CmpE258

F22, HL

August 23 (Tue)

First Day of the Class

1. Organizational meeting

"Green sheet"

Repo: github/hualili/opencv/deep-learning-20225/

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(650) 400-1116 Cellphone for Text message Only.

Office Hours: M.W. On Zoom. (see Syllabus for the Zoom Link).

2 Software Tools:

Anaconda — Install it By the end of this week;

TensorFlow, TF 2.0

OpenCV.

3. Prerequisites: CmpE255 & CmpE257

Homework: To upload a copy of your un-official Transcript to show the required courses satisfied. ON CANVAS.

4. Textbook. Deep Learning with Python.

Keras (API) for T.F.

Robot Vision Book By Horn. (Heavy Theoretical Book, Good Reference for OpenCV Algorithms. Good Theoretical Foundations)

5. Projects { Mandatory Assigned Project; Team Project (Mandatory)

4-Person Team. Presentation By the End of the Semester.

August 25 (Wed)

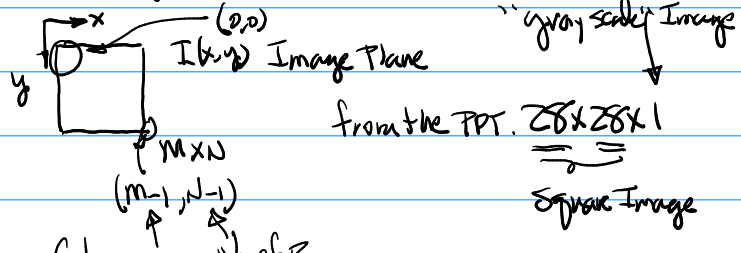
Note: 1° The lecture Note will be posted on to the github.

2° Zoom Recording will be posted on the github.

Homework: By A week from today. 1. Anaconda Installation; 2. OpenCV Installation. Submission On CANVAS. Jpg/Png Image → pdf → zip 2 pdf.

Example: (github: 2022F-103-)

MNIST Architecture for Handwritten Digits Recognition.

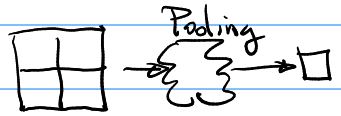


Gray scale image → 1 channel → 8 bit → [0, 255]

First Layer of the MNIST Architecture

n1 Channel/plane of the 1st Convolution Layer C1

Next, Pooling → Reduction of Resolution → 2x2 becomes 1

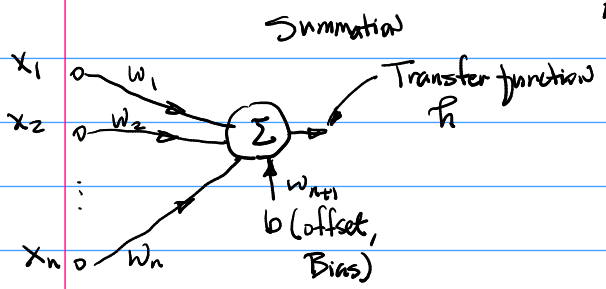


M1

From the Architecture diagram:

C1 M1 → C2M2 → Flatten → (FF) FFNN

To generalize the quick inspection of the the CNNs, we have to investigate the Behavior of Each Single Neuron as the Basic Building Block.



Input/Excitation in Vector Form: $\mathbb{X} = (x_1, x_2, \cdots, x_n) \quad \cdots (1)$

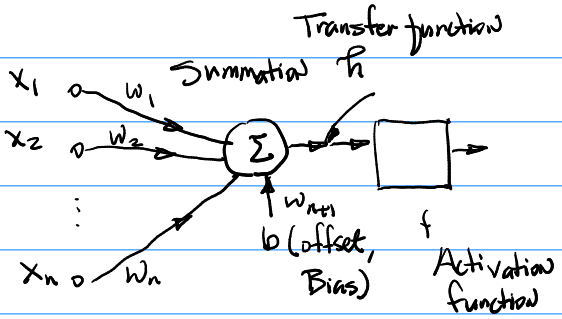
Weights, links each excitation to the Neuron

$$W = (w_1, w_2, \cdots, w_n) \quad \cdots (2)$$

$$x_1 w_1 + x_2 w_2 + \cdots + x_i w_i + \cdots + x_n w_n + b w_{n+1} = h$$

$$\sum_{i=1}^{n} x_i w_i + b w_{n+1} = h(x_i w_i) \text{ or Simply } h(\mathbb{X}W) \quad \cdots (3)$$

$h(\mathbb{X}W; b)$, $h(\mathbb{X}, W)$



$$f(h(\mathbb{X}W)) = f\left(\sum_{i=1}^{n} x_i w_i + b w_{n+1}\right) \quad \cdots (4)$$

$$h(\mathbb{X}W) = \sum_{i=1}^{n} x_i w_i + b w_{n+1}$$

Examples of Different Activation functions include ReLU, A piecewise Linear.

Note: Be Able to Build A Simple Neuron per a technical Specification, Such as $n = 11$, Activation $f(\cdot)$, Draw a Block diagram.