

# The practice of AI

C2: Deep learning & computer vision

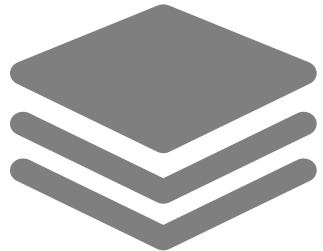
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# Outline

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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

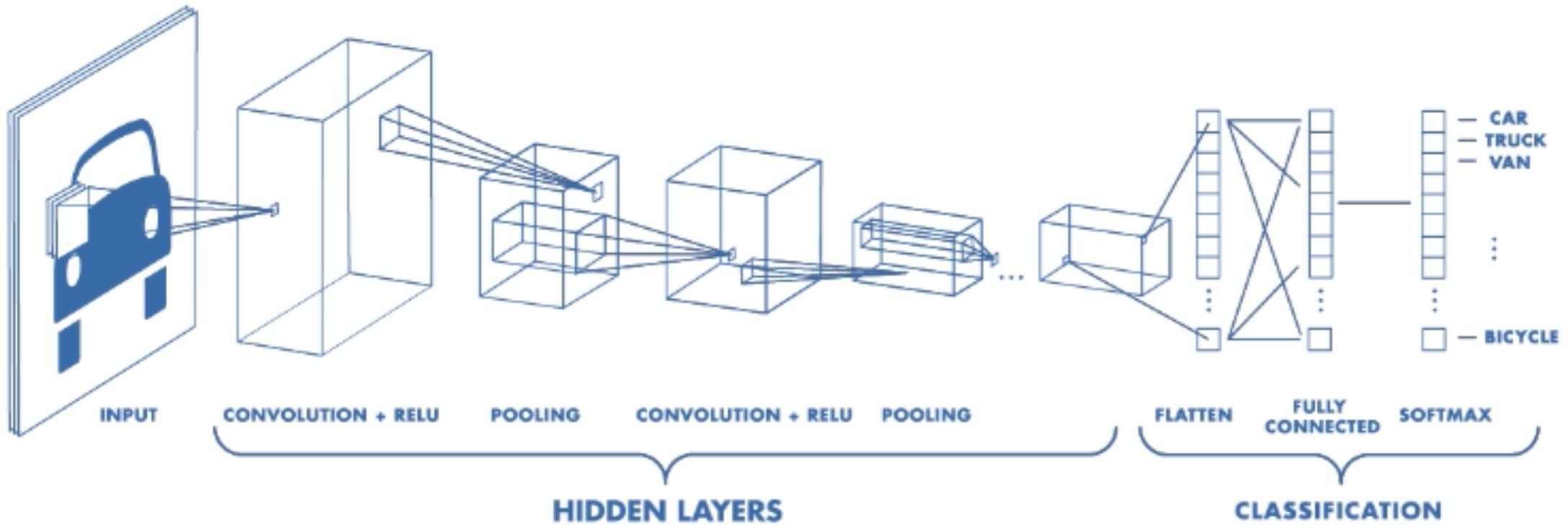
# DL models and applications

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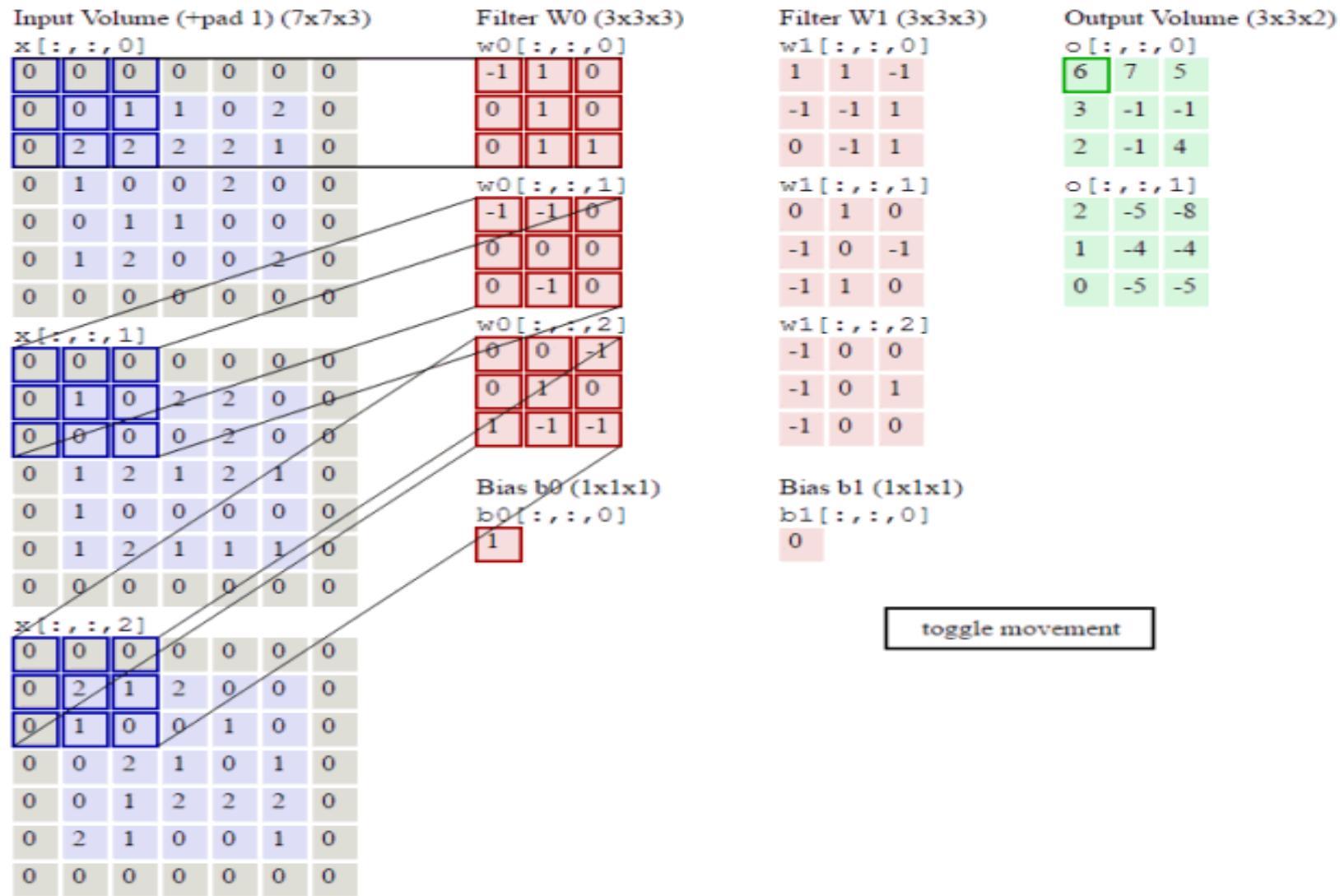
