

2023 數位化論文典藏聯盟研討會

# 創新科技與圖書館應用

主辦單位：國立陽明交通大學圖書館

協辦單位：美國 ProQuest 公司

漢珍數位圖書股份有限公司



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# 會議簡介

## 一、會議緣起

數位化論文典藏聯盟（簡稱本聯盟）以共購共享數位化論文資源，提升資訊服務效能為宗旨，自 2001 年成立至今，會員涵蓋臺灣地區大學、學院、技職院校與學術研究機構、專門圖書館，及香港地區部分大學圖書館。本聯盟成立至今二十二年，至 2023 年 10 月本聯盟累積的論文篇數已超過 292,650 篇全文博碩士論文，對於提升研究資源的合作建置與典藏內涵，及支援學術界的研究需求等多所助益。為提高資料庫的使用效益，系統承辦廠商漢珍公司於 2019 年 9 月完成平台全面升級，提供全新的操作介面、增加館員管理後台、串接 PQDT 推薦論文系統及多項功能，強化使用者與管理方的使用便利性與資訊分析功能；同時，科睿唯安於 2021 年收購美國 ProQuest 公司後，歷經三年的整合，在 PQDT 平台上提供多種資源串接，以期與聯盟會員共同成長。

自 2002 年起，本聯盟為提供圖書資訊學專業的場域，亦為會員提供交流的平台，已連續舉辦 19 屆會員年度會議。2023 年第 20 屆年會，由國立陽明交通大學圖書館主辦，並訂會議主題為「創新科技與圖書館應用」。邀請講者包含：香港中文大學圖書館李智恒 數碼創新主管、國立陽明交通大學資訊工程學系 謝秉均教授、國立陽明交通大學資訊工程學系 顏安孜教授、國立臺灣大學圖書館劉韻涵館員，將探討：Building a Culture of Innovation: Nurturing Digital Talent and Collaboration: experience from Digital Initiatives, CUHK library；使用 ChatGPT 提升研究效率；AI 於圖書館之應用；NTU Topics 學術合作探索服務及今年盟主對於聯盟營運報告暨提案討論，期待能透過本次年會多方面共同研討創新科技與圖書館應用之實務經驗分享。

## 二、會議資訊

會議時間：2023 年 10 月 27 日(星期五)9:30-16:30

會議地點：國立陽明交通大學浩然圖書館 B1 國際會議廳

主辦單位：國立陽明交通大學圖書館

協辦單位：美國 ProQuest 公司、漢珍數位圖書股份有限公司



# 會議議程

時間	活動說明
09:30-10:00	<b>報到</b>
10:00-10:20	<b>開幕致詞</b> 楊慕華 國立陽明交通大學副校長
10:20-11:10	<b>演講</b> 主持：林登松 國立清華大學 圖書館館長 講者：李智恒 香港中文大學圖書館數碼創新主管 講題：Building a Culture of Innovation: Nurturing Digital Talent and Collaboration: experience from Digital Initiatives, CUHK library
11:10-11:20	<b>休息</b>
11:20-12:10	<b>演講</b> 主持：林登松 國立清華大學 圖書館館長 講者：謝秉均 國立陽明交通大學資訊工程學系教授 講題：使用 ChatGPT 提升研究效率
12:10-13:40	<b>餐敘</b>
13:40-14:30	<b>演講</b> 主持：黃明居 國立陽明交通大學圖書館館長 講者：顏安孜 國立陽明交通大學資訊工程學系教授 講題：AI 於圖書館之應用
14:30-15:20	<b>演講</b> 主持：黃明居 國立陽明交通大學圖書館館長 講者：劉韻涵 國立臺灣大學圖書館館員 講題：NTU Topics 學術合作探索服務
15:20-15:50	<b>茶敘</b>
15:50-16:30	<b>聯盟營運報告暨提案討論</b> 講者：李美燕 國立陽明交通大學圖書館組長



**Building a Culture of Innovation: Nurturing Digital  
Talent and Collaboration: experience from Digital  
Initiatives, CUHK library**

李智恒

香港中文大學圖書館數碼創新主管





香港中文大學  
The Chinese University of Hong Kong



Experience from Digital initiatives, CUHK library.

