Introduction to Computer Science & Information Engineering

Instructor: Prof. Chia-Hui Chang & Chia-Yu Lin

張嘉惠&林家瑜

2025/09/05

Why this course CE2013?

- Specifically for CSIE sophormore students (selective)
- Similar to graduate seminars:
  - with different speakers every week,
  - discussing about various topics
- Get to know the research topitcs in CSIE
- Grading based on students summaries after the talks

CE2013 Changed After School Year 106

- Some speakers from industry:
  - 106: 資策會, 鈦鉅, 黃敬群
  - 107: 竹間, KKBOX

第 1 週	智慧城市: 行動應用服務	張嘉惠
第 2 週	Location-Based Services with Emerging IoT and Autonomous Cars	卓政宏
第 3 週	KKBOX 邁向串流媒體的 seafood 之路	邱裕民
第 4 週	關於敏捷開發的兩三事	林裕丞
第 5 週	自然語言處理技術介紹與應用	蔡宗翰
第 6 週	無線網路發展的趨勢與應用	吳曉光
第 7 週	生物辨識技術簡介與應用	栗永徽

Learning Activities

- Hands-on Exercises
  - Data Mining Tools: Weka
  - Crawler
  - LINEBOT
- Soft Skills:
  - Two Chunk summaries
  - How to conduct research ?
    Survey
  - Latex/overleaf for paper preparation
  - Peer review

學生作業範例


小論文主題：人臉識別

相關會議及期刊：
1.IEEE
2.ICPR

相關survey論文：
1.Deep Face Recognition: A Survey
Author: Mei Wang, Weihong Deng
-provide a comprehensive review of the recent developments on deep FR, covering broad topics on algorithm designs, databases, protocols, and application scenes

- summarize different network architectures and loss functions proposed in the rapid evolution of the deep FR methods
- the related face processing methods are categorized into two classes: "one-to-many augmentation" and "many-to-one normalization"
- summarize and compare the commonly used databases for both model training and evaluation
- review miscellaneous scenes in deep FR, such as cross-factor, heterogenous, multiple-media and industrial scenes
- the technical challenges and several promising directions are highlighted.

學生作業一範例：小論文相關文獻蒐集

Project Examples

Two Tracks:

- Techniques
  - Engineering
- Applications
  - Product Design

Topic
基於 Wifi 基地台以機器學習技術應用之室內定位系統
透過交叉比對銜接性課程因果性進行教學評鑑
TabulaTalent

Oral Presentation

Guess the course evaluation?

課程相關照片

學生小論文發表

學生小論文發表

學生期末專題發表

學生期末專題發表

Some Changes

- English Medium Instruction (EMI) since 2021
- Competitions since 2023

InnoServe Awards

最新消息 競賽緣起

2023校務研究議題競賽

時間: 2023-10-18 (三) 09:00
地點: 本校教研大樓羅家倫講堂

https://ir.ncu.edu.tw/index.php/zh/latest-news/631-2023

Agenda for Today

- Course Goal & Topics
  - 4 Goals
- Final Projects
  - Attend Competitions
  - Do research for Taoyuan

Prerequisite:

- Programming Skills

Course Core Competence

Student core competence	Percentence(%)	Core competence achivement index
Understand the knowledge in computer science.	30	I understand the key technologies and related knowledge in each research field of CSIE.
		I know the evaluation methods of various research fields.
		I know how information technologies are applied in various scenarios.
		I can explain the technologies and knowledge required in each research field of CSIE.
The ability to discover problems and apply information technologies to solve problems.	30	I can discover problems that might be solved by information technologies in our society.
		I have the ability to define real-world problem in proper input and output.
		I have the ability to simplify complex problem and provide modular solution.

Course Core Competence (Cont.)

Corresponding to studient core competence	Percentence(%)	Core competence achivement index
Self-learning ability to search, compare, and study available technologies.	20	I have the ability to search for relevant knowledge and technology to solve a problem.
		I can compare and analyze the advantages and disadvantages of different technologies.
		I have the ability to integrate appropriate technologies to solve complex problems in practice.
The ability of teamwork, communication and coordination.	20	I have the ability to describe my thoughts with technical terms with clear verbal expressions.
		I have the ability to communicate with others to reach consensus.
		I have the ability to make a survey report and oral presentation to convey my findings.

