

Introduction of DeepLearning (I)

28 July 2020

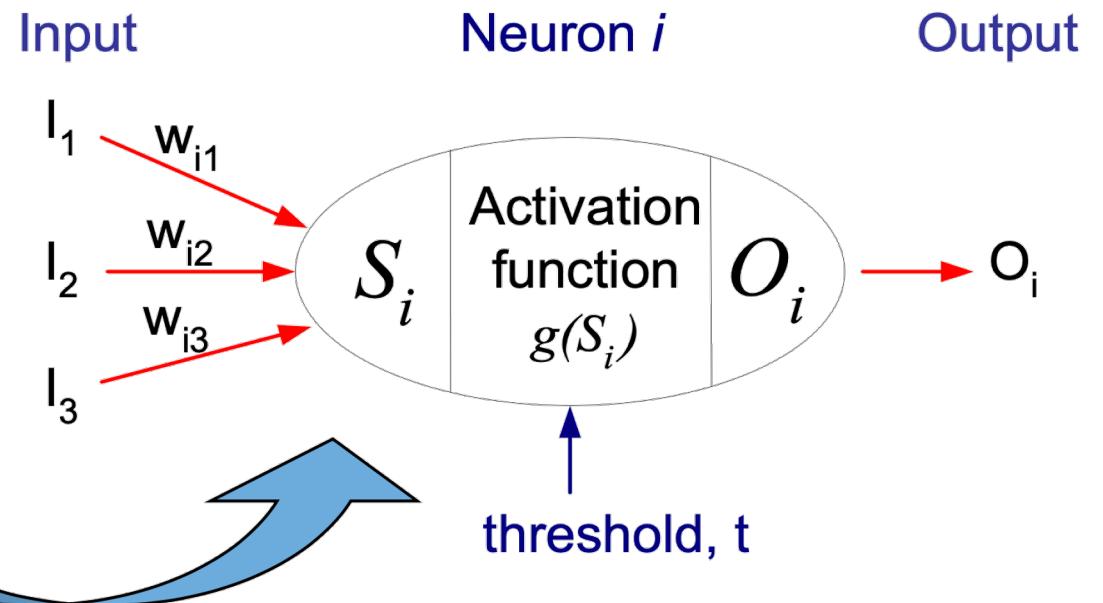
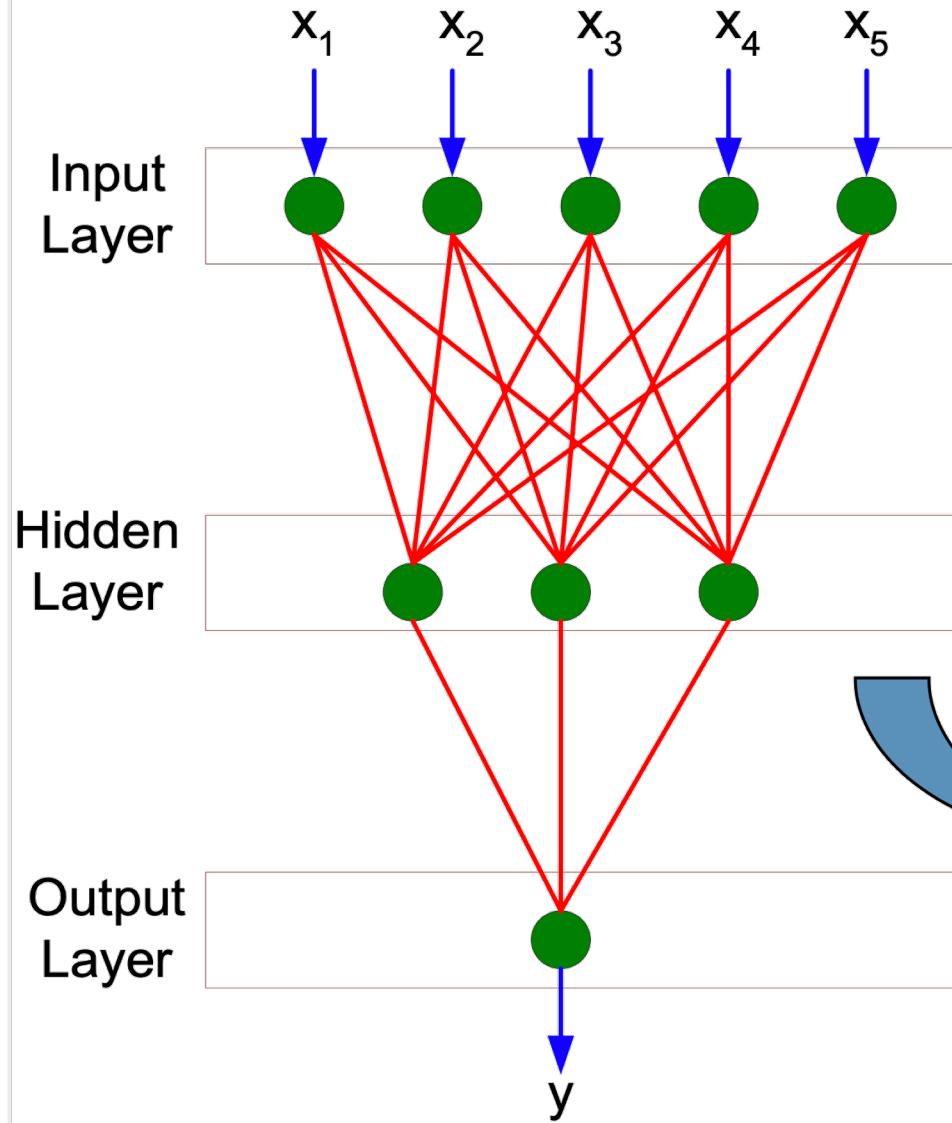
Presented by Red Hsu