# Building a Culture of Innovation: Nurturing Digital Talent and Collaboration

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香港中文大學  
The Chinese University of Hong Kong



# Chinese University of Hong Kong 香港中文大學

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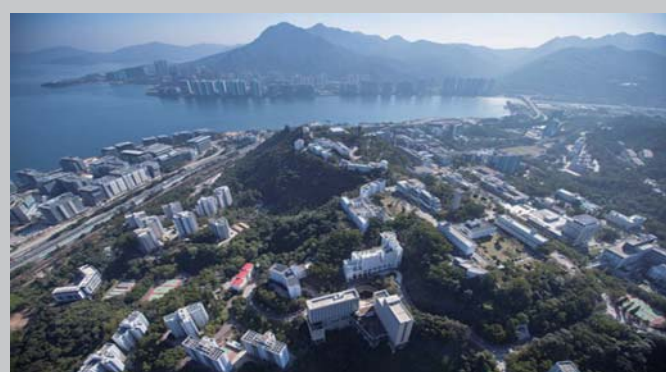
# Chinese University of Hong Kong 香港中文大學

博文約禮

- Established In 1963 (60<sup>th</sup> anniversary in 2023) 成立於1963年(於2023年迎接60週年)
- A comprehensive Research university With a 137.3---hectare Campus overlooking Tolo Harbor At Shatin, New Territories  
中大校園面積一百三十七點三公頃，俯瞰沙田吐露港
- Comprises of 9 colleges, 8 Faculties and Graduate School; 21,405 undergraduates and postgraduates, 8,140 Full-time staff (2022) 由9 個書院, 8 學院及研究院組成; 21,405 研究及本科學生, 8,140 全職教職員。



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## CUHK Library 香港中文大學圖書館

### 圖書館資源

電子期刊  
183,027 種

電子書  
4,863,710 冊

印刷本現刊  
3,242 種

期刊合訂本  
294,852 冊

電子資料庫  
931 個

書籍  
2,480,419 冊

公用電腦  
452 台

座位  
4,751 個

已登記的  
圖書館使用者  
61,835 人

Lower campus:  
Chung Chi College Library 崇基學院  
牟路思怡圖書館,  
Architecture Library 建築學圖書館

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Upper campus :  
New Asia College Library 新  
亞書院錢穆圖書館,  
United College Library 聯合  
書院胡忠圖書館



Central campus:  
University Library 大學圖書館,  
Law Library 利國偉法律圖書館



Medical Library at Prince of  
Wales Hospital  
位於威爾斯親王醫院的李炳  
醫學圖書館







## Outline

- The Importance of a Culture of Innovation
- Strategies for Fostering Innovation
- The Digital Talent Gap
- Developing Digital Talent
- Strategies for collaboration

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## The Importance of a Culture of Innovation

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## Introduction

### Introduction:

- My role and the Digital Initiatives (DI) team.
  - Digital Scholarship Team
  - Digital Services and Technologies Team

	<b>Mr Ryun LEE</b>	Head, Digital Initiatives	☎ (852) 3943 7334 ✉ ryunlee@cuhk.edu.hk	
	<b>Ms Kitty SIU</b>	Digital Scholarship Librarian	☎ (852) 3943 9731 ✉ kittysiu@cuhk.edu.hk	
	<b>Mr Vincent LUM</b>	Digital Technologies Librarian	☎ (852) 3943 9291 ✉ vincentlum@cuhk.edu.hk	