Week	Date	Speaker	Hands-on Exercises (Start at 9:00 am)
1	9/5	張嘉惠	之前修過課的學生分享
2	9/12	張嘉惠	Team up/ Exercise 1 – Github
3	9/19	機械系系主任 陳怡呈主任	Exercise 2 – Line Bot 1
4	9/26	中華大學張辰秋執行長	Exercise 3 – LLM API with LineBot
5	10/3	林家瑜	Exercise 4– SVM/VGG
6	10/10	國慶日放假	
7	10/17	MaiCoin	Proposal 討論
8	10/24	台灣光復節放假	
	10/31	Project Proposal Presentation	
10	11/7	數學系曾國師老師	Exercise 5 – 自建Ollama模型
11	11/14	林子軒副校務長	How to do a survey?
12	11/21	洪慧儒老師	Exercise 6 - Docker
13	11/28	鍾佳儒老師	How to write a report? Overleaf
14	12/5	參加12/3 富采集團參訪	
15	12/12	海洋大學許為元教授	交Paper / Peer Review
16	12/19	Final Presentation	Best Paper分享

Method of Student Evaluation (Grading)

- Individual 6 Exercise: 36%
- Project proposal: 15%
- Paper Submission: 15%
- Peer Review: 6%
- Demo + Final presentation:18%
- Involvement: 10% (2*5)
- Extra Bonus: Competition +1%, Final: +2%, Award: +2%

InnoServe大專校院資訊應用服務創新競賽

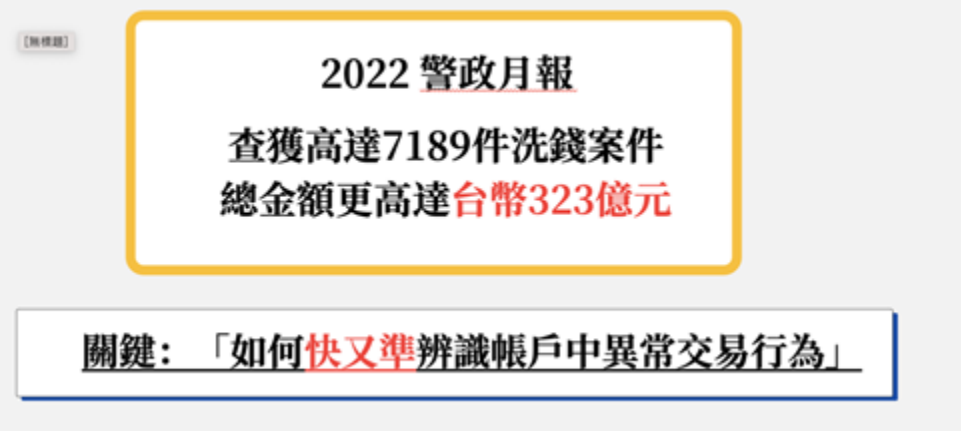
- https://innoserve.tca.org.tw/
- Proposal and video submission: Sep. 30
- Final Competition: Nov. 1
- There are many different topic groups. Each team can select two groups to join using one project.
  - 大會專題類 (4 subgroups)
  - 國際交流類 (1 subgroups)
  - 指定專題類 (16 subgroups)

Proposal

- 一、前言背景 (BG)
- 二、創意描述 (Idea)
- 三、系統功能簡介 (Function)
- 四、系統特色 (Features)
- 五、系統開發工具與技術 (Tools & Technologies)
- 六、系統使用對象 (Target Users)
- 七、系統使用環境 (Environment)
- 八、結語 (Conclusion)

智慧AI洗錢防制：即時辨識異常交易 (1/2)

- **2023 AI金融科技應用組 第三名**



智慧AI洗錢防制：即時辨識異常交易 (2/2)

