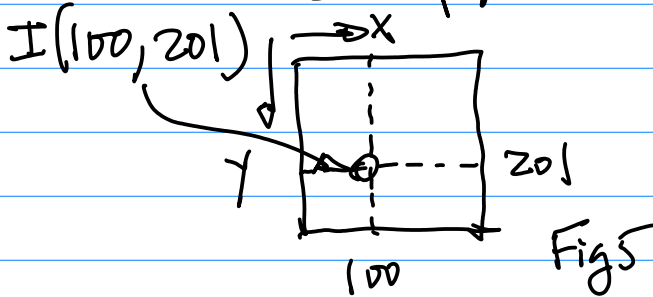grey scale as Traveling from
$(0,0,0)$ towards $(1,1,1)$

Highest Red $(r, g, b) = (1, g, b)$

" Green $(r, g, b) = (r, 1, b)$

" Blue $(r, g, b) = (r, g, 1)$
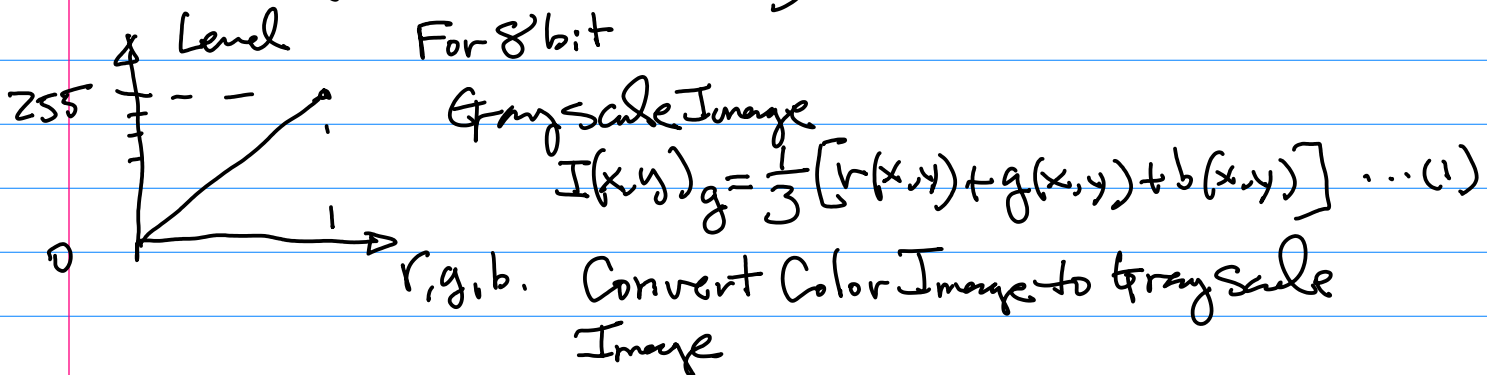
$I(x, y)$ — Intensity in terms of (r, g, b)

① Location On the Image Plane

$I(100, 201)$

Fig 5

$r : 8 \text{ bit} \quad [0, 255] \quad (2^8 = 256)$

$g, b ; 8 \text{ bit}, \quad \text{"} \quad \text{"}$

Quantization Level

Pixel Depth (BPP : Bit Per Pixel)

Level   For 8 bit

255

Gray Scale Image

$$I(x, y)_g = \frac{1}{3} [r(x, y) + g(x, y) + b(x, y)] \quad \cdots (1)$$

0

$r, g, b.$ Convert Color Image to Gray Scale Image

Action 3. Enable OpenCV $\{$ colab

.... Display A "Jpg" $\{$ Locally (Install)

Color Image → From Your Smart