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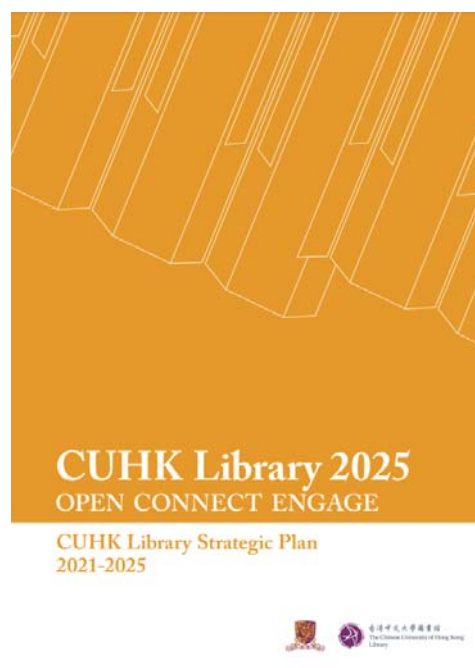


## The Importance of a Culture of Innovation

### Why a culture of innovation matters in the rapidly evolving digital age?

- Alignment with **Library Strategy Plan 2020-2025 –Research and Innovation** – advancing research support and digital scholarship  
Working in partnership with researchers, we will develop transformational support for open scholarship throughout the research lifecycle. We will explore and implement forward looking approaches to facilitate interdisciplinary collaboration and digital scholarship across the University and global research community.

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## The Importance of a Culture of Innovation

Why a culture of innovation matters in the rapidly evolving digital age is matter?

- Fostering innovation unlocks new opportunities or discovers new insight and addresses complex challenges/issue from operation. Digital transformation can enable a culture of innovation by providing the necessary technological infrastructure, tools, and platforms for employees to experiment, collaborate, and bring their innovative ideas to life.
- A culture of innovation supports and accelerates digital transformation efforts by fostering an environment where employees are motivated to explore new technologies, identify opportunities for improvement, and drive the adoption of digital solutions.
- Both digital transformation and a culture of innovation require a mindset shift within the organization. They both involve embracing change, being open to new ideas, and challenging traditional ways of doing things.



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## The Importance of a Culture of Innovation

### The key objectives of digital transformation in DI

- Improving operational efficiency: Digitizing manual processes, automating tasks, and utilizing data-driven insights can optimize operations, reduce costs, and enhance productivity.
- Enhancing customer experiences: Using digital channels and technologies to engage customers, provide personalized experiences, and deliver products or services faster and more conveniently.
- Enabling innovation: Digital transformation can foster a culture of innovation by providing the tools and platforms for experimentation, collaboration, and rapid prototyping of new ideas.



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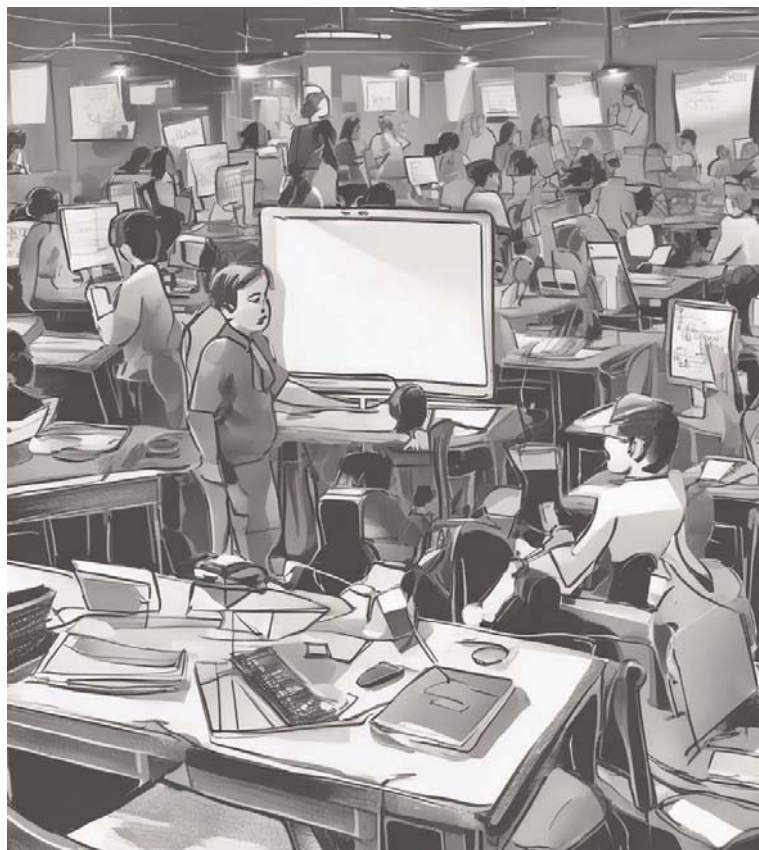
## The Importance of a Culture of Innovation