- Computer vision
  - CNN
  - R-CNN/Fast R-CNN
  - Mask R-CNN
- NLP/Speech
  - RNN
  - LSTM
  - GRU
- Methodologies
  - Transfer Learning
  - Reinforcement Learning

# Architecture of CNN

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# Feature extraction of CNN



## Demo #1

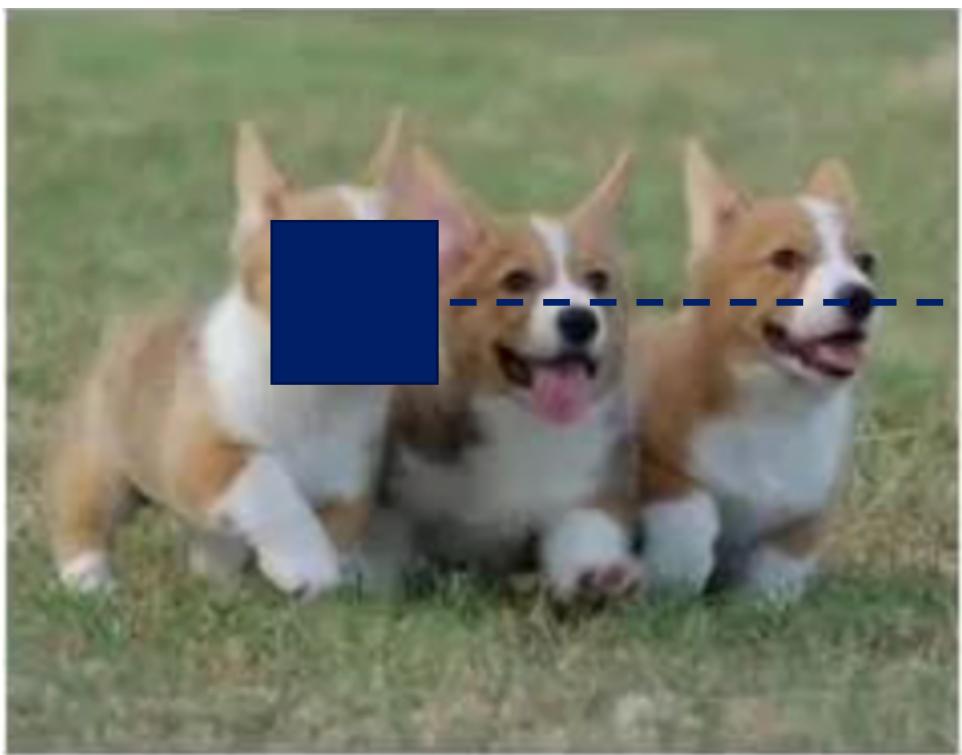
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Train a model

