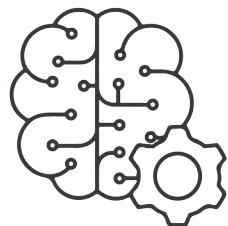




KONFERENSI  
**BIG DATA**  
INDONESIA  
JAKARTA, 12 - 13 MEI 2018

BERTEMU BERSINERGI BERINOVASI



Machine  
Learning  
ID

# Deep Learning on Your Own Computer

By Afif A. Iskandar

# About Me



Afif A. Iskandar

Company :  
Bukalapak (AI Scientist)

Community :  
Machine Learning ID (Board Director)

Educational Background:

- Bachelor of Mathematics at Universitas Indonesia (2011-2015)
- Master of Computer Science at Universitas Indonesia (2015-2018)

Specialization:

- Machine Learning
- Deep Learning
- Computer Vision

Email : [afifai@sci.ui.ac.id](mailto:afifai@sci.ui.ac.id) Linkedin : <https://www.linkedin.com/in/afifai/>  
Facebook : <https://www.facebook.com/afifakbariskandar>

# Prerequisites

- Tensorflow
- Keras
- Scikit Learn
- Numpy

# Dogs or Fried Chicken



# Puppy or Donuts



# Sheepdog or Mop



# Barn Owl or Apple



@teenybiscuit

# Raw Chicken or Donald Trump



# Deep Learning Introduction

- Artificial Neural Network
- Deep Learning Architecture
- Application of Deep Learning
- Deep Learning Project (Classify 6 MotoGP Riders)

# Artificial Intelligence

## Machine Learning

Deep Learning  
(Neural Nets.)

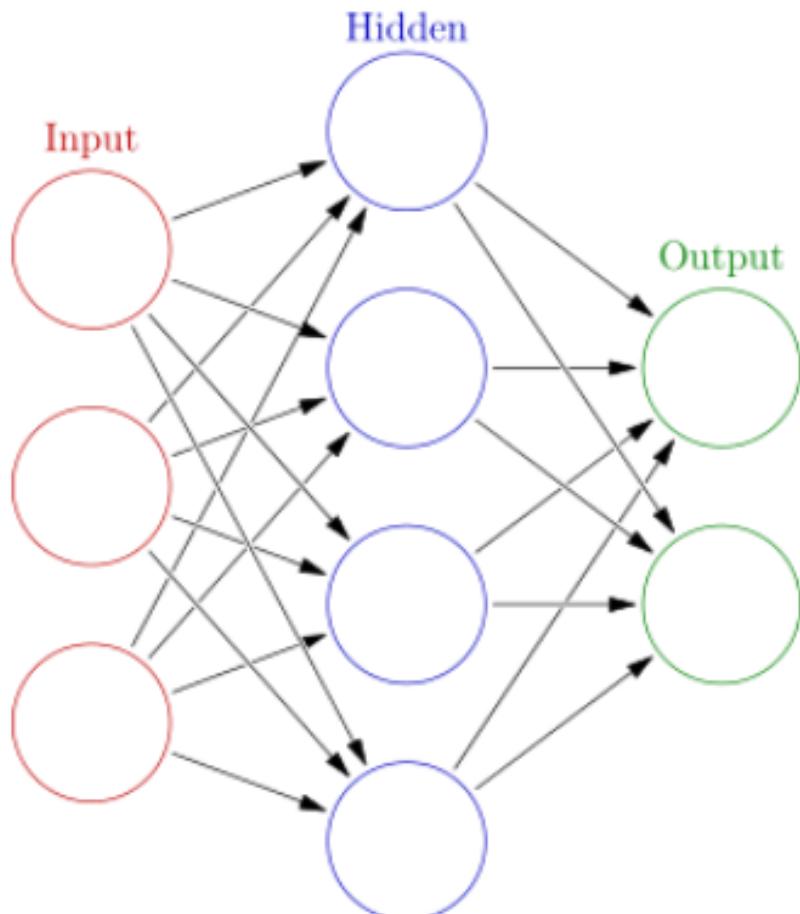
Linear Models  
SVM  
Random Forest  
XGBoost  
....

I Don't  
Know

# Deep Learning



# Artificial Neural Network



1. Activation Function
2. Weights
3. Cost Function
4. Learning Algorithm

<http://playground.tensorflow.org/>

# Neurons are Function

- Let's start with a complex one!
- Given  $x = a, y = b$ , how to update  $x$  and  $y$  to make  $f(x, y)$  larger?
- Follow gradient directions!

$$f(x, y) = x + y \quad \rightarrow \quad \frac{\partial f}{\partial x} = 1 \quad \frac{\partial f}{\partial y} = 1$$

$$x = a + 0.01 * 1,$$

$$y = b + 0.01 * 1$$

$$f(x, y): a + b \rightarrow a + b + 0.02$$

# Neuron are Functions

- A more complex one!