二、數據應用及操作

資料來源

KAGGLE :
IBM Transactions for Anti Money Laundering (AML) Dataset

內容欄位

Timestamp 交易時間	From bank 轉出帳戶 銀行代號	Account 轉出帳戶	To Bank 轉入帳戶 銀行代號
Account 轉入帳戶	Amount Received 收到金額	Receiving Currency 收款幣種	Amount Paid 支付金額
Payment Currency 收款貨幣	Payment Format 付款方式	Is Laundering 是否為洗錢交易	

三、技術架構及進行步驟

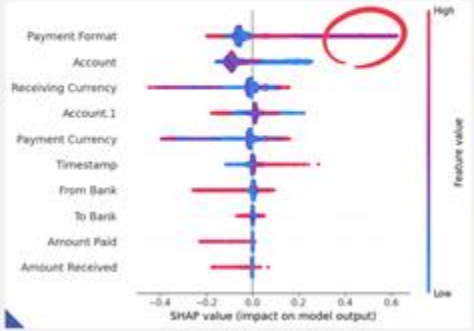
四、成果效益

模型效果

Model	Recall
Decision Tree	0.32
Random Forest	0.32
XGBoost	0.65
DNN	0.94

四、成果效益

SHAP



Payment Format
是最重要的特徵

Payment Format為中間值時，
最有可能洗錢

進一步分析資料集，
最多人使用自動轉帳方式
進行洗錢

圖像混淆應用於工業自動化檢測 (1/2)

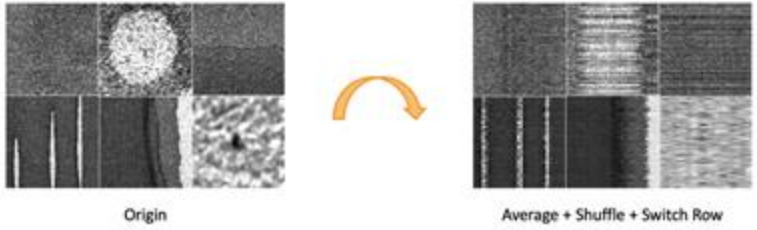
- **2021 資訊應用組 第一名**

圖像混淆應用於工業自動化檢測 (2/2)