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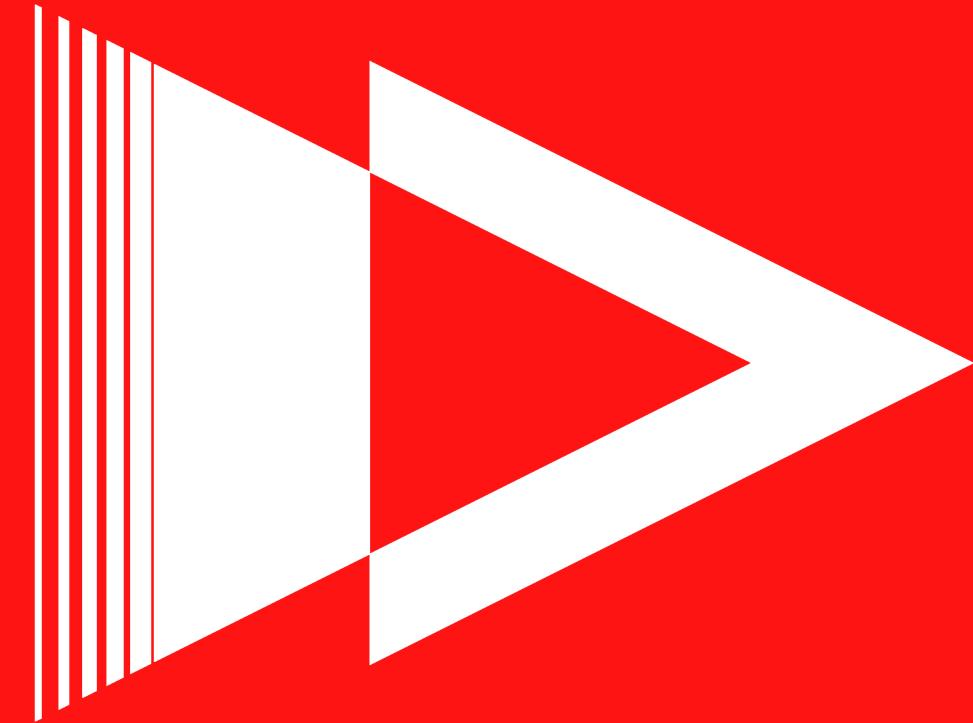
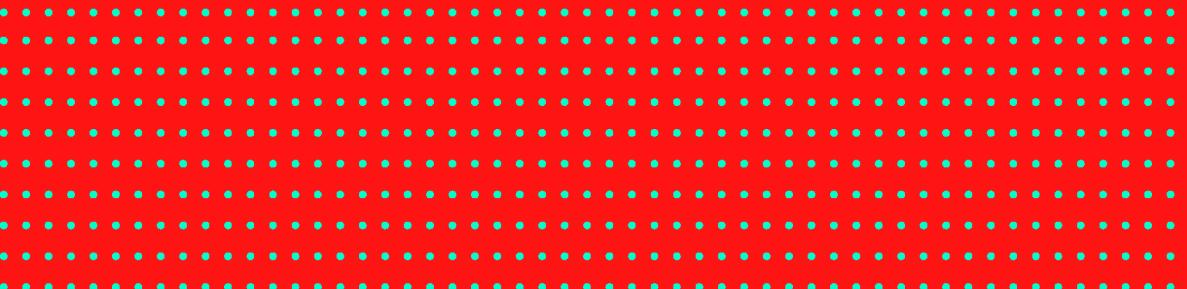
- ▶ 介紹人工神經網路的數學基礎、超參數等介紹
- ▶ 以二分類問題來進行人工神經網路建構
- ▶ 機器學習基礎，介紹操作流程
- ▶ 建立多分類問題的模型
- ▶ 進行模型能力評估