$$f(x, y) = x * y$$

- Given  $x = a, y = b$ , how to update  $x$  and  $y$  to make  $f(x, y)$  larger?
- Follow gradient directions!

$$f(x, y) = xy \quad \rightarrow \quad \frac{\partial f}{\partial x} = y \quad \frac{\partial f}{\partial y} = x$$

$$x = a + 0.01 * b,$$

$$y = b + 0.01 * a$$

$$f(x, y): a * b \rightarrow (a + 0.01 * b)(b + 0.01 * a)$$

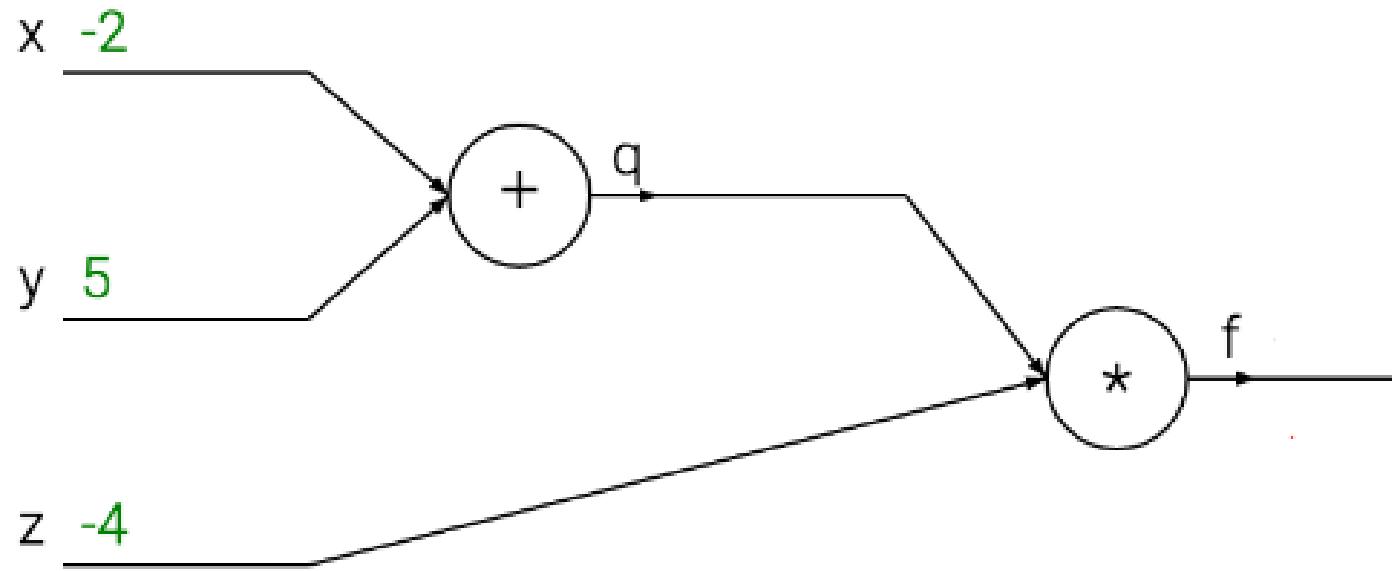
$$f(x, y): 4 * (-3) \rightarrow 3.97 * (-2.96)$$

