

# AI - FOUNDATION AND APPLICATION

Instructor:

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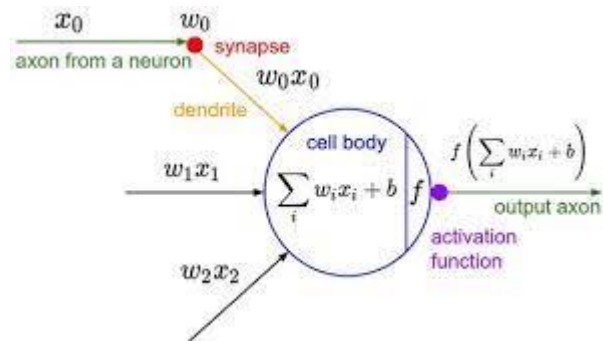
# Why should we take this course ?

- Many courses provide the mathematical model, such as algorithm, model, network architecture
- Many open-source provide the code for most AI applications
- Many open-source provide the ***simple code*** for the ***complex models*** by using the frameworks, such as keras, tensorflow. However, if you just using them as a function, you can not understand AI well.



# This course attempts to:

- Provide the mathematical model, such as algorithm, model, network architecture
- Show how to <sup>triển khai</sup> deploy the model using python from scratch for deep understand how AI model and algorithm
- Implement AI models using published models with **Pytorch framework** for practical applications



$$\begin{aligned} x &= [x_1, x_2, x_3, x_4, \dots, x_{784}] \\ W_h &= \begin{bmatrix} w_{1,1} & \dots & w_{1,784} \\ \vdots & \ddots & \vdots \\ w_{512,1} & \dots & w_{512,784} \end{bmatrix} \\ b_h &= [b_1, \dots, b_{512}] \\ W_o &= \begin{bmatrix} w_{1,1} & \dots & w_{1,512} \\ \vdots & \ddots & \vdots \\ w_{10,1} & \dots & w_{10,512} \end{bmatrix} \\ b_o &= [b_1, \dots, b_{10}] \end{aligned}$$

```
from qiskit import IBMQ
from qiskit.aqua import QuantumInstance
from qiskit.aqua.algorithms import Shor

IBMQ.enable_account('Enter API token here')
provider = IBMQ.get_provider(hub='ibm-q')

backend = provider.get_backend('ibmq_qasm_simulator')

print('\n Shors Algorithm')
print('-----')
print('\nExecuting...\n')
print('\nFactoring 21...\n')

factors = Shor(21)

result_dict = factors.run(QuantumInstance(backend, shots=1000,
result = result_dict['factors']

print(result)
print('\nPress any key to close')
input()
```

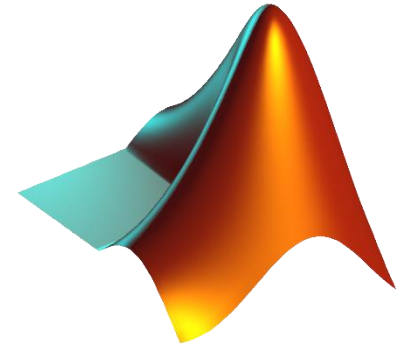
# This course is intended for:

- Engineer, who have not taken any AI course
- Student, who begin to study AI and computer vision
- You are not major in computer engineering, or related field, however, you want to become AI developer, designer and programmer.



# Tools and materials

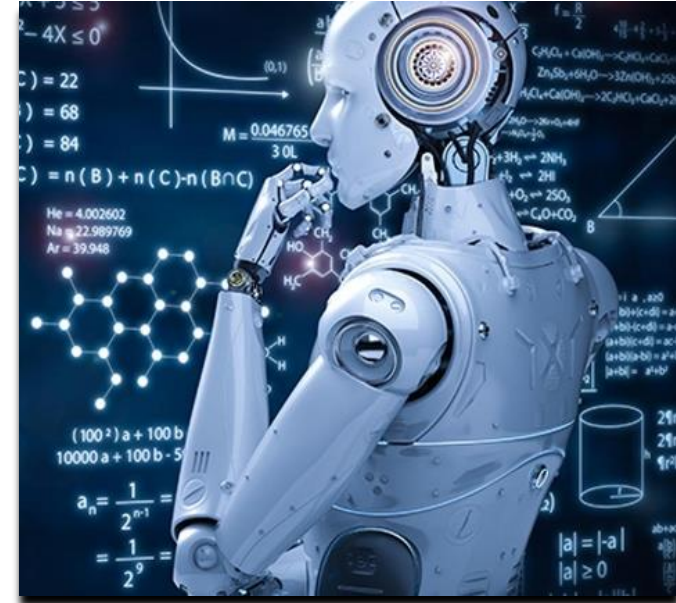
- Matlab software
- Ubuntu
  - (Jupyter notebook)
- MacOS
  - (Jupyter notebook)
- Google Colab: <https://colab.research.google.com>