Artificial Neural Network

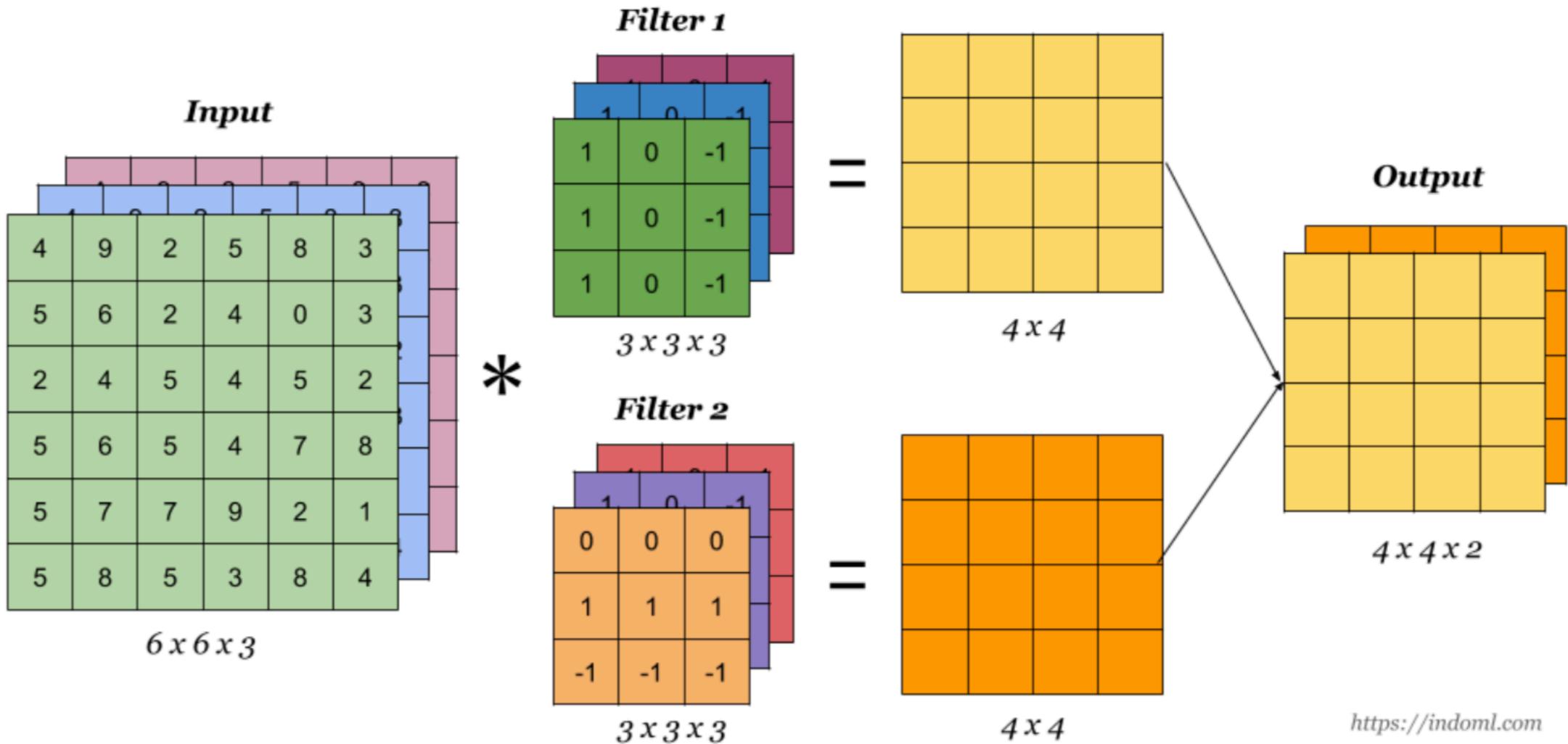


Training ANN means learning the weights of the neurons

Lab



Convolutions



<https://indoml.com>

Input

4	9	2	5	8	3
5	6	2	4	0	3
2	4	5	4	5	2
5	6	5	4	7	8
5	7	7	9	2	1
5	8	5	3	8	4

$$n_H \times n_W = 6 \times 6$$

Filter

1	0	-1
1	0	-1
1	0	-1

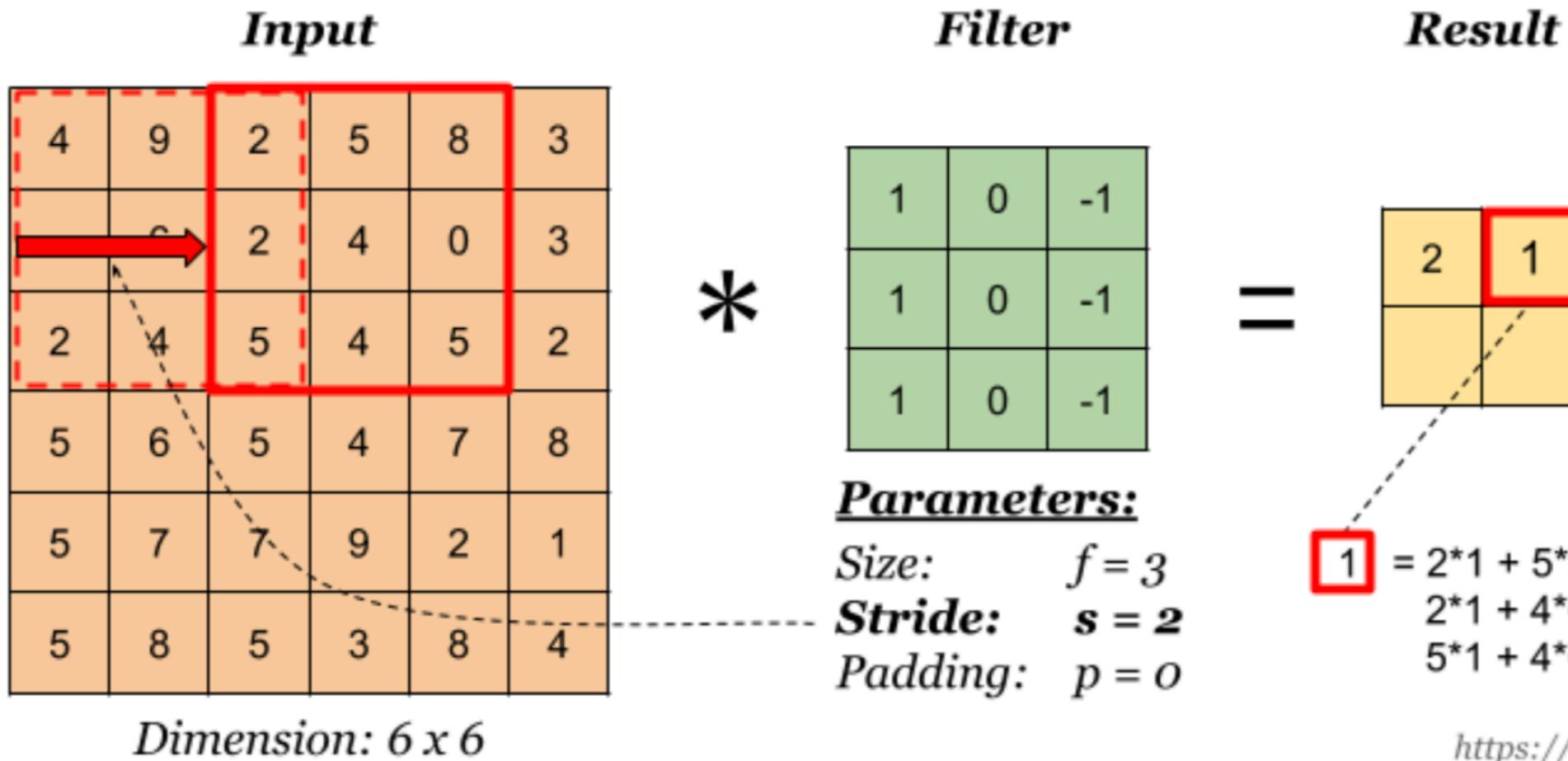
*

Parameters:Size: $f = 3$ Stride: $s = 1$ Padding: $p = 0$ ***Result***

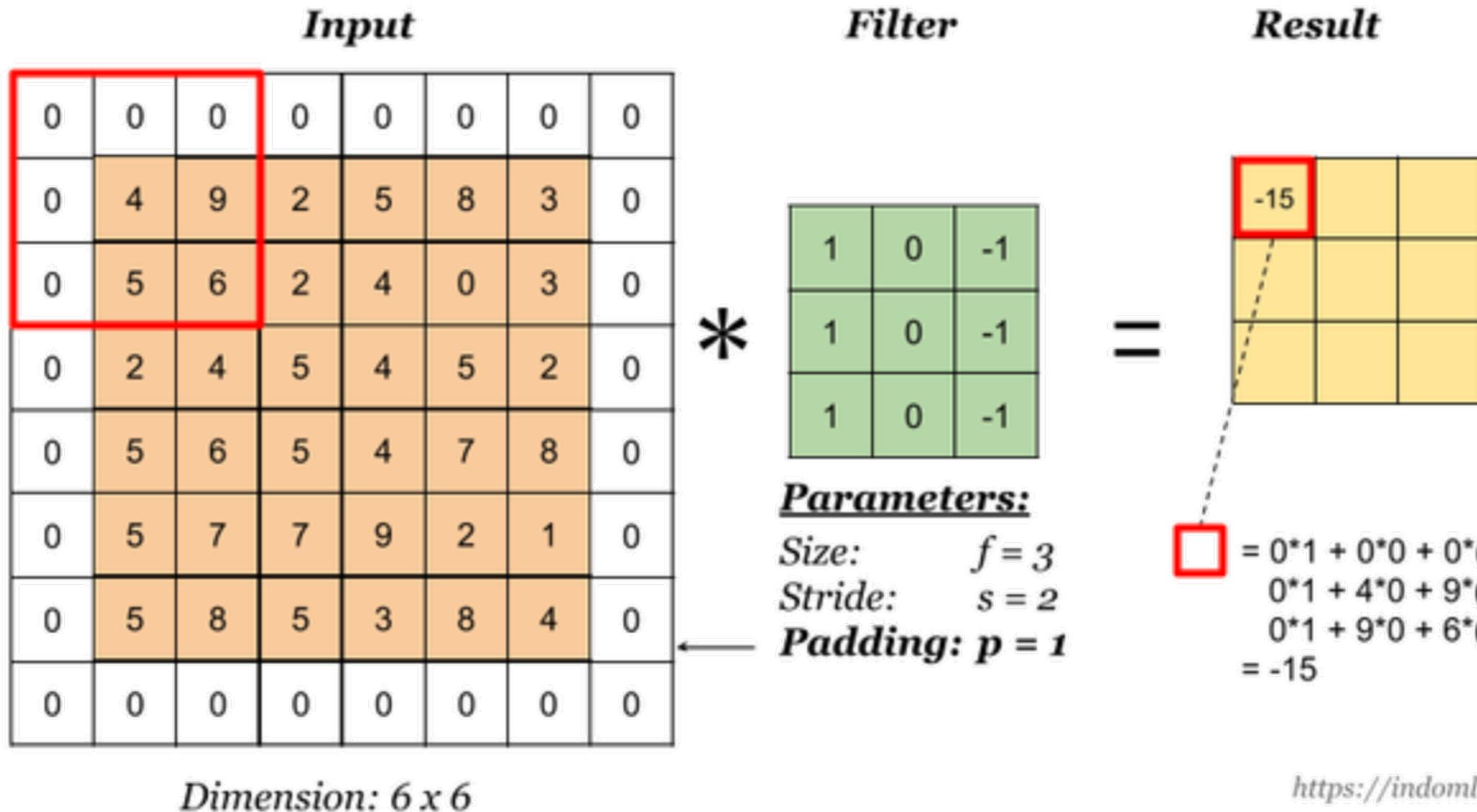