# Back-Propagation

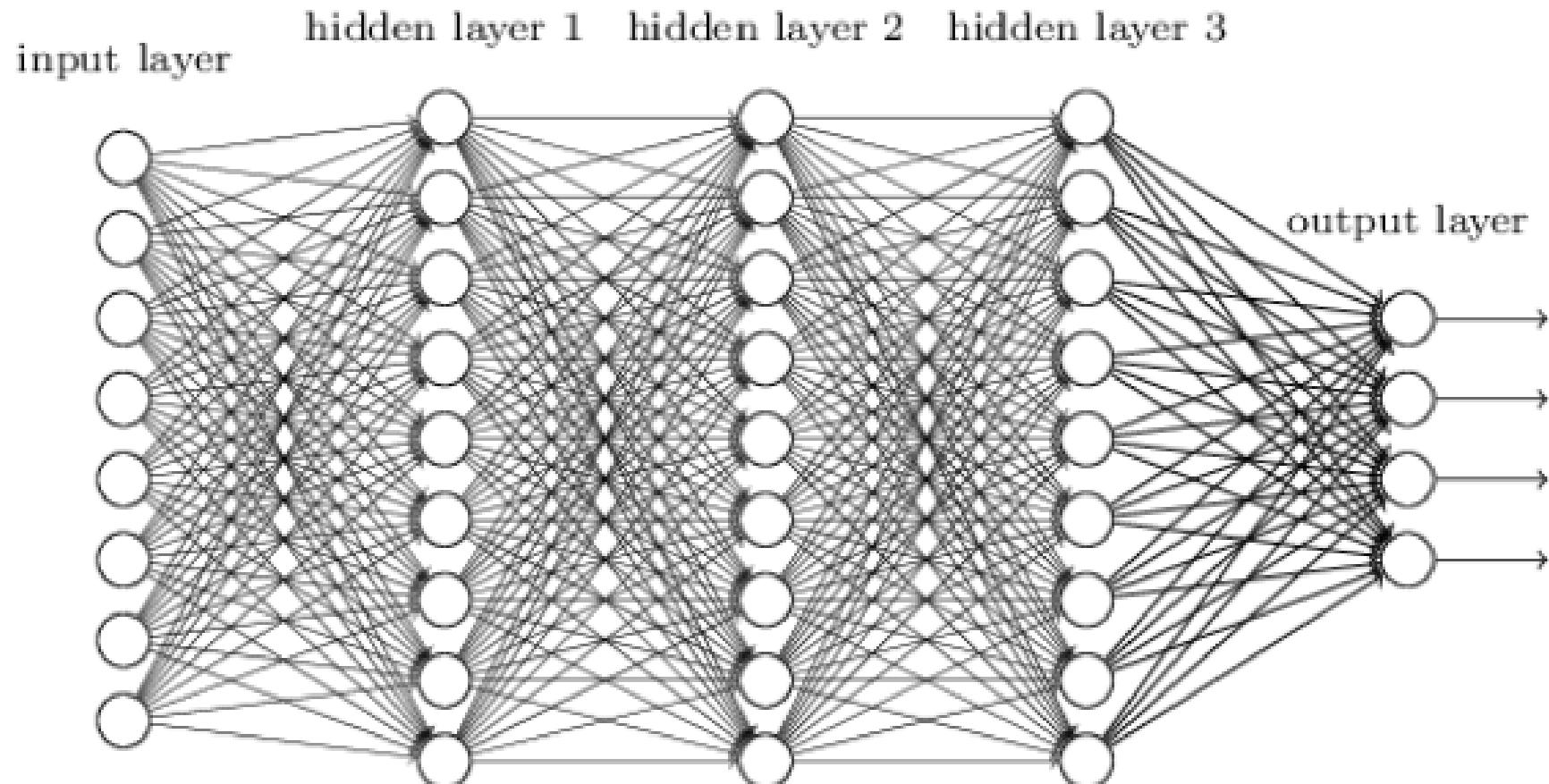
- An extremely complex one!

$$f(x, y, z) = (x + y) * z$$

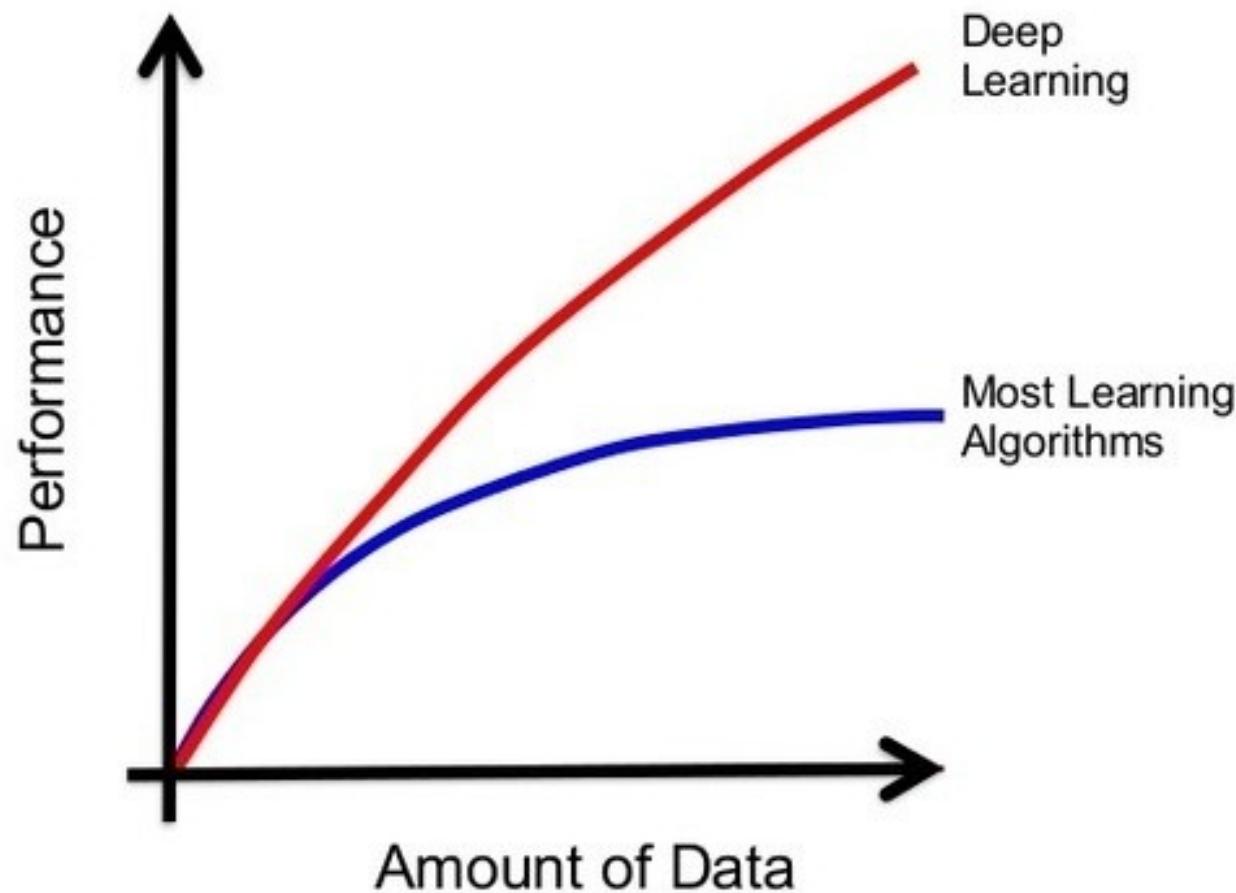
- Let  $q(x, y) = (x + y)$ , then  $f(x, y, z) = q(x, y) * z$
- Chain rule:  $\frac{\partial f}{\partial x} = \frac{\partial f}{\partial q} \frac{\partial q}{\partial x}$