圖像混淆應用於工業自動化檢測系統

➢ 系統架構圖

DEMO-圖像混淆模組



總結

➢ 若業者使用我們的「圖像混淆應用於工業自動化檢測系統」

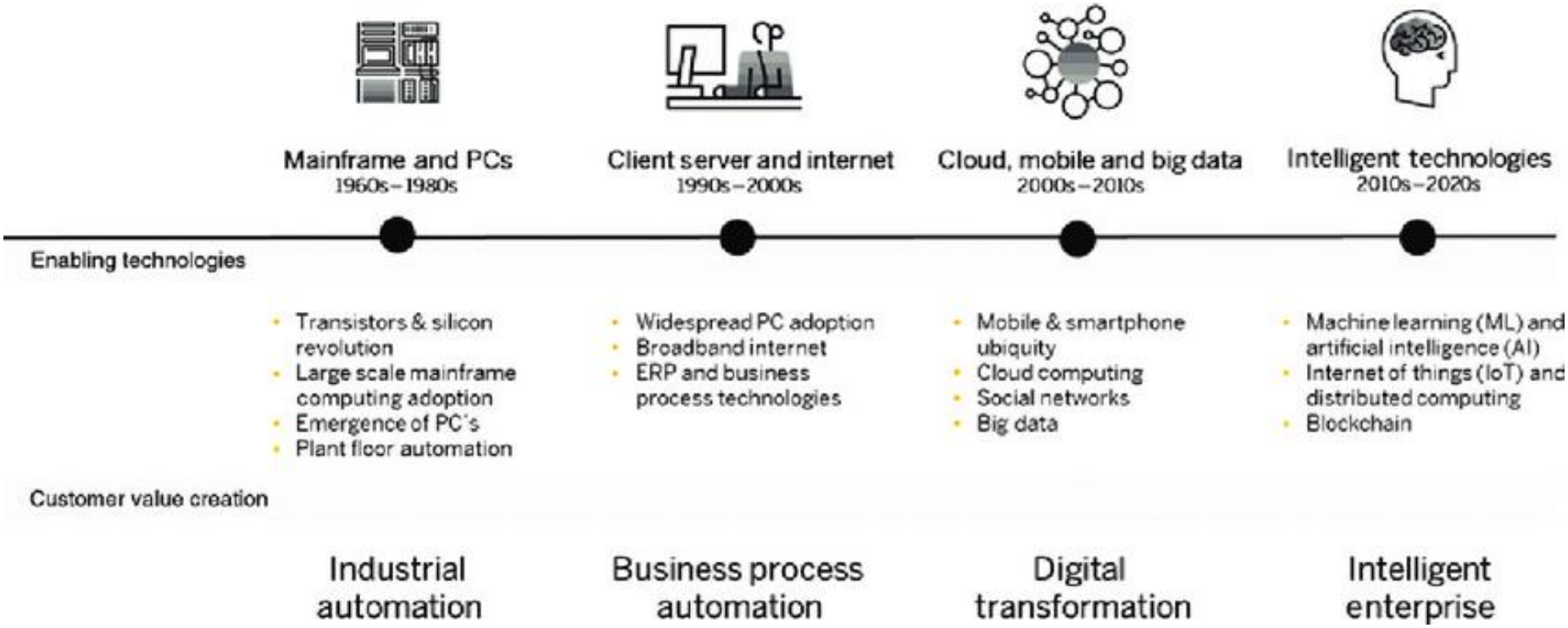
系統擁有91%的高準確率，且模型預測一張圖的時間僅需0.002秒

駭客無法透過模型逆向攻擊從訓練資料得到有用內容，可進而保護業者的產品資訊

未來若將系統應用於邊緣裝置，邊緣運算可以加快資料的處理與傳送速度，減少延遲

How do you introduce CSIE to others?