2			

$$\boxed{2} = 4*1 + 9*0 + 2*(-1) + \\ 5*1 + 6*0 + 2*(-1) + \\ 2*1 + 4*0 + 5*(-1)$$

<https://indoml.com>



<https://indoml.com>



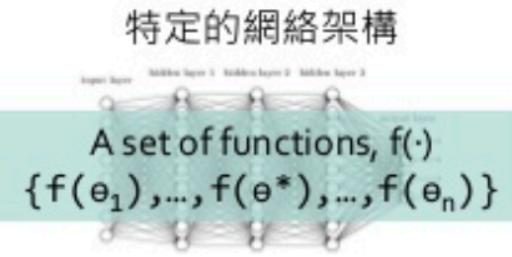
Dimension: 6×6

<https://indoml.com>

Define a set of functions

Evaluate and Search

Pick the best function

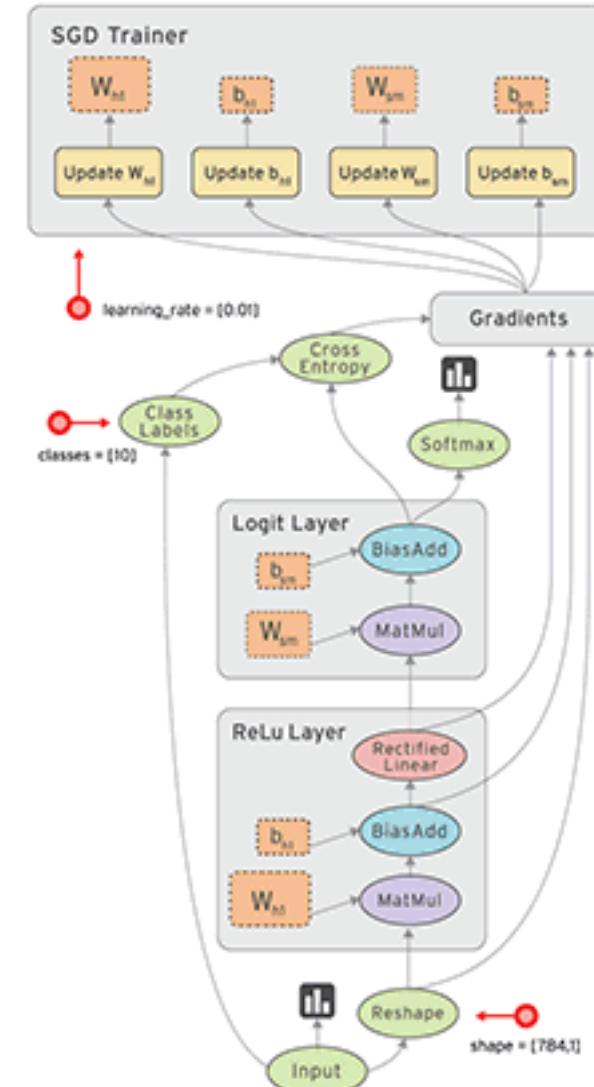


不斷修正 f 的參數

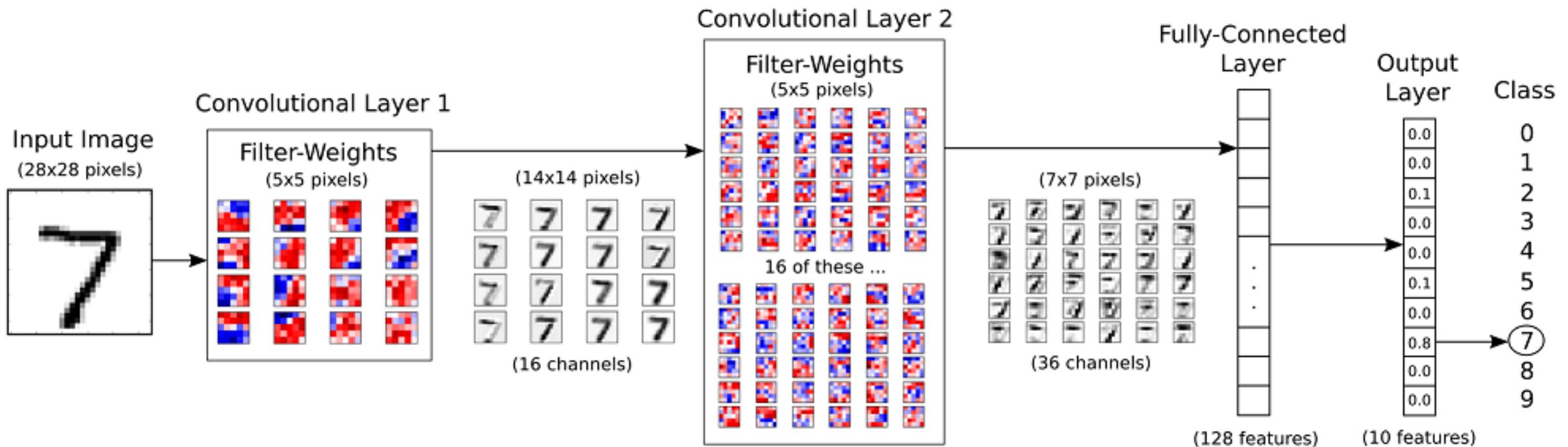
$f(\theta_{94}) \rightarrow$
 $f(\theta_{87}) \rightarrow$
 $f(\theta_{945}) \dots$