# Fully-Connected Layers



# Why Deep Learning



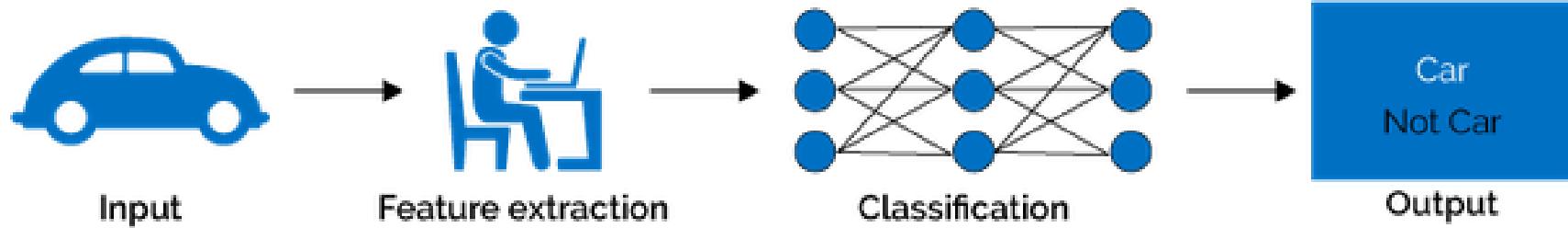


“Coming up with features is difficult, time-consuming,  
requires expert knowledge”

