

# The practice of AI

## C2: Deep learning & computer vision

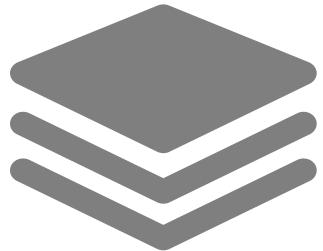
Jim Xie

2020/7/6



# Outline

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1. Goal
2. Deep learning overview
3. Demo for CNN model train
4. Demo from model Inference
5. Brief summary

# Goal

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Learn how to train and use a DL model

# What is deep learning

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- Recognize patterns VS Learning features
- More deep neural networks
- More unexplainable

# Why now

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- Prevalent data
- High hardware performance
- More software framework

# DL workflow

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- Build neural networks
- Initialize parameters
- Feed data to neural networks
- Calculate error by predicted values and real values
- Adjust parameters base on error
- Iterate previous steps until error is accepted

# DL models

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Neural networks



- LeNet
- AlexNet
- VGG/GoogleLeNet
- ResNet
- InceptionNet
- DenseNet

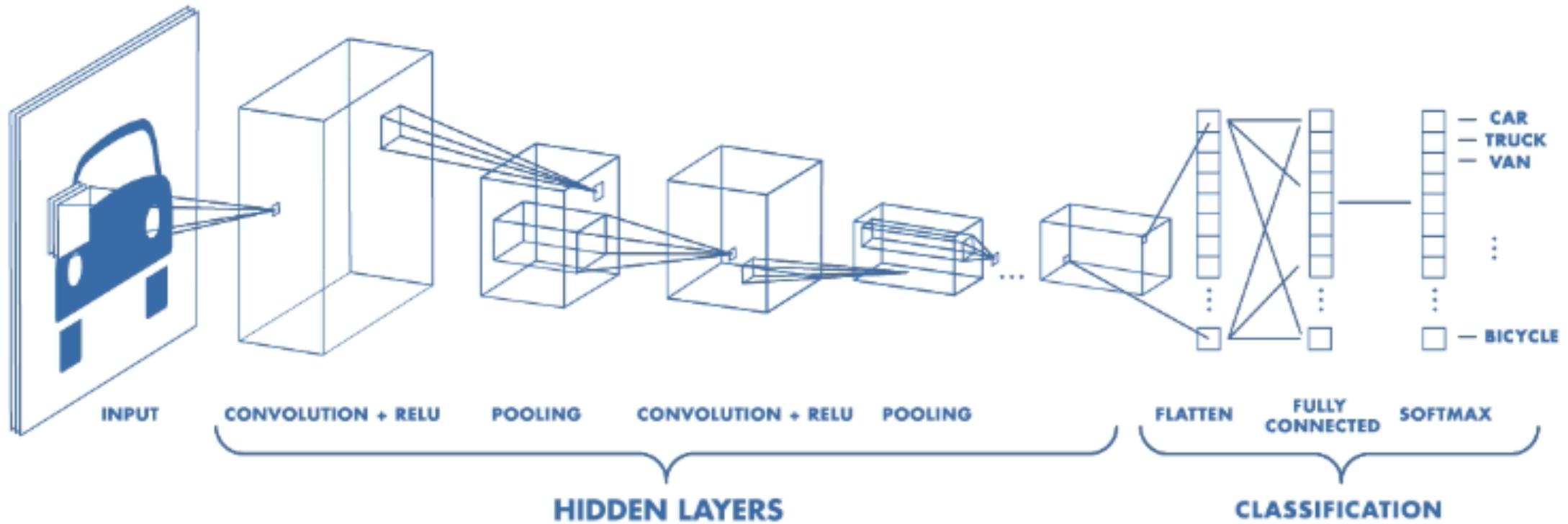
# DL models and applications

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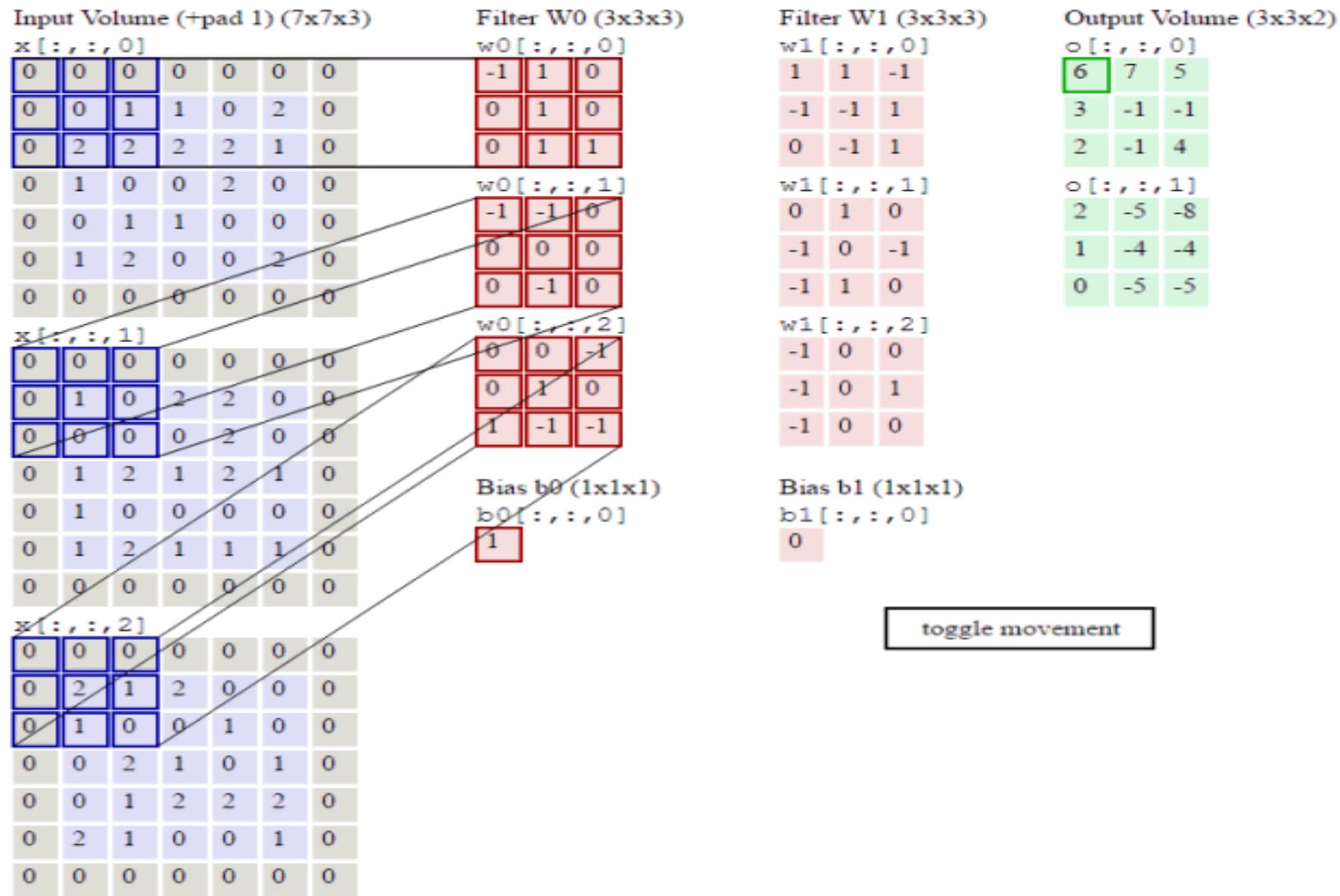
- Computer vision
  - CNN
  - R-CNN/Fast R-CNN
  - Mask R-CNN
- NLP/Speech
  - RNN
  - LSTM
  - GRU
- Methodologies
  - Transfer Learning
  - Reinforcement Learning

# Architecture of CNN

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# Feature extraction of CNN



## Demo #1

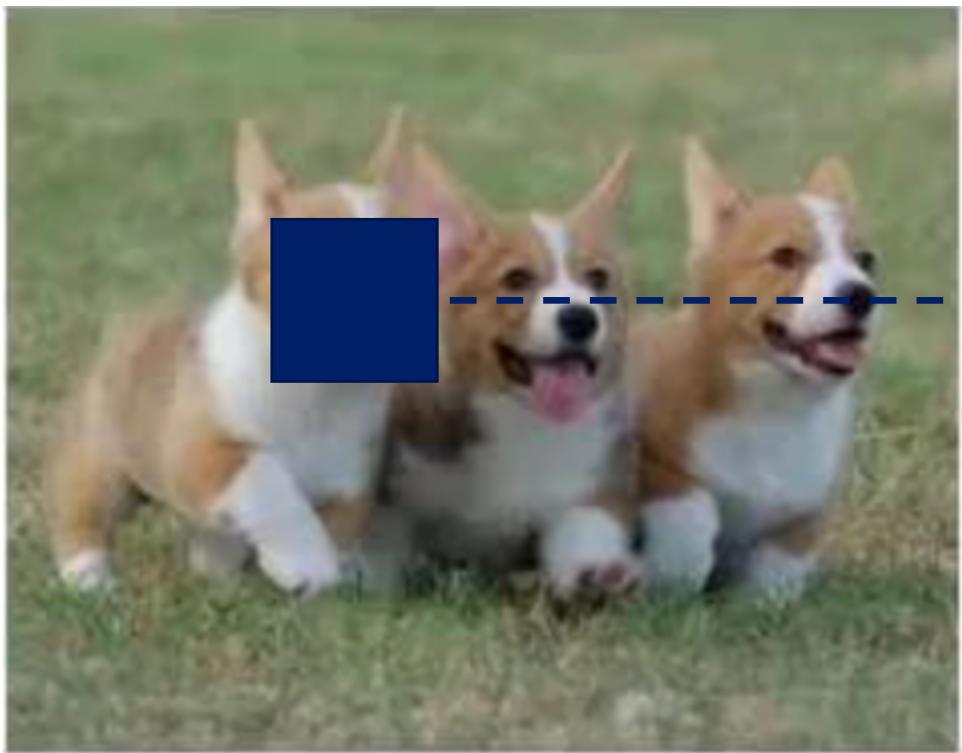
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Train a model