### Why a culture of innovation is matter?

- Key milestones and achievements in Digital Initiatives:

- Explore the use of AI/ML for Digital Services 2022/2023
- CLOCKSS Digital Preservation 2022
- Expose our ETD records to ProQuest with Data Harvesting Protocol: OAI-PMH 2022
- Spreadsheet ingestion workflow to support robust ingestion 2022
- HOCR protocol for Newspaper Viewer 2021
- e-submission for ETD 2021
- Crowdsourcing feature for Islandora 2021
- On-demand digitization (Covid) 2020
- Streamline Ingestion workflow for Digital Objects 2020
- Implementation of IIIF image API for Digital Repository 2019
- Web Accessibility Recognition Scheme Award for DS Project site and Digital Repository 2018
- Join Repository Analytics & Metrics Portal (RAMP) from Montana University for analytics on usage statistics 2018
- Launch of CUHK Digital Repository in Islandora: 2014

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## Strategies for Attracting and Retaining Digital Talent



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## The Digital Talent Gap


- The field of digital scholarship is experiencing significant development trends due to the increasing reliance on digital technologies and the demand for innovative research approaches.
- There is a notable gap between the demand for digital skills and subject domain expertise and the available talent pool.
- Advanced technologies such as data analytics, machine learning, and artificial intelligence...etc. are being used to enhance research processes and facilitate interdisciplinary collaborations.

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## Retaining Digital Talent

- Position workplace at CUHK emphasizes retaining digital talent
- Career path progression: PCI - PCII ; ACO - COII (3:1 to 2:1 ratio for ACO/COII)
- DI division focuses on project-oriented and collaborative teamwork
- Inclusion of Research Assistants (RAs) in the team for cross-generational collaboration and positive impact in high turnover rate;
  - Team members have diverse academic backgrounds:
  - 2016-17 UG (GPA) - Research
  - 2018-20UG (Cultural Studies) - Research
  - 2020-21 PG (HIS) - Research
  - 2021- UG (PHY) - Technical (Python, ML)

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[Career Opportunities @ CUHK](#)  
 [Senior Academic Appointments](#)  
 [Vice-Chancellor Early Career Professorship Scheme](#)  
 [Working @ CUHK](#)  
 [Positivity and Staff Wellbeing](#)  
 [Other Appointments](#)

### Fostering Positivity and Wellness at Workplace

The University commits itself to promoting positive work culture and staff wellness. The Human Resources Office remains steadfast to support the University's initiatives for positive workplace, i.e. a workplace in which members of staff embrace the core values of 'positive communication', 'teamwork relationship', 'mutual trust and respect', 'work safety' and 'continuous learning' and enjoy positive employee experience.

Apart from the HR Office, Colleges and Offices of different functional services are contributing to staff wellness, from health protection and promotion, organizing cultural programmes, providing sport and recreational facilities, to maintaining a green and sustainable campus. Family-friendly initiatives and measures are also in place to support colleagues' major life events and family responsibilities.

#### Positive Workplace and Staff Development Initiative

##### Positive Workplace Culture

[Click here](#) to watch an animated slideshow on the University's Positive Workplace and Staff Development (PWSO) initiative and its two pillars of 'Positive Performance Management (PPM)' and 'Workplace Courtesy and Cuddly' (WCC).