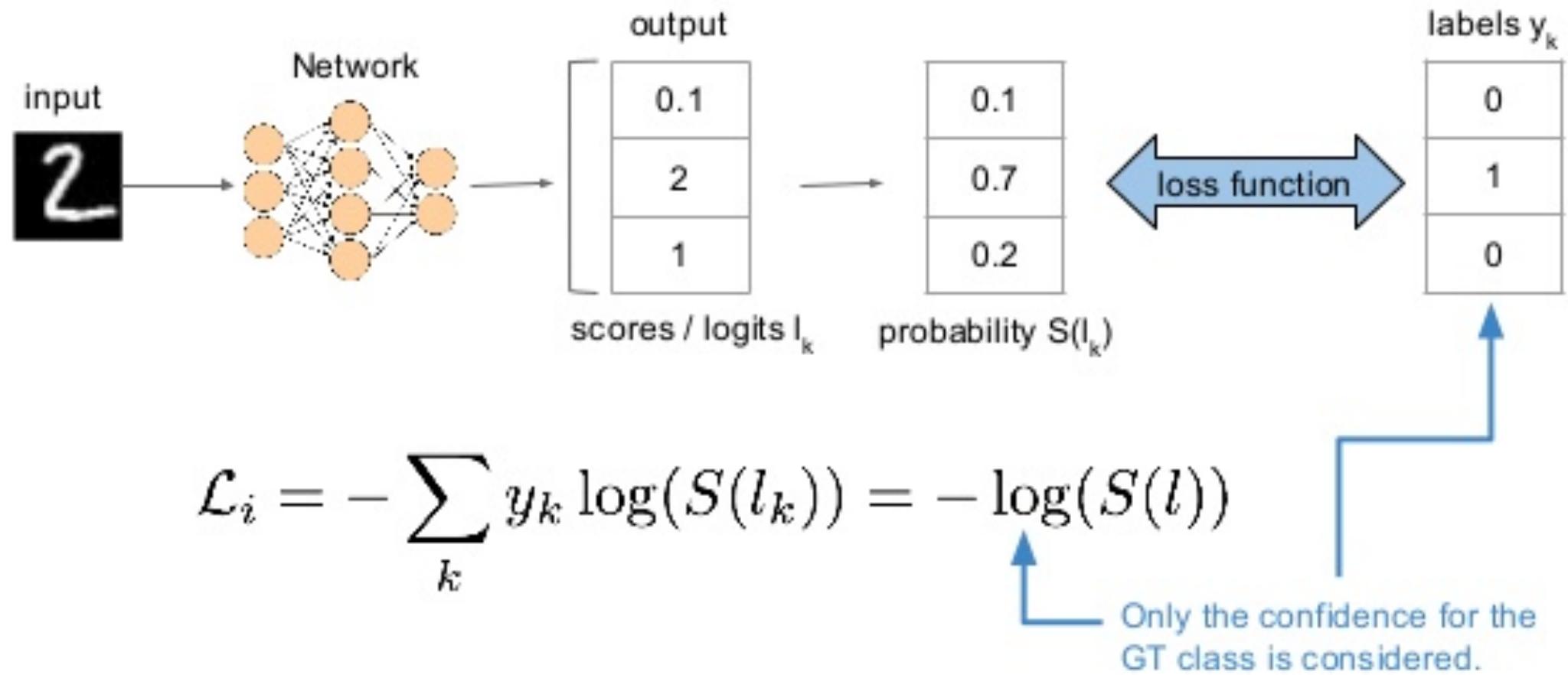
找到最適合的參數

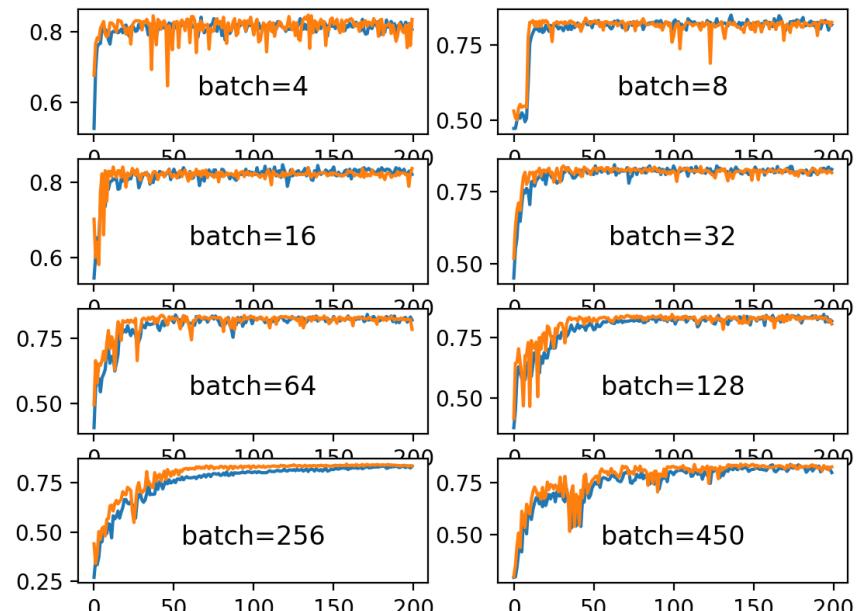
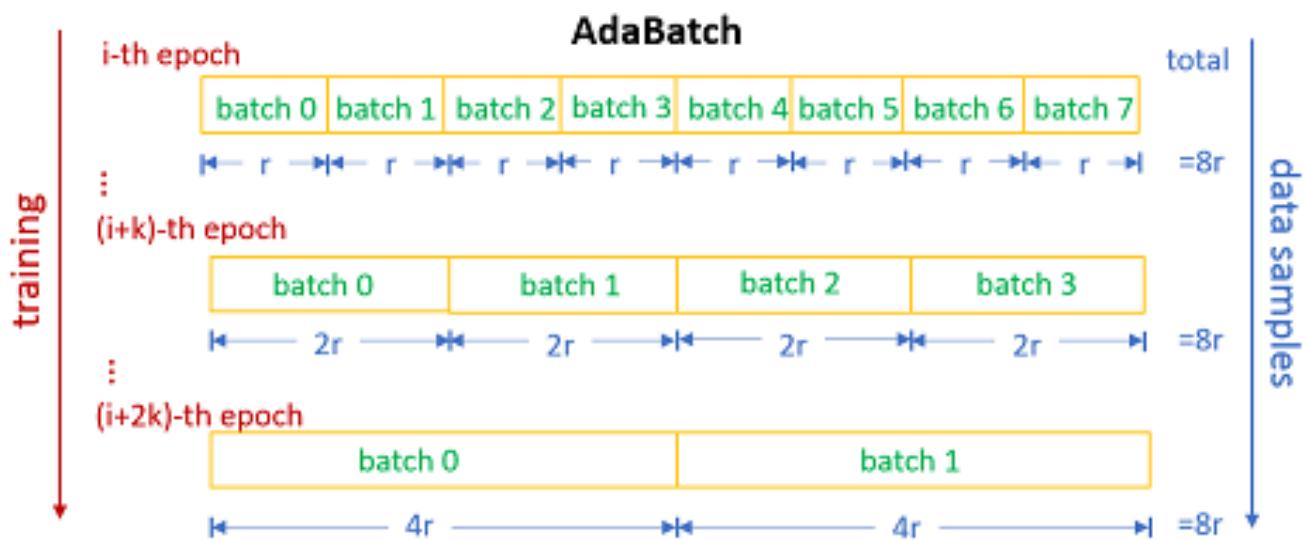
$f(\theta^*)$