Evolution of Information Technologies



Development of Web Technology

Early 1990s

Birth of the Web

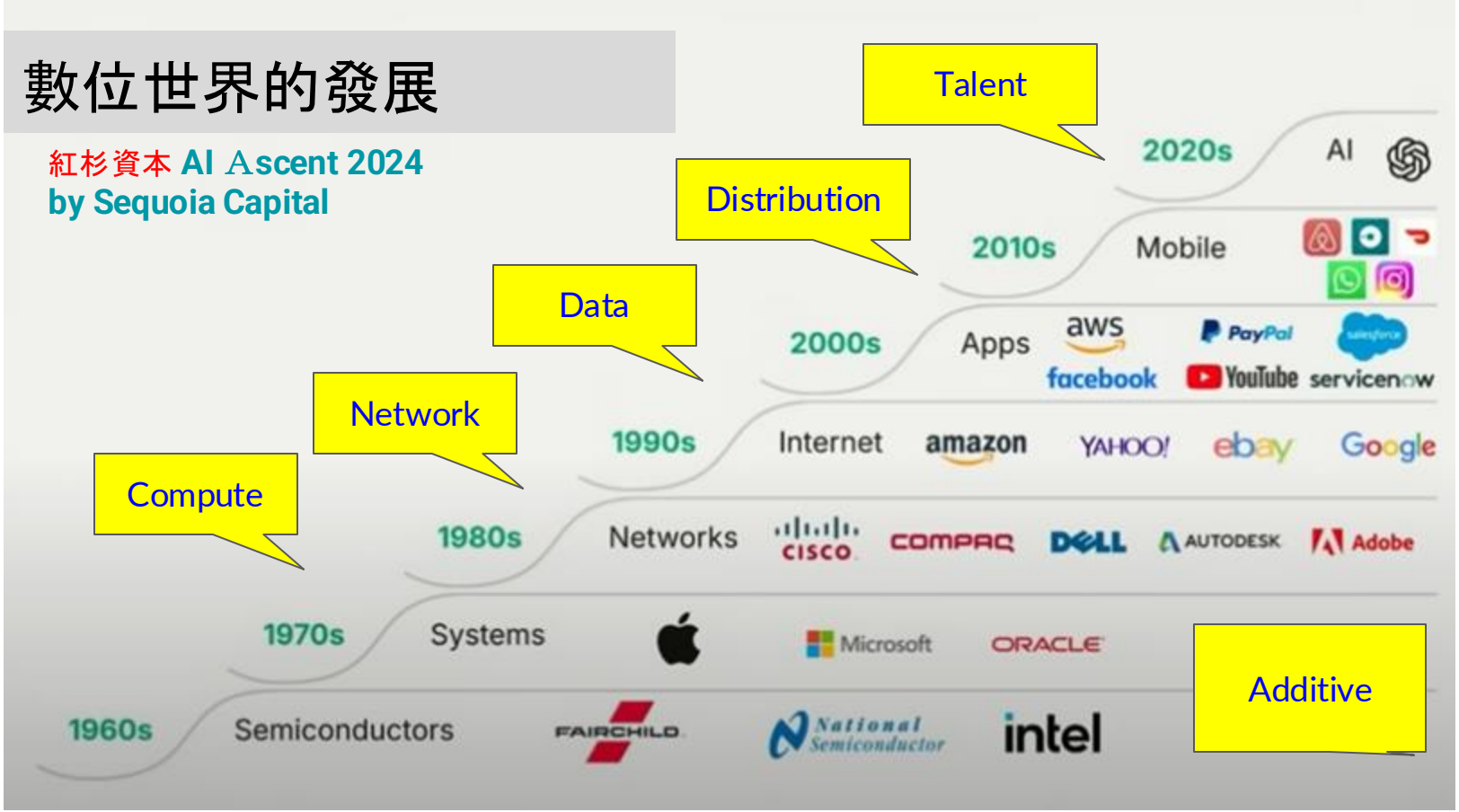
HTML

HTTP

URL

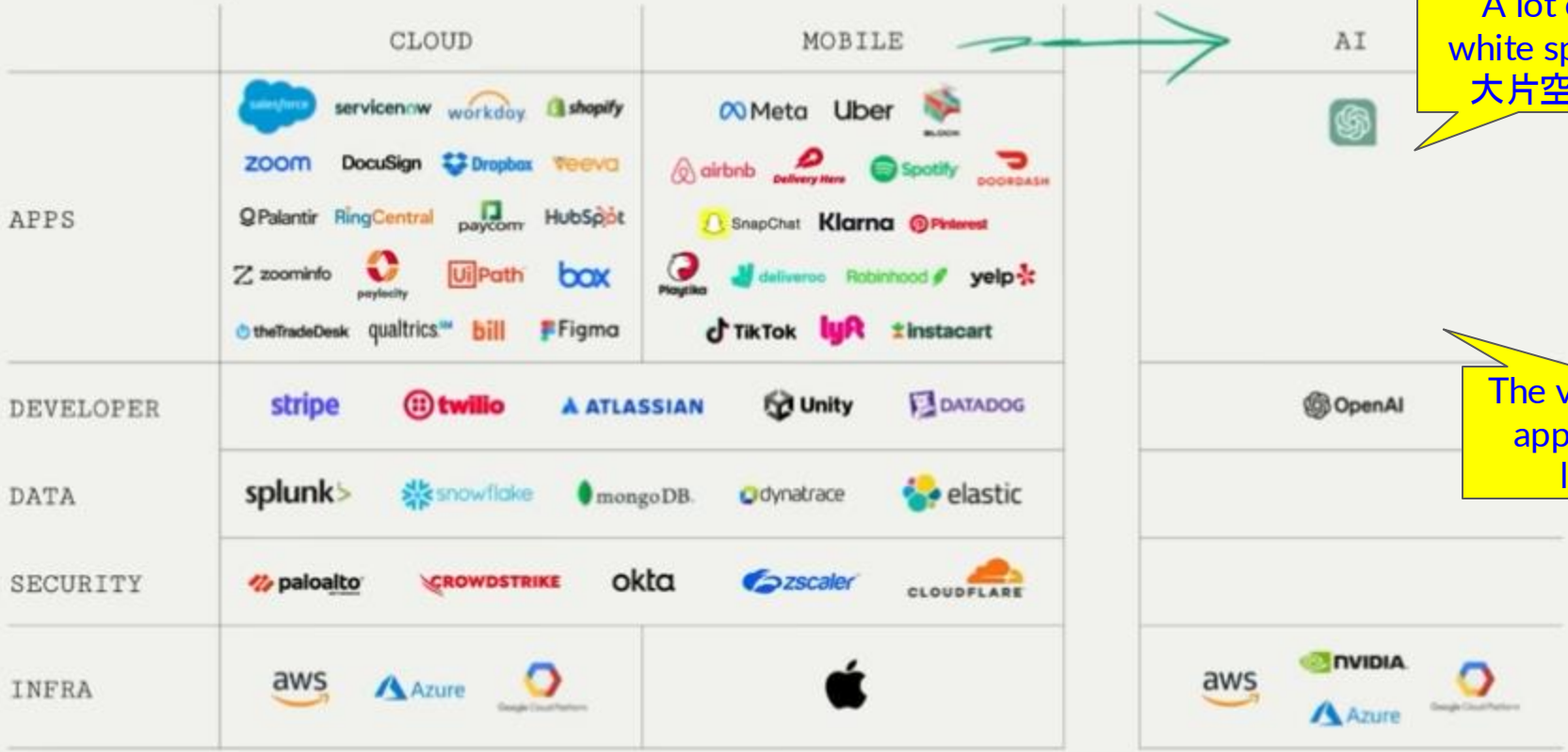
數位世界的發展

紅杉資本 AI Ascent 2024