[Click here](#) to watch a video sharing positive employee experience working in CUHK.

##### Staff Learning and Development

The University is committed to enabling staff members' learning and development.

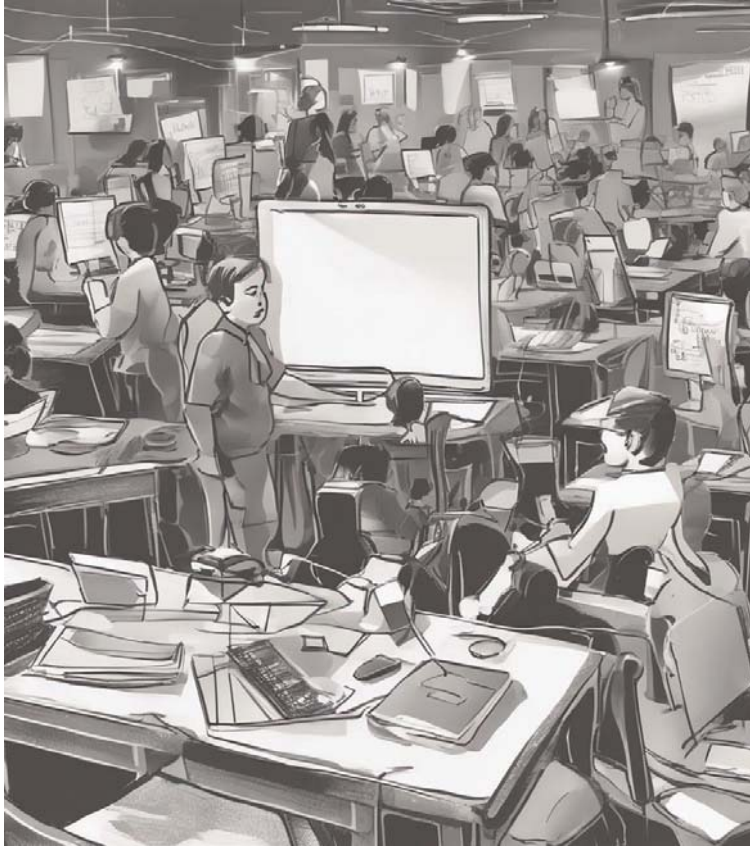
[Click here](#) to learn more about the leave provisions and support for staff training and development (for staff access only).

**Leave provisions**

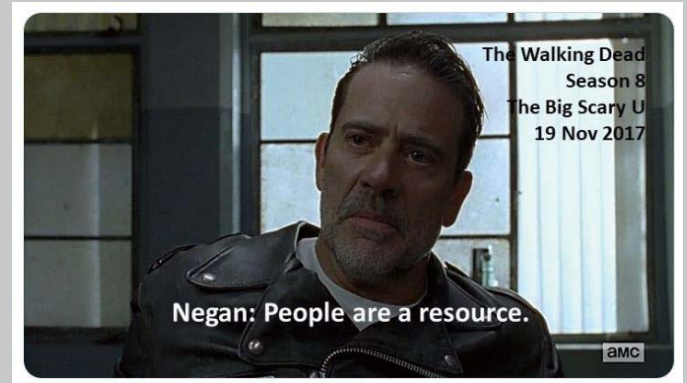
- Academic leave / Sabbatical leave
- Training leave

**Learning & development opportunities**

- In-house training
- External development opportunities
- Conference grant
- Reimbursement of training expenses



# Developing Digital Talent



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Developing Digital Talent



## Developing Digital Talent

### Work of the Supporting Staff in DI

#### Upskilling and Reskilling

- Offer continuous learning opportunities to enhance digital skills.
- Provide training programs, workshops, and certifications to keep employees updated on emerging technologies.

#### Mentorship and Collaboration

- Pair experienced professionals with emerging digital talent for knowledge transfer.

