Fundamental of Artificial Intelligence (CSC3180)

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Instructor

- Academic Position

  Chair Professor: 2005-2018 in PolyU
  Presidential Chair Professor: 2018-2021 in CUHKSZ
  X.Q. Deng Presidential Chair Professor: 2018- in CUHKSZ
  Founding Lecturer (CSC3180) since 2018 in CUHKSZ
  Web: https://www4.comp.polyu.edu.hk/~csdzhang/

- Professional Honors

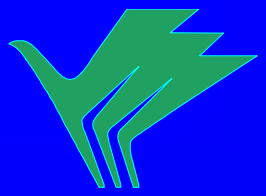
  Fellows, Royal Society of Canada & Canadian Academy of Engineering
  IEEE Life Fellow & IAPR/AAIA Fellow

- Research Interests

  Biometrics, Artificial Intelligence, Image Processing & Pattern Recognition

- Office Hour

  16:20-17:20 Thursday TB_105 / DY513



Teaching Arrangement

- Schedule

Lectures:	15:30-17:20	Tuesday	ZX_102
	15:30-16:20	Thursday	ZX_102
Tutorials	18:00-18:50	Wednesday	TC_414
	19:00-19:50	Wednesday	TC_414
	18:00-18:50	Thursday	TC_208
	19:00-19:50	Thursday	TC_208

- Assessment

Mid-term test	30%
Assignment	30% (Report 10%; Presentation 20%)
Final exam	40%

- Teaching Materials

1) comp.polyu.edu.hi/~csdzhang; 2) bb.cuhk.edu.cn

Teaching Arrangement

- TAs:

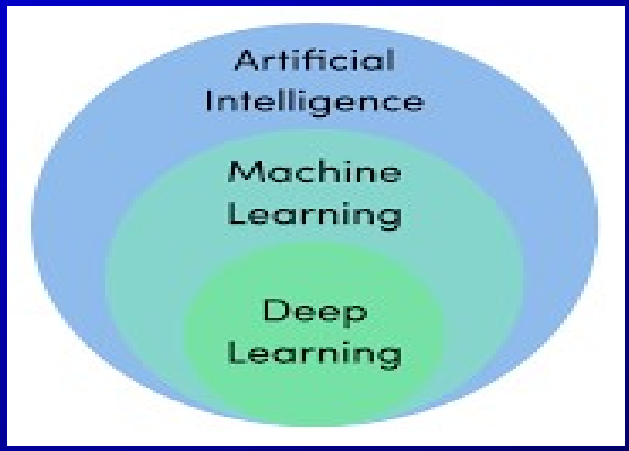
TA1: **Ruoyu Xu** (许若愚) (218019044@link.cuhk.edu.cn)
Phone: 15927033550
Office Hour: 13:00-14:00 Wednesday ZhirenB_502

TA2: **Xinyu Lin** (林昕雨) (220019039@link.cuhk.edu.cn)
Phone: 18781655602
Office Hour: 13:00-14:00 Tuesday Daoyuan_322

TA3: **Nannan Zhang** (张南南) (219019080@link.cuhk.edu.cn)
Phone: 18576657765
Office Hour: 13:00-14:00 Friday Daoyuan_322

Fundamentals of Artificial Intelligence (AI)

- Aim: Understand the basic technologies and some typical applications

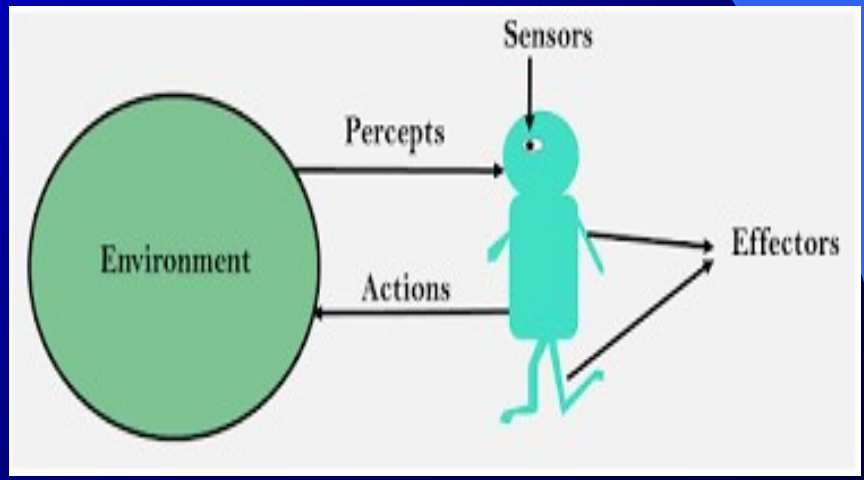


- Main topics
  - Introduction to AI
  - Part I: AI Basic Functions (Problem solving agent & Logical agent, etc.)
  - Part II: General AI approaches – Machine Learning (DM, PCA and Sparse)
  - Part III: Recent AI development – Deep Learning (ANN, DL)

Why to learn Part I: AI Basic Functions?