by Sequoia Capital

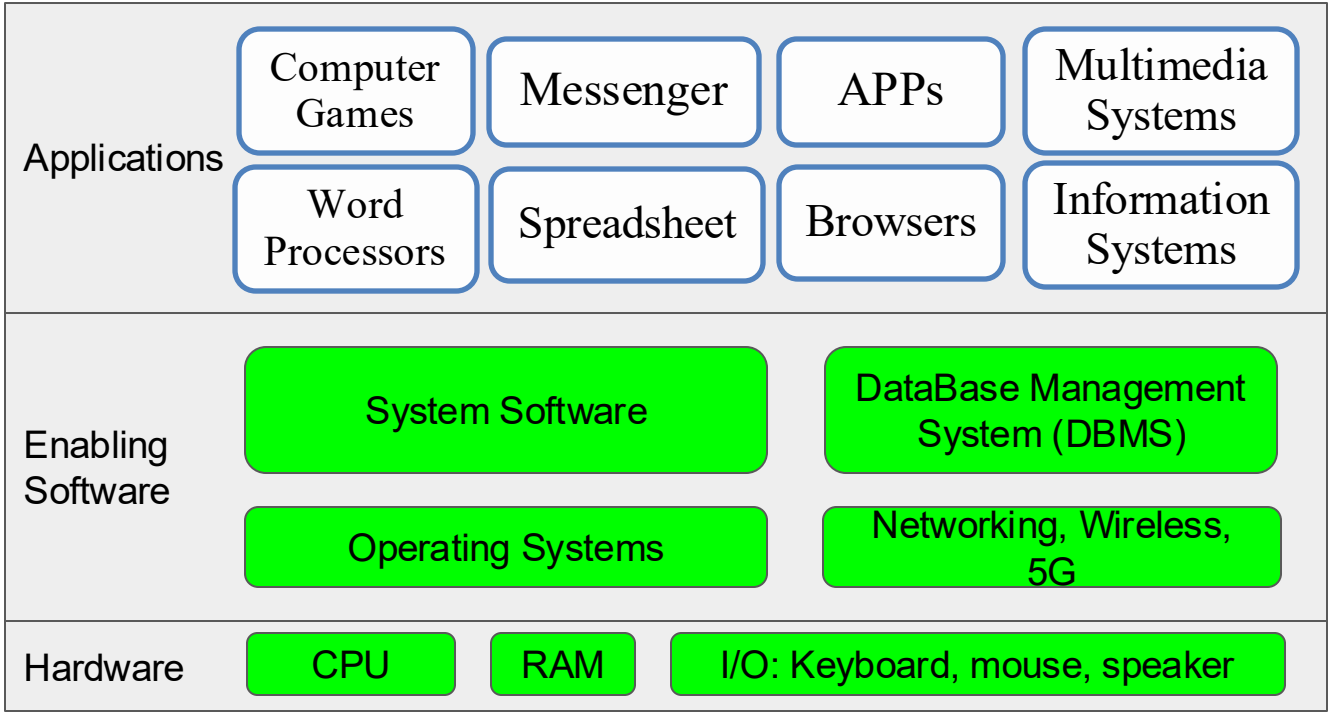


White space

紅杉資本AI Ascent 2025



CSIE Overview



- Software Engineering
- Computer Vision
- Natural Language Understanding
- Speech Recognition
- Machine Learning
- Computing Theory