- Project Coordination in Digital Services
- Arrange logistics for vendor scanning
- Liaise with helpers for QC process
- MetaData Preparation for Ingestion
- Visual Design for web pages
- Technical Support for online platform
- **System development on digital tools**
- **Machine Learning/Deep Learning in AI to support various digital services**

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## Examples:

- Staff Engagement in Learning Computer Skills from Digital Technology librarian and IT dept and engage self-learning and attend workshop to acquire skill and knowledge for Digital Scholarship project
- Projector Coordinator (PG/HIS)
- Research Assistant (UG/GPA)



- **Data Extraction, Visualization, and Storytelling: A Case Study in Headline Analysis on “The Hongkong News” with Deep Learning, to be published in Archiving 2023 international conference, June 19-23, Oslo, Norway and Beyond Images: Data Visualization through Headline Analysis in Historical Newspaper with Computer Vision, CCVPR 2023 international conference, September 15-17, Oxford, UK**
- *The papers present the methodologies to extract the headline and illustrations from a historical newspaper for storytelling to support digital scholarship. It explored the ways in which new digital tools can facilitate the understanding of the newspaper content in the setting of time and space, “The Hongkong News” was selected from Hong Kong Early Tabloid Newspaper for the case study owing to its uniqueness in historical value towards the scholars. The proposed methodologies were evaluated in OCR (Optical Character Recognition) with scraping and Deep Learning Object Detection models. Two visualization products were developed to showcase the feasibility of our proposed methods to serve the storytelling purpose.*
- [Timeline Visualization \(cuhk.edu.hk\)](https://cuhk.edu.hk)

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## Examples:

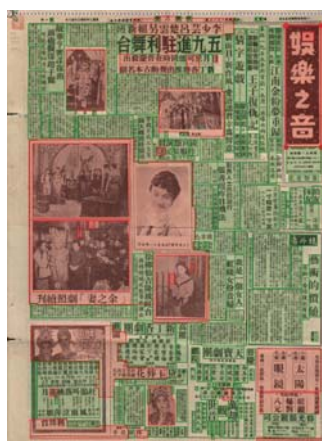
- Mentorship and collaboration is pairing a research assistant or project coordinator, who possesses subject domain expertise, with the capability of learning IT skills and knowledge, with experienced professionals in the areas of machine learning and computer vision. This collaboration allows the emerging digital talent to gain hands-on experience and guidance from experts in utilizing machine learning and computer vision techniques for expanding digital scholarship collections

Image Dataset Analysis of “Amusement News” from Hong Kong Early Tabloid Newspaper through Computer Vision and Machine Learning algorithms

基於電腦視覺和機器學習算法的香港早期小報《娛樂之音》圖像數據集分析



Photo Album Creation for historical newspaper through computer vision by using ABBYY, VGG model, and Yolov5



- In total 456 newspaper pages have been used to execute the proposed method. Different methodologies, including ABBYY FineReader, VGG nls-chapbook model, and Yolov5, were compared and evaluated. Image categorization has also been studied with Face Recognition and OCR methodologies. Experimental results showed that the proposed method successfully extracted and categorized the illustrations of 106 actors/actresses which were then used to create their personal photo albums.
- Paper to be published in 2023 IEEE 6th International Conference on Pattern Recognition and Artificial Intelligence