# CV: Image format

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**Shape :** [height,weight,channel]

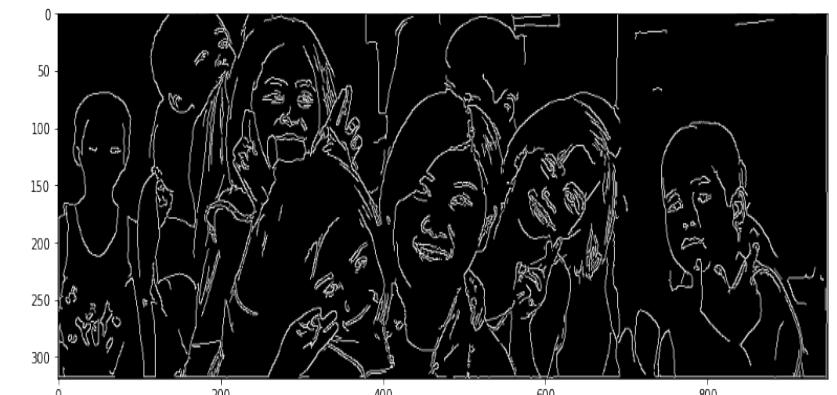


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81	49	31	73	55	79	14	29	93	71	40	67	53	88	30	03	49	13	34	65
52	70	95	25	04	60	11	42	69	24	68	56	01	32	56	71	37	02	36	91
22	31	16	71	51	67	43	59	41	92	36	54	22	40	40	28	66	33	13	80
24	47	32	60	99	03	45	02	44	75	33	53	78	36	84	20	35	17	12	50
32	98	81	28	64	23	38	40	67	59	54	70	66	18	38	64	70			
67	26	20	68	02	62	33	94	39	43	08	40	91	66	49	94	21			
24	55	58	05	66	73	77	78	78	96	83	14	88	34	89	63	72			
21	36	23	09	75	00	55	35	14	00	61	33	97	34	31	33	95			
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01	70	54	71	83	51	54	69	16	92	33	45	48	86	81	16	23	57	05	54

# CV: Common translation

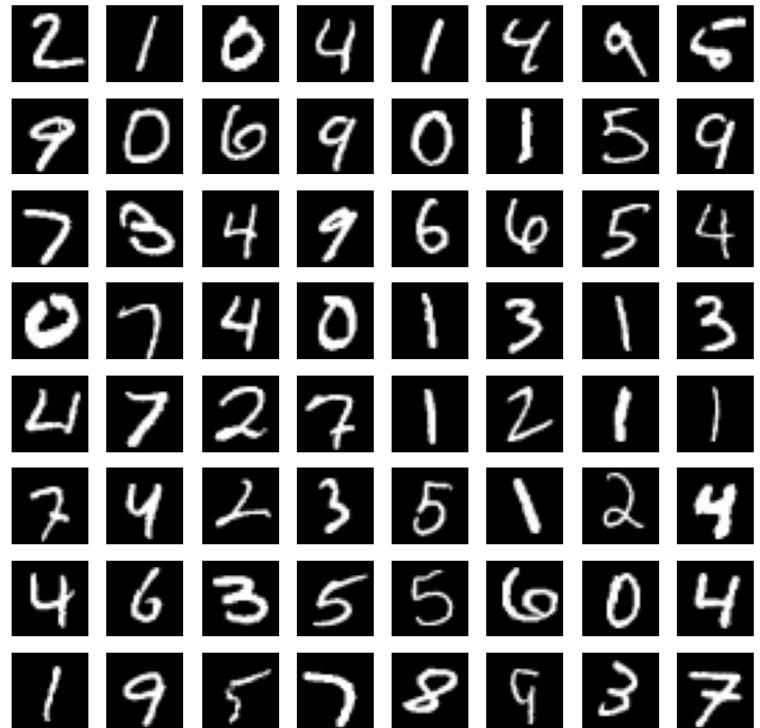
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- Grayscale
- Blur
- Binarization
- Edge detection



# Demo: mnist recognition

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- Create train/test dataset
- Build a CNN model
- Train model
- Performance evaluate
- Visual analysis
- Inference and deployment

# Learn from Demo #1

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- Train (Hyper parameters selection)
  - CNN layers
  - Learning rate
  - Iteration round
  - Loss/activation functions
- Inference/evaluate
  - Sample unbalance
  - Unexplainable
  - NOT 100% accurate

## Demo #2

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Use a model