Convolution







Idea #1: Choose hyperparameters that work best on the data

BAD: K = 1 always works perfectly on training data

Your Dataset

Idea #2: Split data into **train** and **test**, choose hyperparameters that work best on test data

BAD: No idea how algorithm will perform on new data

train

test

Idea #3: Split data into **train**, **val**, and **test**; choose hyperparameters on val and evaluate on test

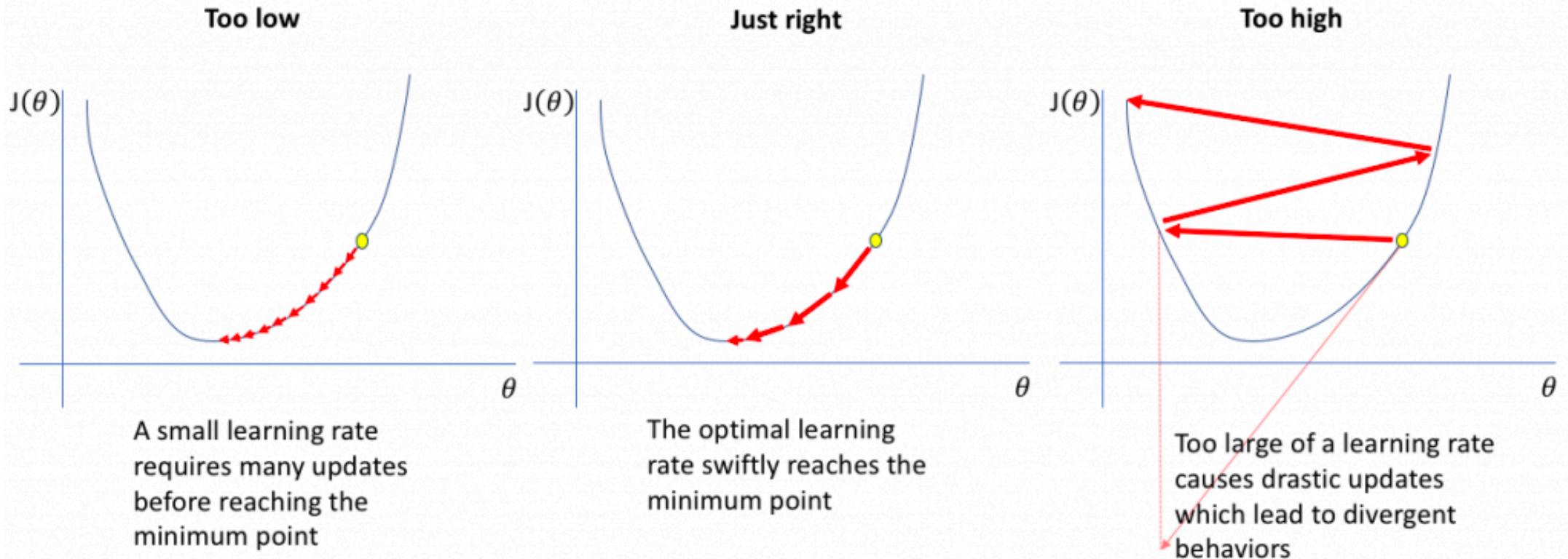
Better!

train

validation

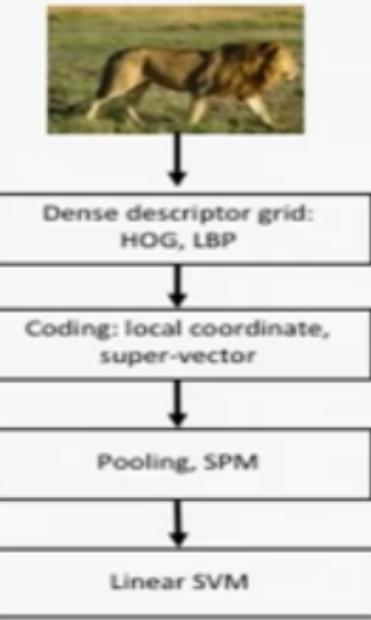
test

Stanford



Year 2010

NEC-UIUC

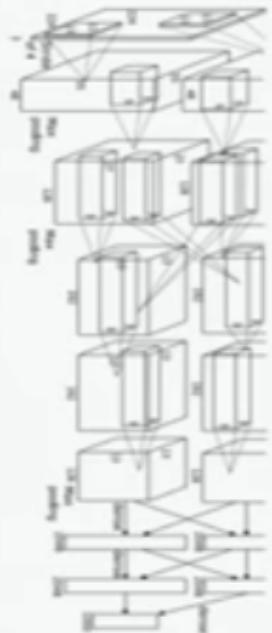


[Lin CVPR 2011]

Lion image by Swissfrog is
<https://creativecommons.org/licenses/by-sa/2.0/>

Year 2012

SuperVision



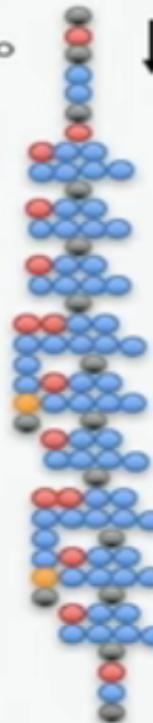
[Krizhevsky NIPS 2012]

Figure copyright Alex Krizhevsky, Ilya
Sutskever, and Geoffrey Hinton, 2012.