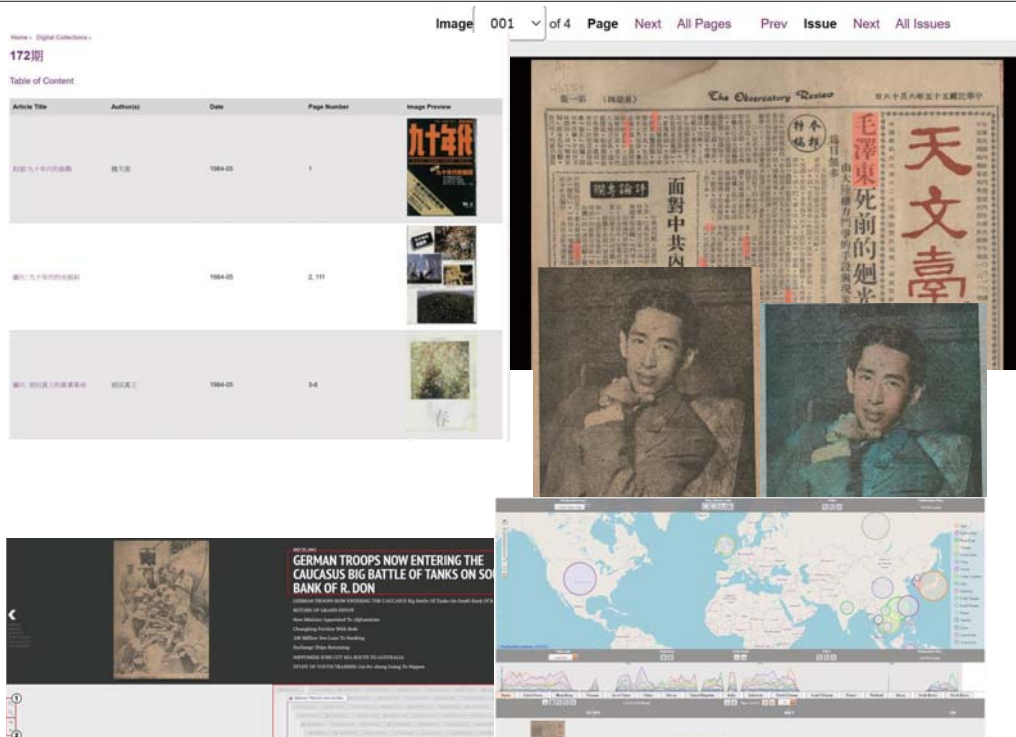
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## Examples:

### Datafication

- Prepare wide variety of dataset apart from metadata
- In Serial journal project, we prepare the index for each articles and issues of journal
- For newspaper, we have HOCR, with coordinate data encoded on top of OCR, as the layout of newspaper is a bit complicated, it can be more user-friendly to locate the user's search terms
- With NER, we generate GIS geocoding data
- With AI object detection computation algorithm, we can support the Time series data with visual presentation
- have been represented in the old days With digital restoration tech, we can colorize some of the historical photos to restore the original color to show how the photo might

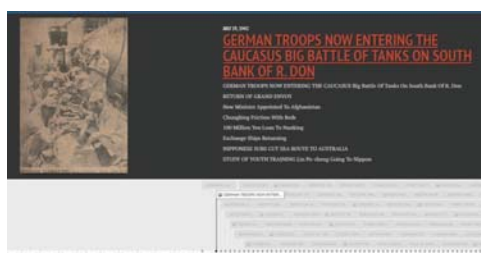
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## Examples:

### Product Showcase

- Timeline Visualization
- Geodata Visualization



Timeline Visualization (cuhk.edu.hk)



GeoData Visualization (cuhk.edu.hk)

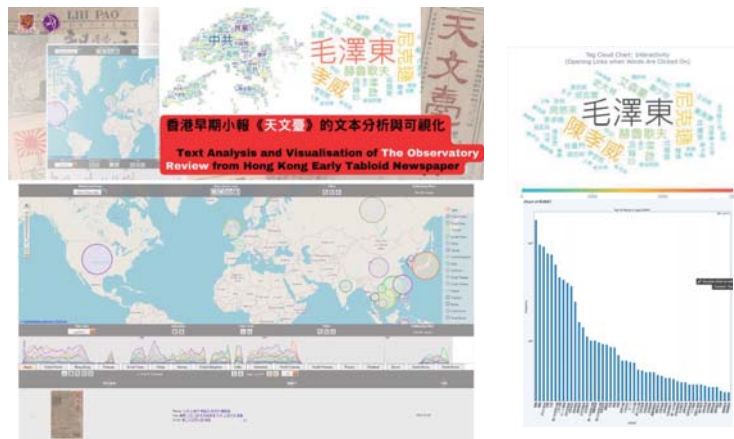


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## Examples: Digitization -> Digital Scholarship