colab

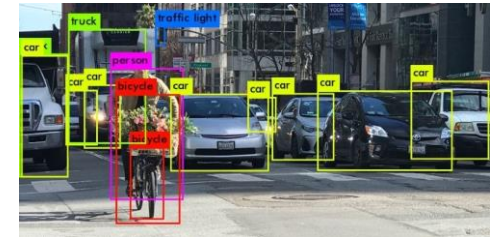
# This course covers:

- Introduction to AI
- Introduction to Neural network and Deep learning
- Mathematical model of Neural Network
- Learning Algorithm
- Gradient Descent
- Loss optimization methods
- Convolution Neural Network
- Applications of Deep neural Networks



# Course introduction

- AI Applications
  - *Face recognition*
  - *Speech recognition*
  - *Image recognition*
  - *Robot*
  - *Recommendation system*
  - *Computer vision*
  - *Smart camera*
  - *So on*

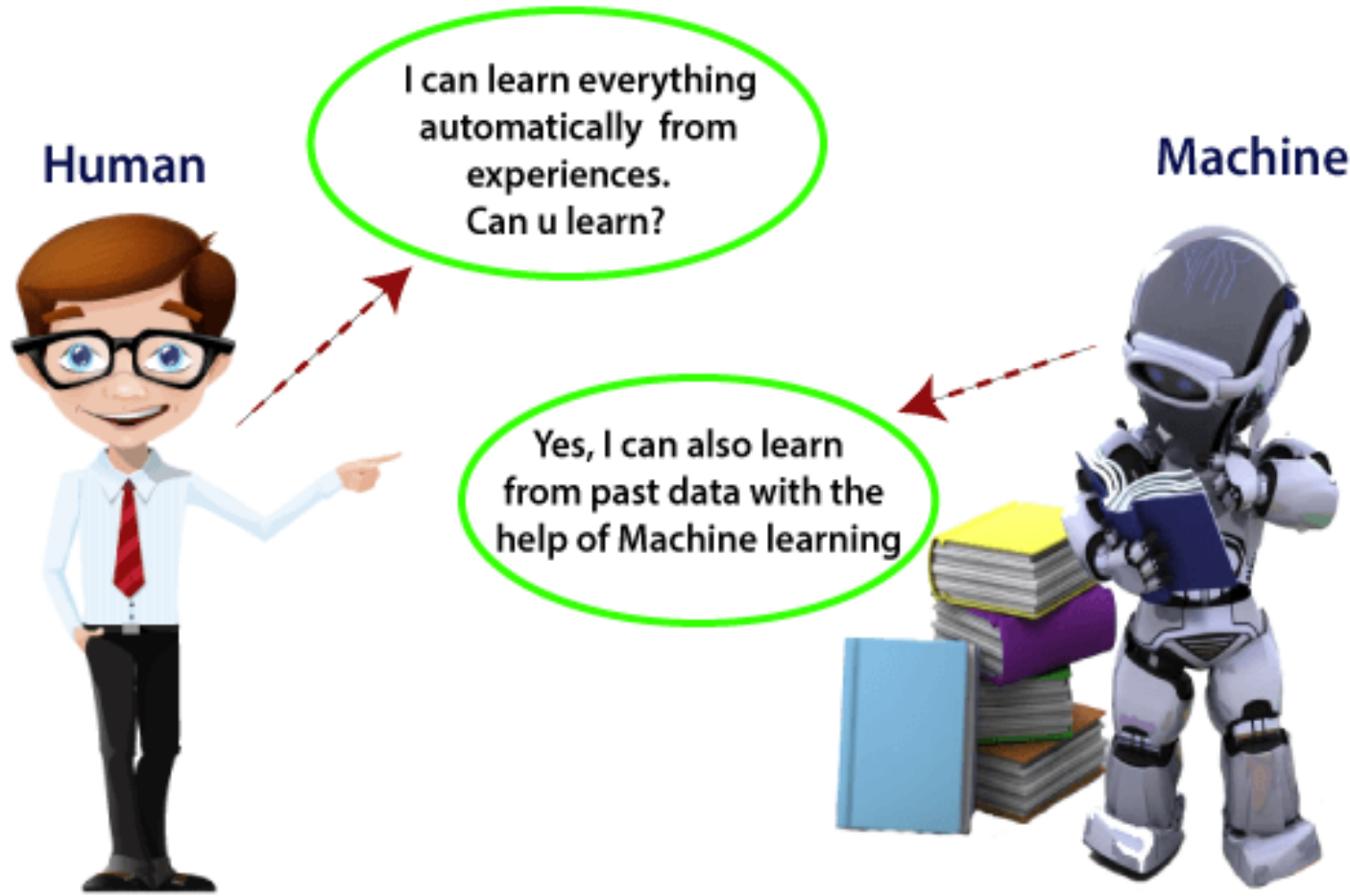