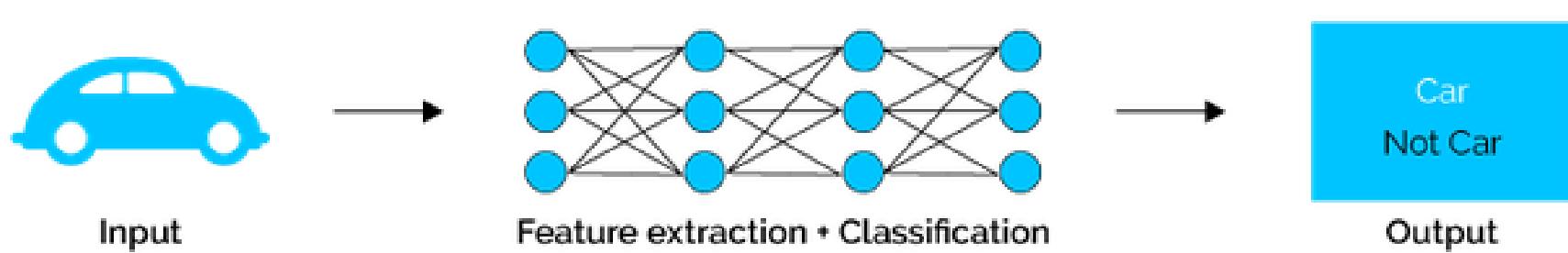
~ Andrew Ng

# Deep Learning vs Machine Learning

## Machine Learning



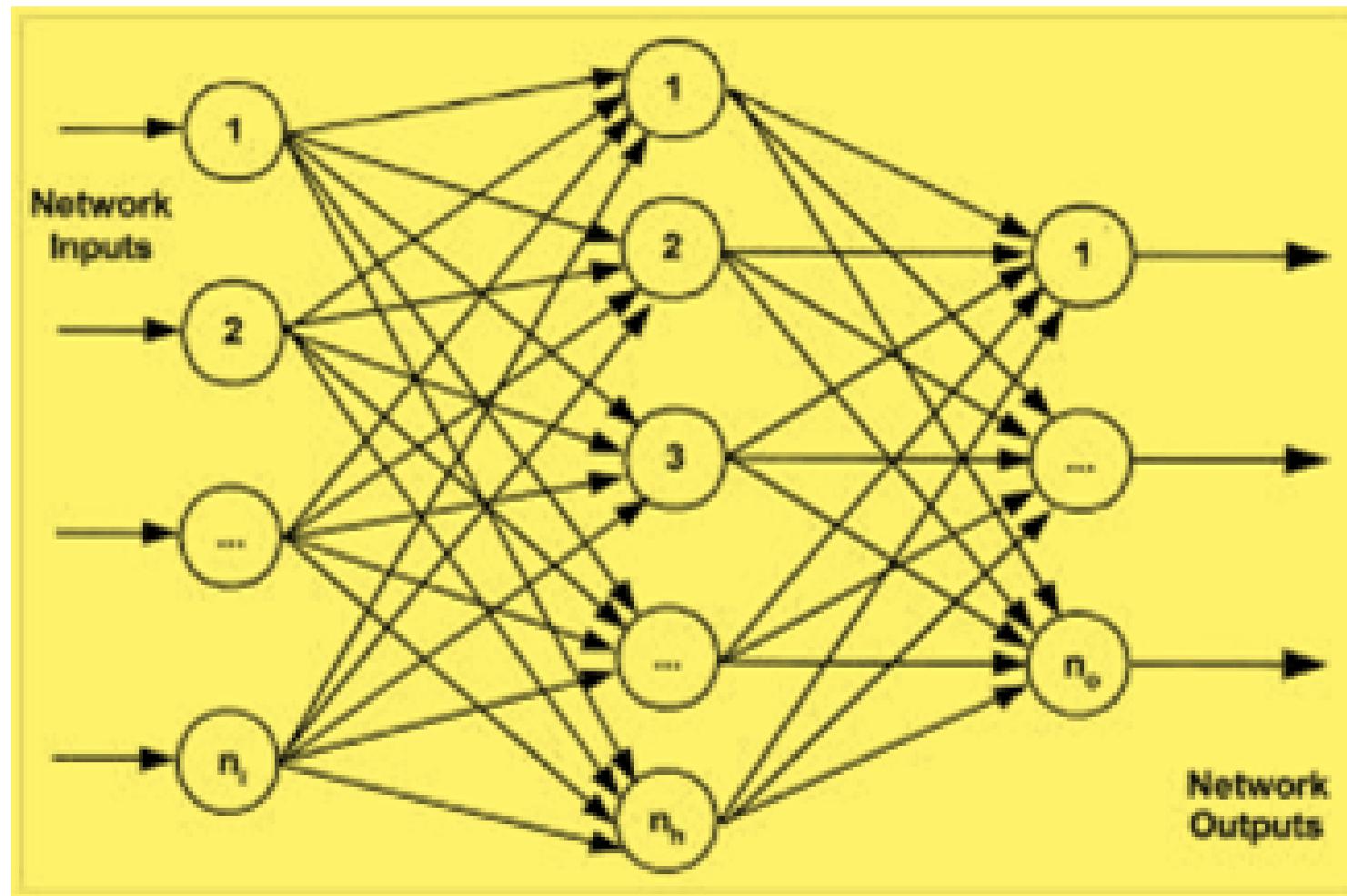
## Deep Learning