Year 2014

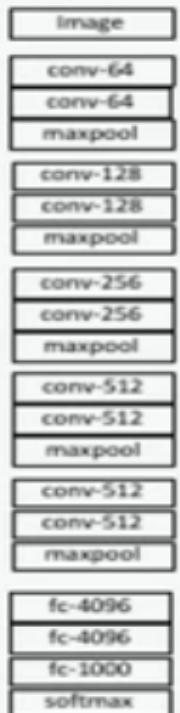
GoogLeNet

● Pooling
● Convolution
● ○ Other
● Softmax



[Szegedy arxiv 2014]

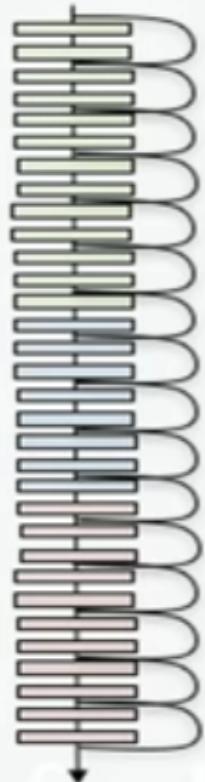
VGG



[Simonyan arxiv 2014]

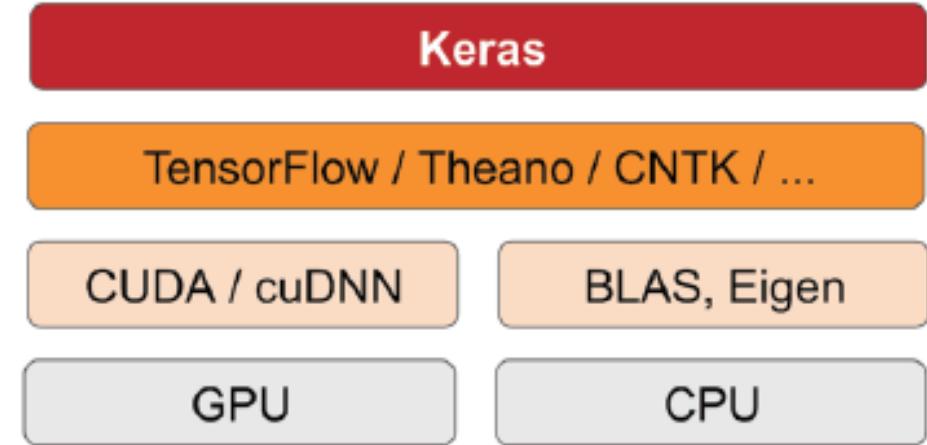
Year 2015

MSRA



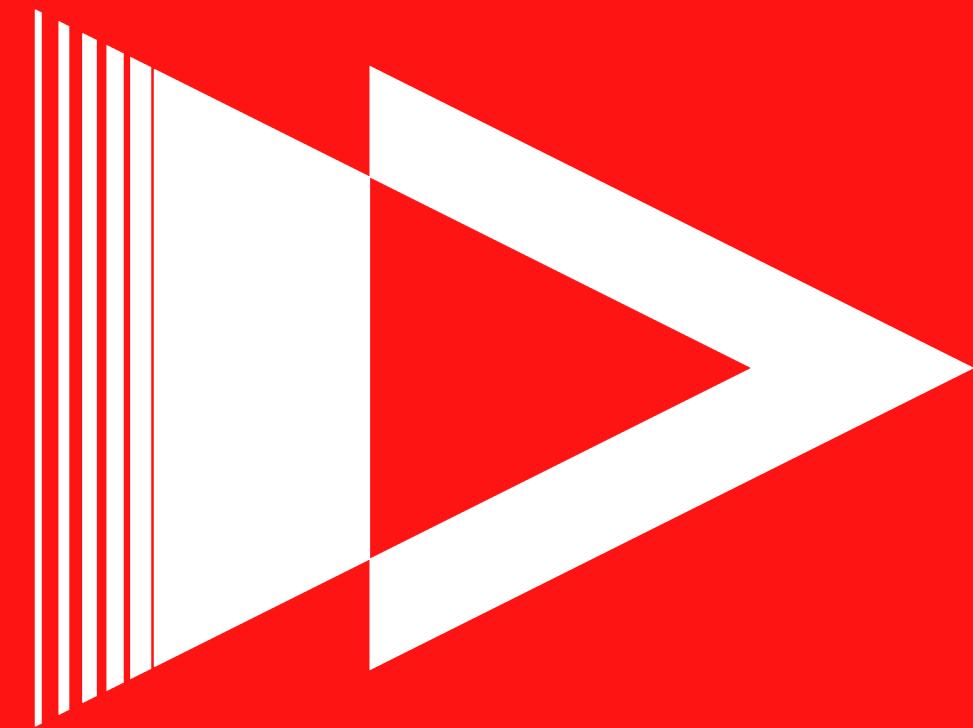
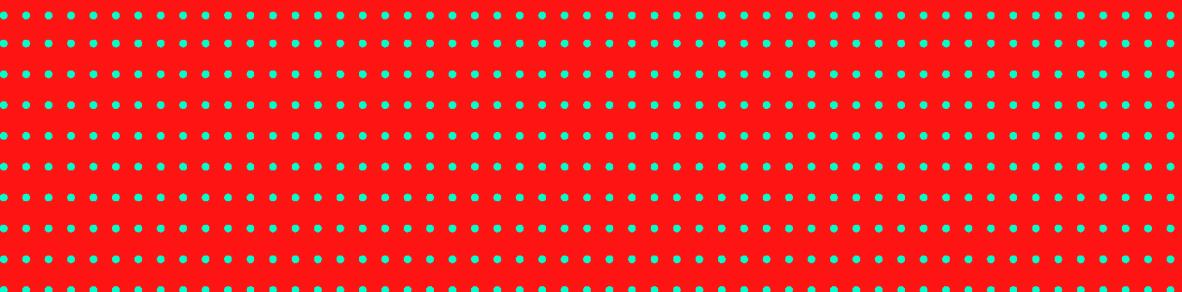
[He ICML 2015]

- Keras is a high-level API to build and train deep learning models.
 - User friendly
 - Modular and composable
 - Easy to extend