# AI, Machine learning, and Deep learning

- Artificial intelligence, Artificial Intelligence (AI) has been defined in many ways:
  - IBM Cloud Education: Artificial intelligence leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind
  - IEEE Advancing Technology for human: Artificial Intelligence is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment
- AI is a bigger concept to create intelligent machines that can simulate human thinking capability and behavior, whereas, machine learning is an application or subset of AI that allows machines to learn from data without being programmed explicitly

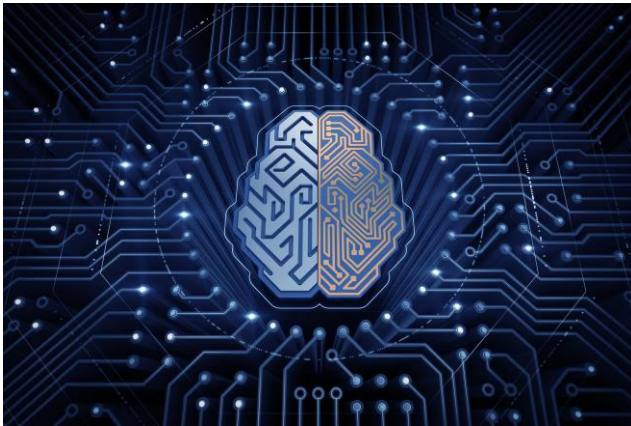
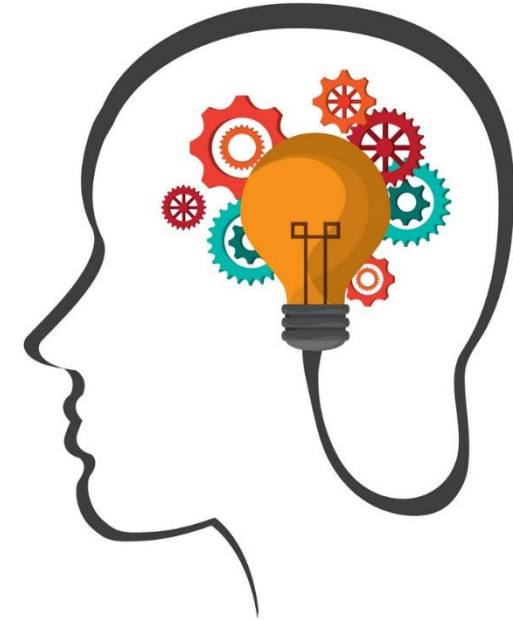