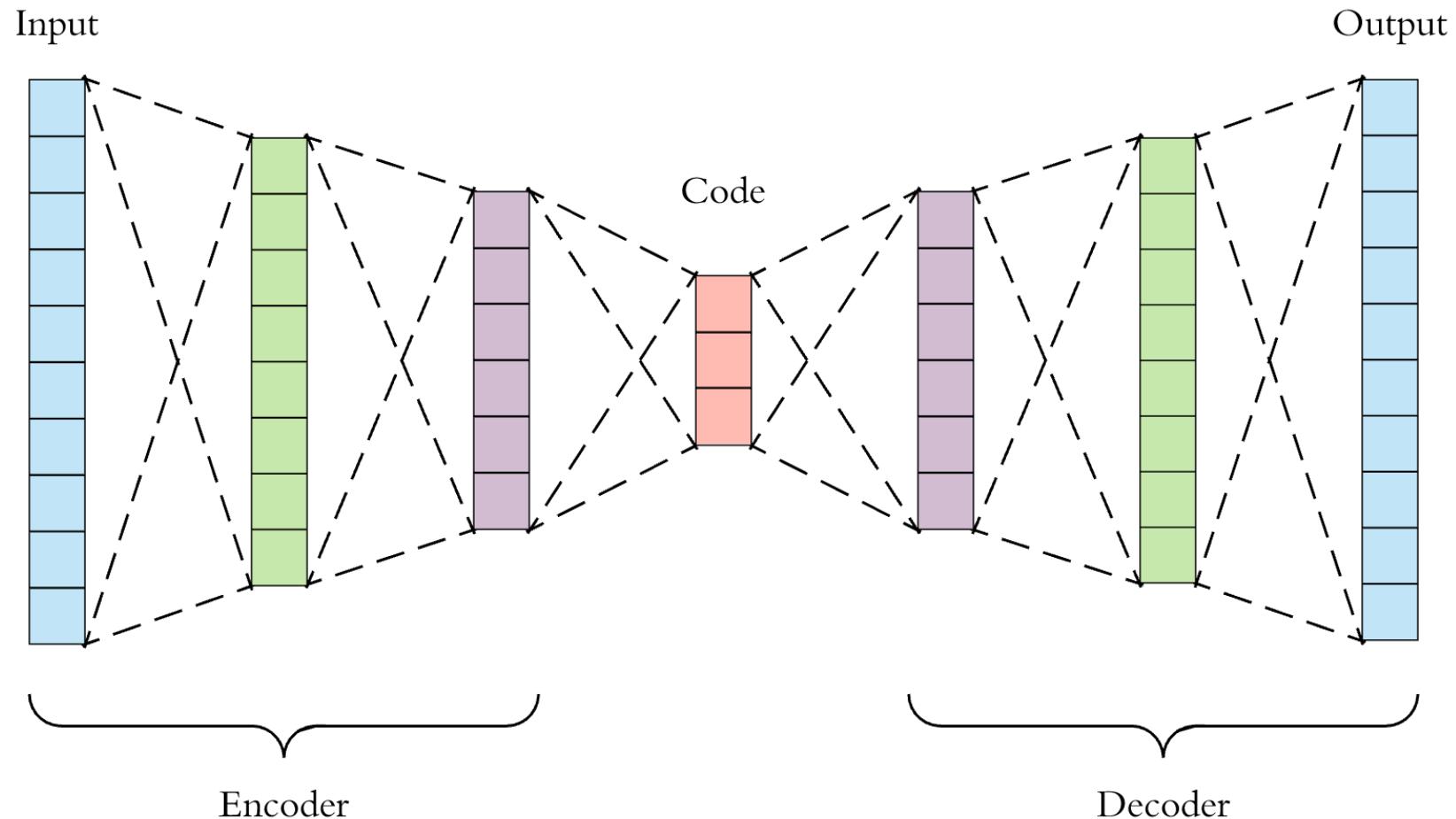
# Types of Deep Neural Network

- Multi Layer Perceptron (MLP)
- Auto-Encoders
- Convolutional Neural Network (CNN)
- Recurrent Neural Network (RNN)