CSIE - Undergraduate Program: Required Courses

Introduction to Computer Science Programming

Mathematics for Computer Science

Data Structures+Algorithms

Fundamentals of Programming

Computing System Engineering

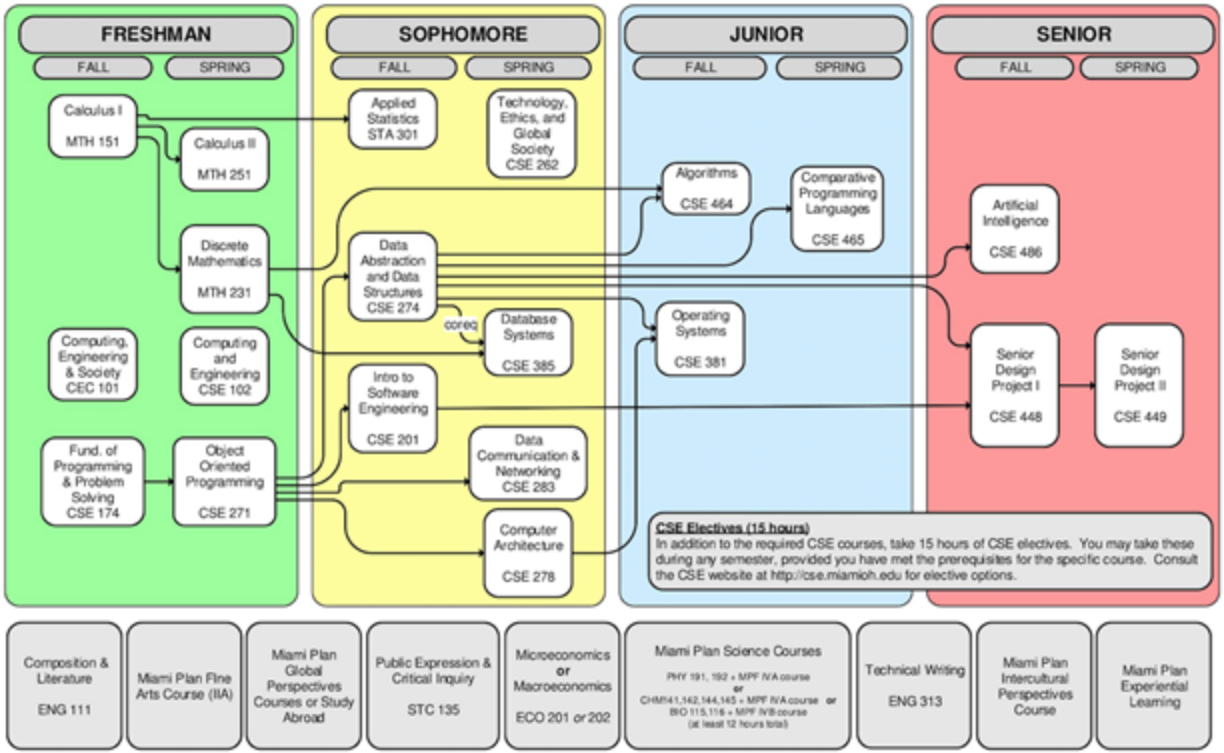
System Design & Development

Communication and Networking

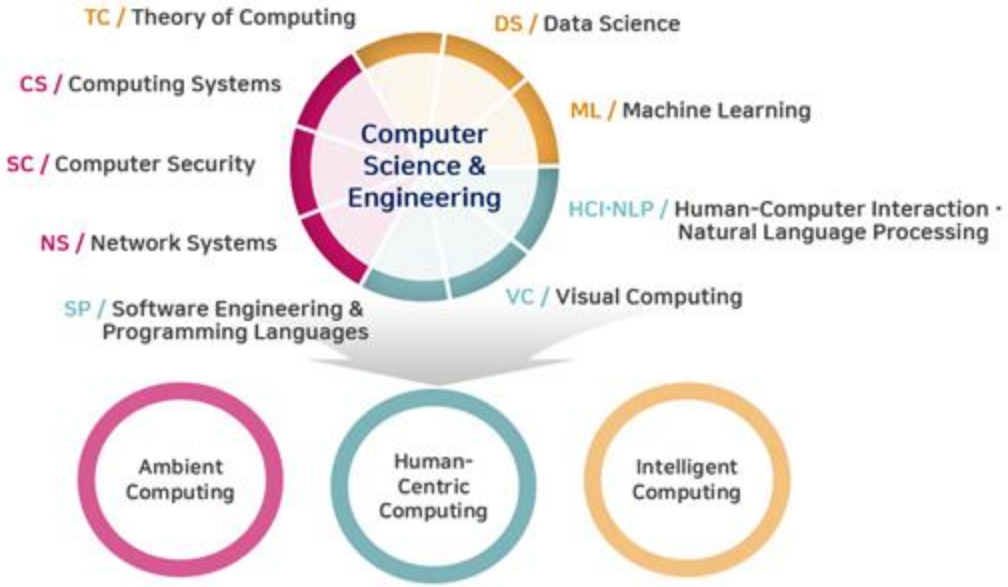
Artificial Intelligence or Machine Learning

Computability and Complexity Theory

Miami University



