香 港 資 優 教 育 學 苑
The Hong Kong Academy for Gifted Education

Machine Intelligence – Principles and Applications (E4AIG001C)

Introduction	This is an introductory course to machine intelligence and its computational realization. Students will learn the fundamental concepts and theoretical principles of machine learning, and their applications in speech, language and image processing. The course provides hands-on training on Python programming and guides students through the Python implementation of speech and image recognition systems. This course is co-organised with Department of Electronic Engineering, The Chinese University of Hong Kong (CUHK).
Programme Type / Level	Artificial Intelligence Course (Level IV) (Token-required)
Instructor(s)	Prof. Tan Lee (Associate Professor and Director of Undergraduate Studies, Department of Electronic Engineering, CUHK) Prof. Hongsheng Li (Assistant Professor Department of Electronic Engineering, CUHK)
Pre-requisite	• Fundamental knowledge and some experience in computer programming. • Mathematics knowledge of S3 or above level is recommended.
Target Participants	➢ S1-S6 HKAGE student members only in 2020/21 school year ➢ Class size: 20 ➢ Priority will be given to student members who have awarded Certificate of Distinction or Certificate of Merit in Introductory Course in Computer Programming: Introduction to Computer Programming Using C++ (TECS1441) in 2018/19 school year. This programme is the same as Intermediate Course in Artificial Intelligence: Machine Intelligence - Principles and Applications (TECS2461) in 2019/20 school year.
Medium of Instruction	English (supplemented by Cantonese or Putonghua) with English handouts
Certificate	**E-Certificate** will be awarded to participants who have: ❖ Attended **AT LEAST 8** sessions AND ❖ Completed all the assessments with satisfactory performance.
Intended Learning Outcomes	Upon completion of the programme, participants should be able to: • describe the basic principles and major applications of artificial intelligence and machine learning; • explain the operation of an automatic speech recognition system; • explain the operation of an image recognition system; • apply software tools to design an application of machine intelligence; • appreciate the uniqueness of human intelligence and machine intelligence.
Screening	Please answer the screening question in the online application form. *The screening question is designed to help the applicant understands the course level and the course content. The question must be answered by the student applicant and it can only be attempted once. The answer cannot be changed once the application is submitted. Selection is based on students' performance in answering the question. Only students who can demonstrate motivation and the knowledge of artificial intelligence in the screening question can be enrolled in the programme.

Application Deadline	17 May 2021, 12:00 n.n	Application Result Release Date	28 May 2021

If student members withdraw from the programme after the Application Deadline, the token will be deducted.

Schedule

Session	Date	Time	Venue
1	10 Jul	9:30 a.m. – 12:30 p.m.	Electronic Engineering Computing Laboratory, Room 402, Ho Sin Hang Engineering Building, The Chinese University of Hong Kong (map)
2		2:00 p.m. – 5:00 p.m.	
3	17 Jul	9:30 a.m. – 12:30 p.m	
4		2:00 p.m. – 5:00 p.m.	
5	21 Jul	2:00 p.m. – 5:00 p.m.	
6	24 Jul	9:30 a.m. – 12:30 p.m	
7		2:00 p.m. – 5:00 p.m.	
8	31 Jul	9:30 a.m. – 12:30 p.m	
9		2:00 p.m. – 5:00 p.m.	
10	7 Aug	9:30 a.m. – 12:30 p.m	

Sample Notes

Run Python program via commands

- A sample code

Sample code

```
def main():
    x = 34 - 23                 # A comment.
    y = "Hello"                 # Another one.
    z = 3.45
    if z == 3.45 or y == "Hello":
        x = x + 1
        y = y + " World"         # String concat.
    print (x)
    print (y)

if __name__ = "__main__":
    main()
```

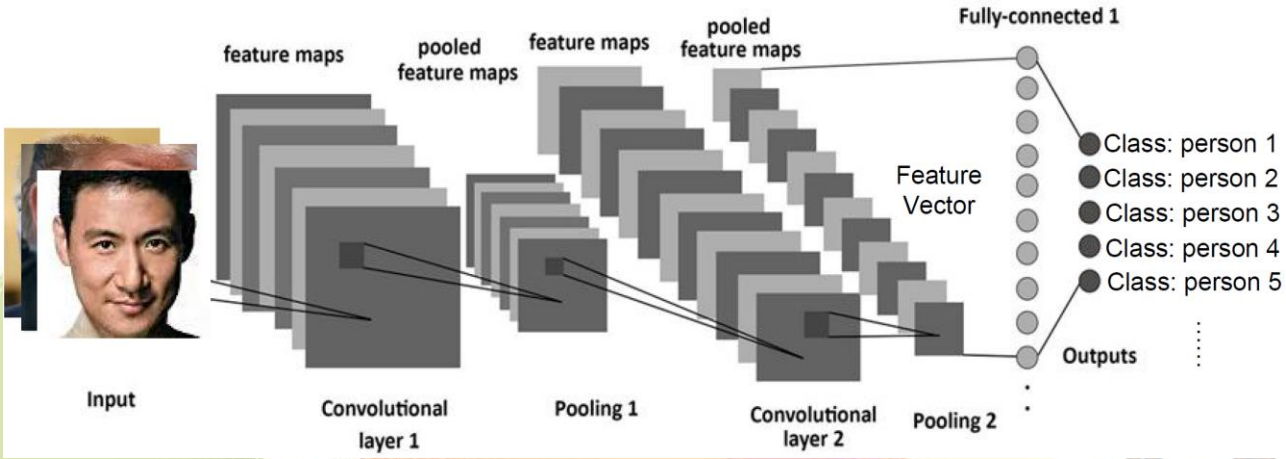
- Execution results

Running results

```
12
Hello World
```

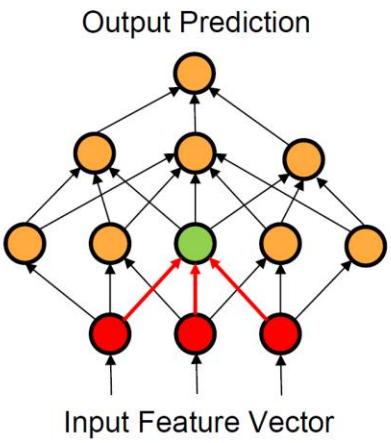
Training Deep Face Recognition Model

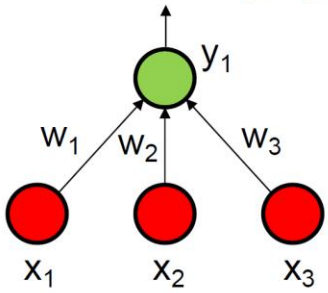
- Training process



Deep Neural Network and Deep Learning (深度學習)

- Deep learning is a sub-field in machine learning
- It uses neural networks to model the mapping function
- ***Deep learning*** uses neural network of ***many layers***





$$f(w_1 \times x_1 + w_2 \times x_2 + w_3 \times x_3)$$