Artificial Intelligence is not a new word and not a new technology for researchers. This technology is much older than you would imagine. Even there are the myths of Mechanical men in Ancient Greek and Egyptian Myths.

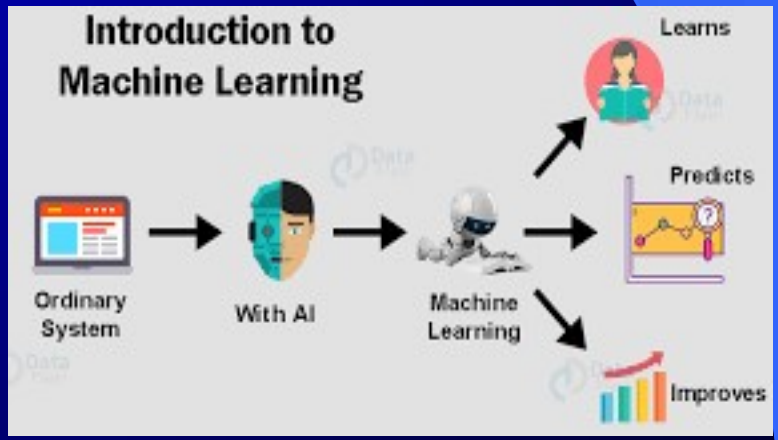
- Intelligent agents
- Solving problems by searching
- Logic and inference



Why to learn Part II: Machine Learning?

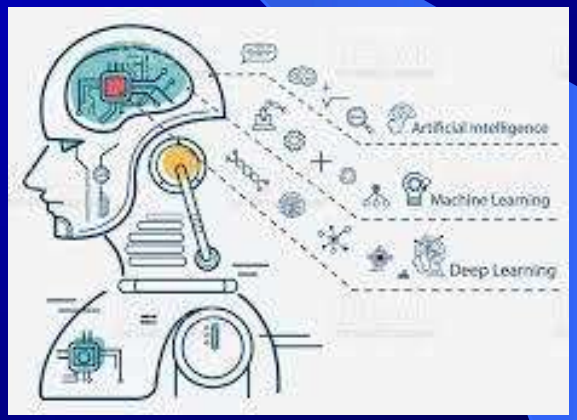
Machine learning (ML) is **a type of artificial intelligence (AI)** that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. ML algorithms use historical data as input to predict new output values.

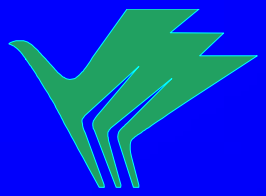
- Data mining
- Feature extraction
- Classification & clustering



Why to learn Part III: Recent AI Developments?

- Neural networks, a **beautiful** biologically-inspired programming paradigm which enables a computer to learn from observational data.
- Deep learning, a **powerful** set of techniques for learning in ANN.
- Neural networks and deep learning currently provide the **best solutions** to many problems in image recognition, speech recognition, and natural language processing.

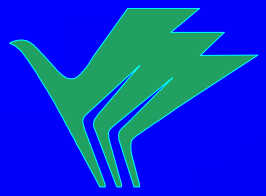




Learning Outcomes

Upon completing this course, students will be able to:

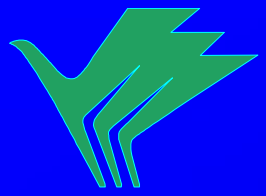
- Understand the concept of AI and its basic functions;
- Use the traditional AI approaches by some typical examples;
- Know recent AI developments for future work;
- Apply the AI knowledge into some real applications.



Background Knowledge

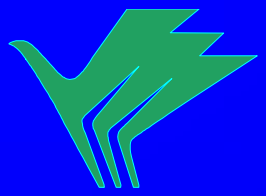
Except *Internet* and *Computer System*, the main background is needed as follows:

- CSC1001: Introduction to Computer Science: Programming Methodologies
- STA2001: Probability and Statistics I
- CSC3100: Data Structures



Mid-Term Test and Assignment

- Mid-term test:
  - Explain the requirement in the lecture time
- Assignment:
  - A special topic for each group
  - Project output
    - Midterm report/Short introduction
    - Final Report
    - Final Presentation



Recommended Texts

- Stuart Russell and Peter Norvig, *Artificial Intelligence: A modern approach*, 3rd edition, Prentice Hall International, 2010.
- Wolfgang Ertel, *Introduction to Artificial Intelligence*, Springer, 2011.
- Witten I H, Frank E, Hall M A, et al, *Data Mining: Practical Machine Learning Tools and Techniques*, Morgan Kaufmann, 2016.
- *Neural Networks and Deep Learning,* free online book. (http://neuralnetworksanddeeplearning.com/)