# CV: Image format

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

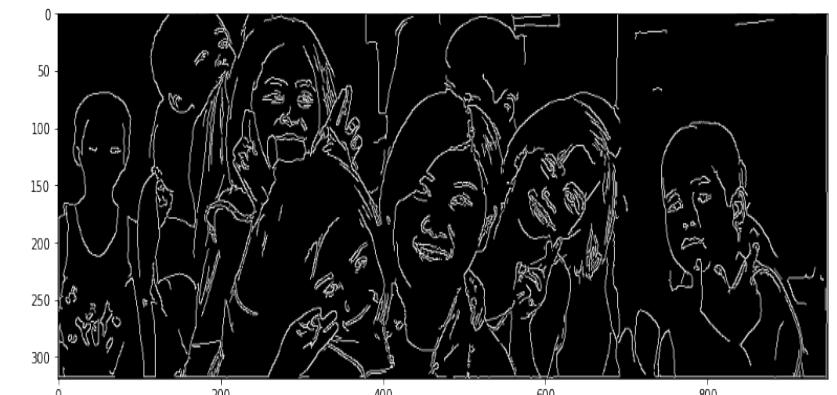


08 02 22 97 38 15 00 40 00 75 06 05 07 78 52 12 50 77 91 08  
49 49 99 40 17 81 18 57 60 87 17 40 98 43 69 48 04 56 62 00  
81 49 31 73 55 79 14 29 93 71 40 67 53 88 30 03 49 13 34 65  
52 70 95 25 04 60 11 42 69 24 68 56 01 32 56 71 37 02 36 91  
22 31 16 71 51 67 43 59 41 92 36 54 22 40 40 28 66 33 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 39 94 39 43 08 40 91 66 49 94 21  
24 55 56 05 66 73 7 78 78 96 83 14 88 34 89 63 72  
21 36 23 09 75 00 5 35 14 00 61 33 97 34 31 33 95  
78 17 53 28 22 75 31 67 15 94 03 80 04 62 16 14 09 53 56 92  
16 39 05 42 96 35 31 47 55 58 85 24 00 17 54 24 36 29 85 57  
86 56 00 48 35 71 89 07 05 44 46 37 41 60 21 58 51 54 17 55  
19 80 81 68 05 94 47 69 28 75 92 13 86 52 17 77 04 89 55 40  
04 52 08 53 97 35 99 14 07 97 57 32 16 26 26 79 33 27 98 66  
88 36 68 07 57 62 20 72 03 46 33 67 46 55 12 32 63 93 53 69  
04 42 16 73 38 25 39 11 24 94 72 18 08 46 29 32 60 62 76 36  
20 69 36 41 72 30 23 88 34 62 99 69 82 67 59 85 74 04 36 16  
20 73 35 29 78 31 90 01 74 31 49 71 48 86 81 16 23 57 05 54  
01 70 54 71 83 51 54 69 16 92 33 48 48 86 81 16 23 57 05 54

# CV: Common translation

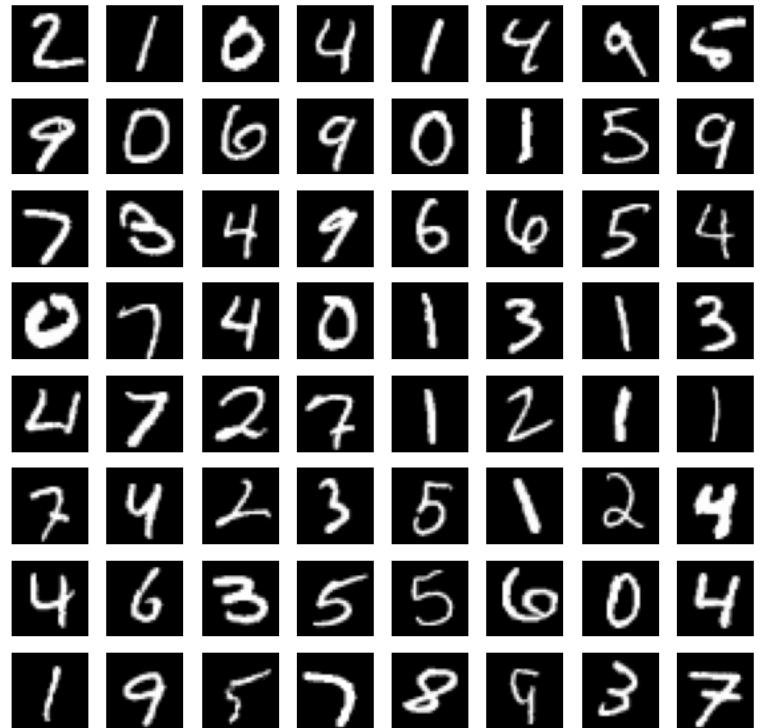
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- Grayscale
- Blur
- Binarization
- Edge detection



# 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