# AI, Machine learning, and Deep learning

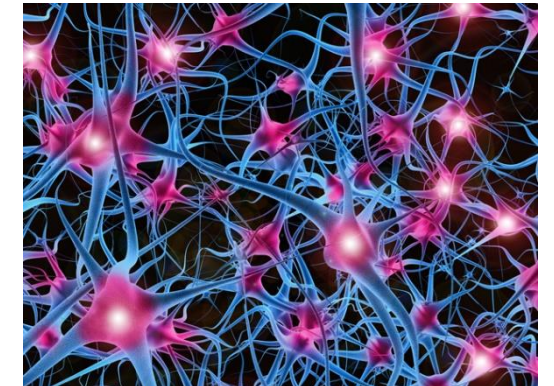
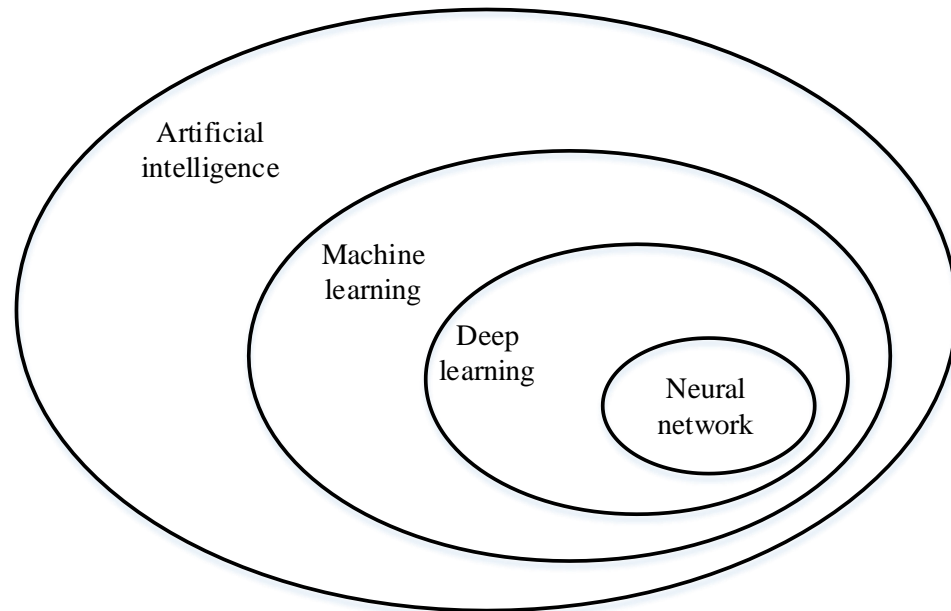
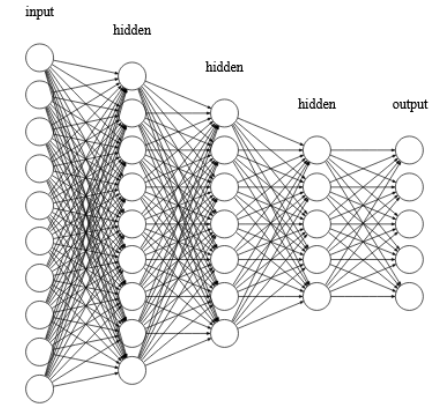


# AI, Machine learning, and Deep learning

- **Human approach:**
  - Systems that think like humans
  - Systems that act like humans
- **Ideal approach:**
  - Systems that think rationally hợp lý
  - Systems that act rationally



# AI, Machine learning, and Deep learning

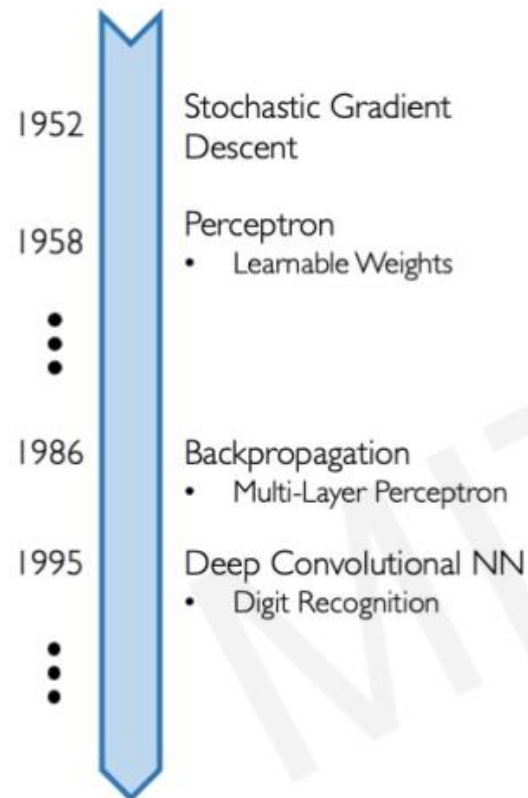


# Development of AI

## Why Now?

hồi sinh

Neural Networks date back decades, so why the resurgence?



### 1. Big Data

- Larger Datasets
- Easier Collection & Storage

IMAGENET



### 2. Hardware

- Graphics Processing Units (GPUs)
- Massively Parallelizable



### 3. Software

- Improved Techniques
- New Models
- Toolboxes





# AI Applications