CS Research Area



POSTECH, Korea

Network systems

Embedded systems

Cloud computing

Cyber security

Software engineering/Programming languages

Natural language processing

Computer vision / Image processing

Speech recognition

Virtual reality

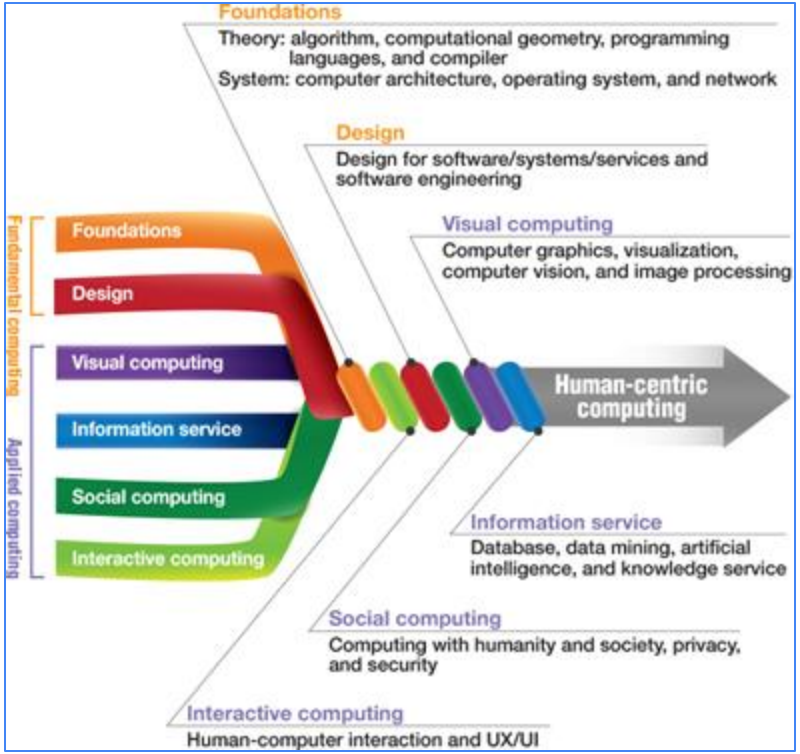
Artificial Intelligence from discriminative to generative

Machine learning

Social Network Analysis - Graph Theory

Theory of computing

Create Your Concept Map




Q
A