<https://www.tensorflow.org/guide/keras>

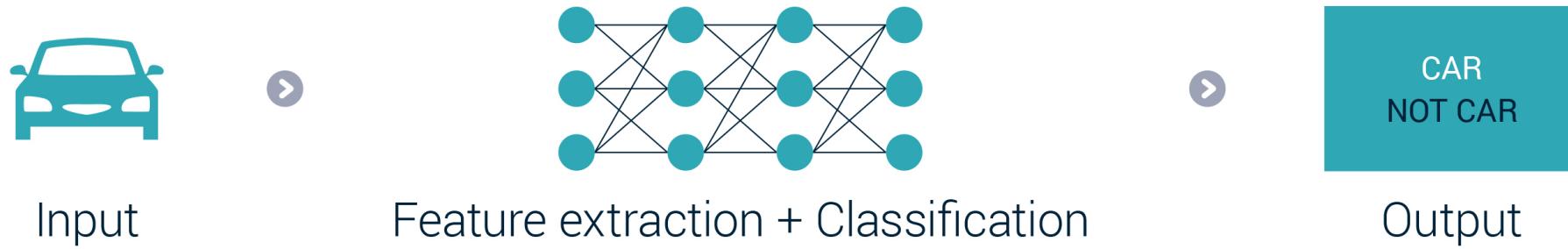
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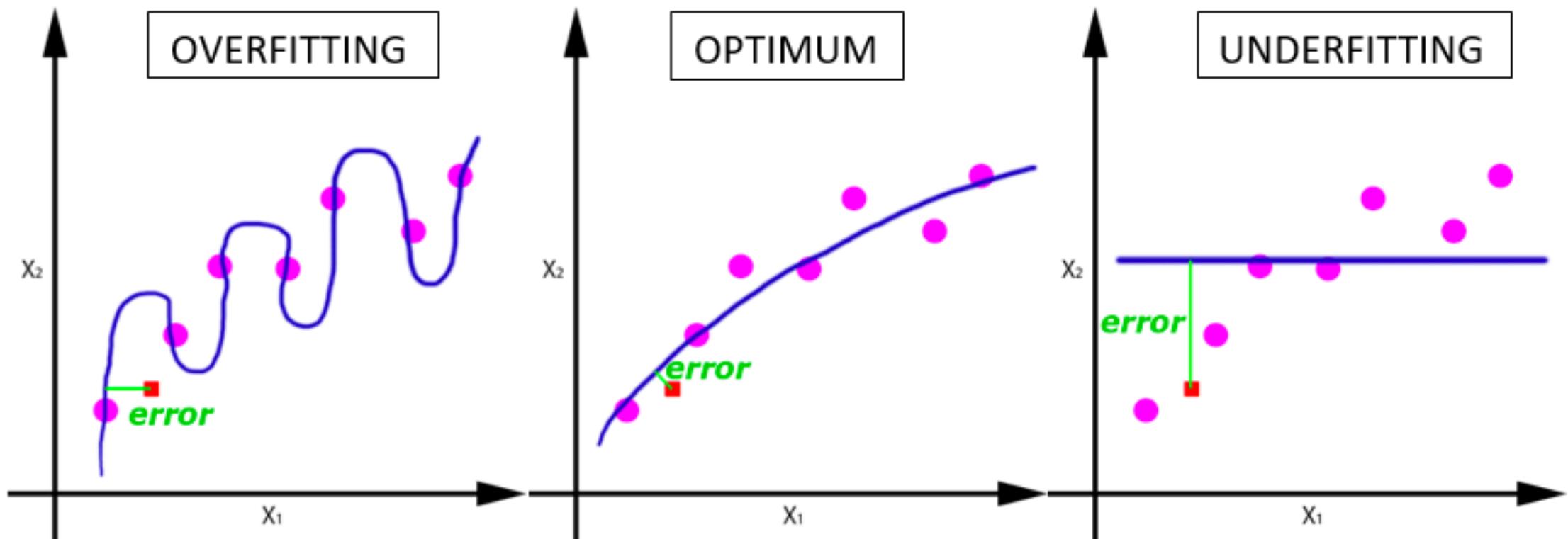


Machine Learning

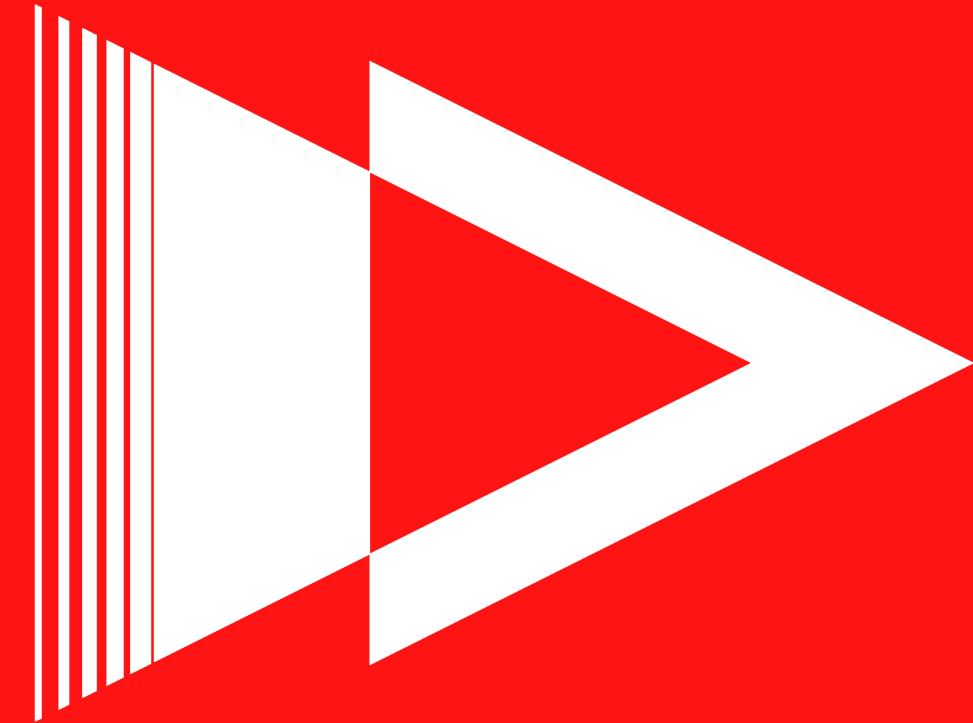
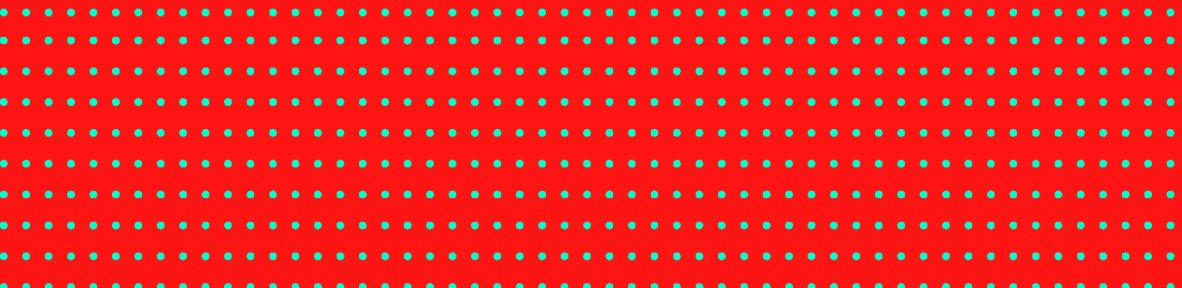


Deep Learning





Lab



Thank you

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