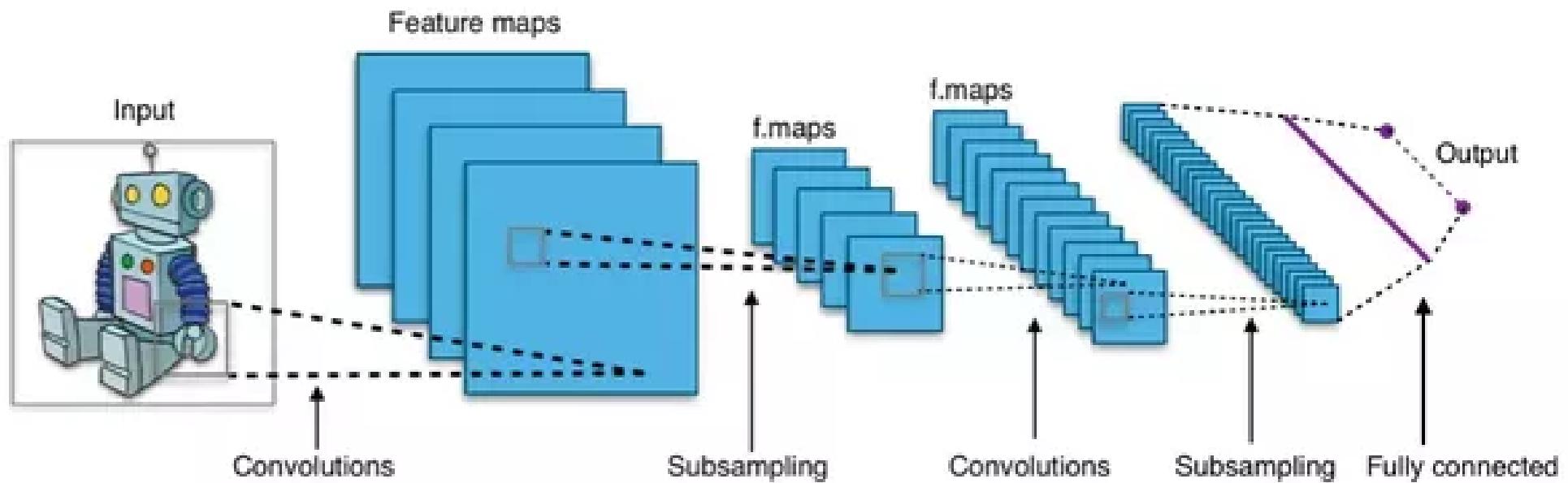
# Multi Layer Perceptron



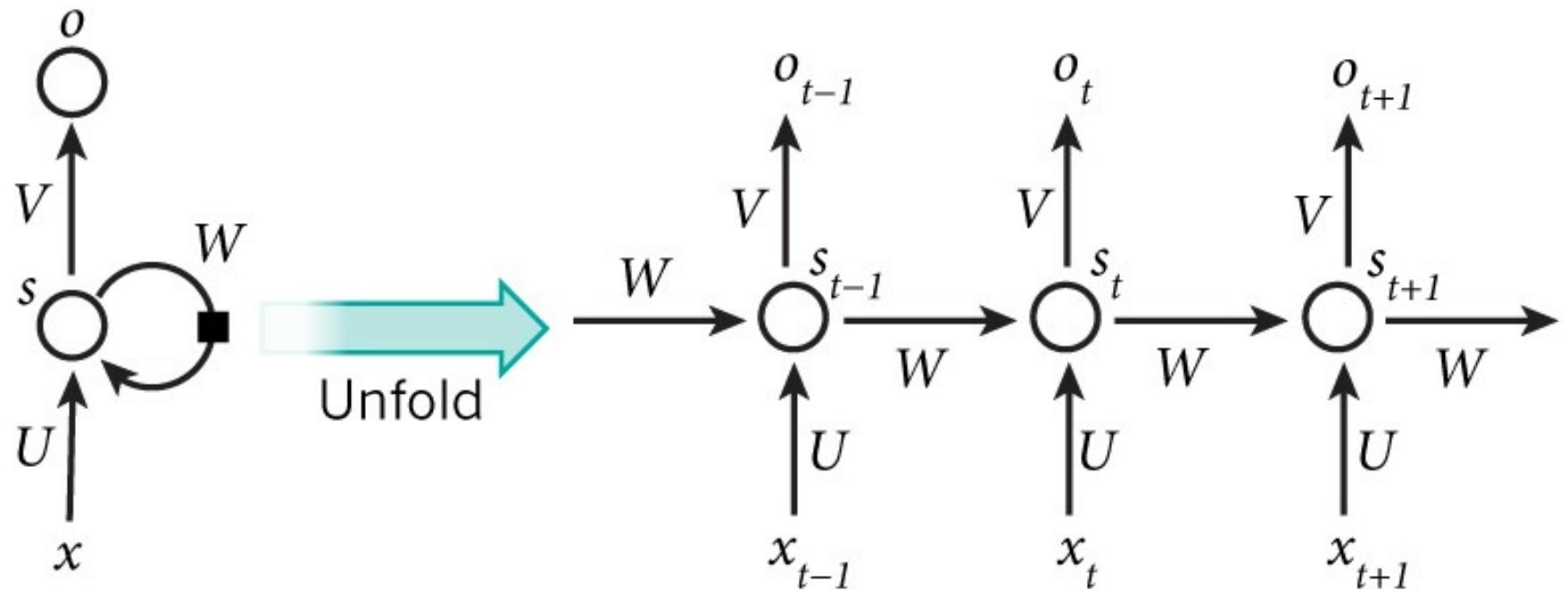
# Auto Encoders



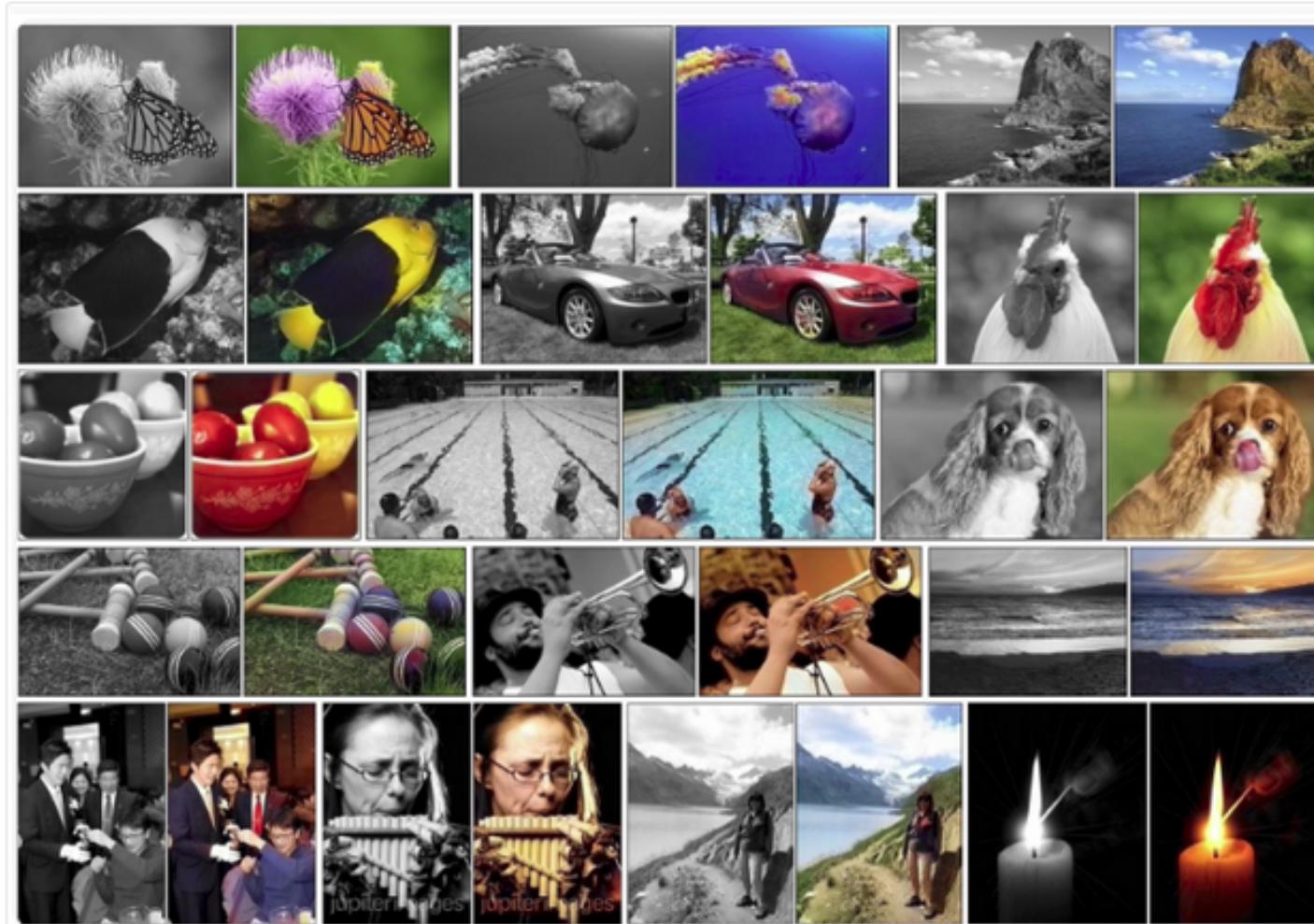
# Convolutional Neural Network

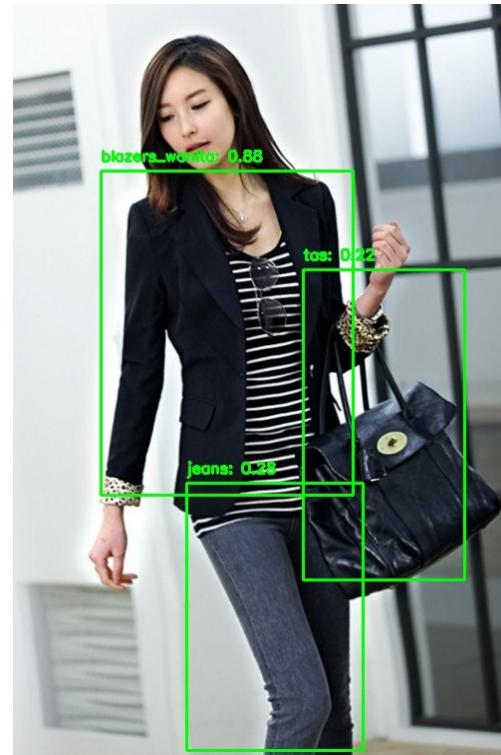
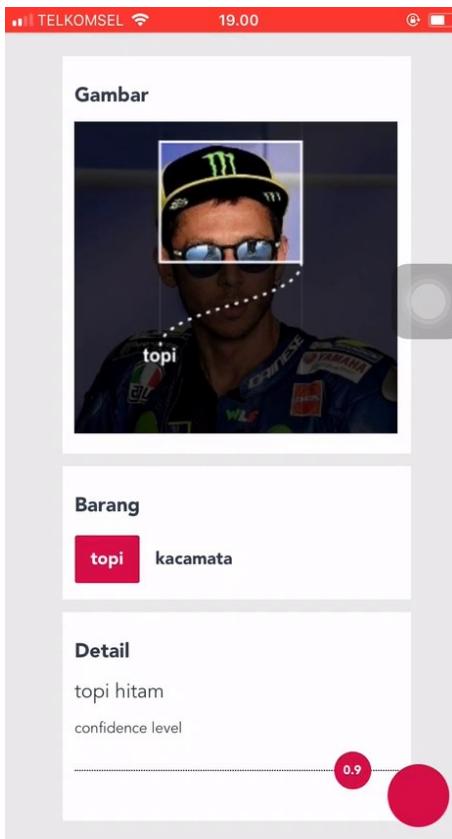


# Recurrent Neural Network



# Application of Deep Learning





# Hands on Tutorial (Guess MotoGP Rider)



lorenzo: 91.59%



dovizioso: 92.81%



rossi: 84.73%

Download notebook at :  
[http://bit.ly/kbi\\_dl](http://bit.ly/kbi_dl)



Thank You  
For your attention

KONFERENSI  
**BIG DATA**  
INDONESIA

JAKARTA, 12 - 13 MEI 2018

BERTEMU BERSINERGI BERINOVASI