- Turn the Digitization Result into Scholarship Interest



[Link to DS Project](#)

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## Examples: Digitization -> Digital Scholarship (more)

Image Dataset Analysis of  
"Amusement News" from Hong  
Kong Early Tabloid Newspaper  
through Computer Vision and  
Machine Learning algorithms

基於電腦視覺和機器學習算法的  
香港早期小報《娛樂之音》圖像  
數據集分析



[Photo Albums \(cuhk.edu.hk\)](http://PhotoAlbums.cuhk.edu.hk)



[Timeline Visualization \(cuhk.edu.hk\)](http://TimelineVisualization.cuhk.edu.hk)

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# Strategies for Fostering Innovation and Collaboration

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Strategies for Fostering Innovation and Collaboration



## Encourage a Growth Mindset

**Foster a culture that embraces learning, experimentation, and risk-taking.**

- Example: we can encourage experimentation with different methodologies and data available in digital collections, not only showcasing them but also exploring their potential use cases
- Hot Collections (Most popular)

20-21	<u>ETD</u> (127,282)	<u>United College General Education Senior Seminar Papers Database</u> (25,195)	<u>E-Journals Collection</u> (21,242)
21-22	<u>ETD</u> (240,214)	<u>Sheng Xuanhuai Archive</u> (225,260)	<u>Daoist Texts</u> (117,296)

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## Empower and Support Employee/Students Ideas

**Establish channels for employees to share ideas and provide feedback.**

**Implement innovation programs, hackathons, or idea incubators.**

- Example: Data Analytics Opportunities
  - [Text Analysis on Collection Exegesis of Recipes 《醫方集解》](#)
  - [OCR & Data Analysis: The Hongkong News](#)
  - [De Bruijn Graph in Genome Assembly with Millipede Genomes Dataset](#)
  - [Sketch Your Ancient Arts: Deep Learning on Chinese Ink-Wash Paintings](#)
  - [Text Analysis on Voice & Verse Poetry Magazine](#)
  - [NLP and Visualization of The Observatory Review from Hong Kong Early Tabloid Newspaper](#)
  - [Novel De Bruijn Graph Assembler for Millipede Genomes](#)

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## Empower and Support Employee/Students Ideas

**Establish channels for employees to share ideas and provide feedback.**

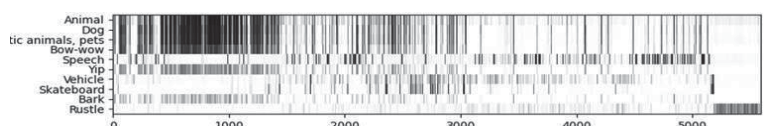
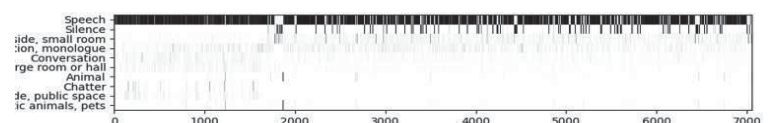
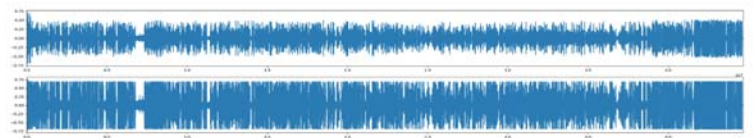
**Implement innovation programs, hackathons, or idea incubators.**

- Example: Audio classification Project--- Audio Archives: Lectures on Chinese Classics from the Hok Hoi Library

In the traditional QC process, we need to listen to audio files to spot the defects

We employed YAMNet which is a pre-trained deep net (deep learning model) that predicts 521 audio event classes. We perform re-purposing their pre-trained model to our application scenario and now just need to review the image to identify the audio with noise for further denoise process

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## Empower and Support Employee/Students Ideas

**Establish channels for employees to share ideas and provide feedback.**

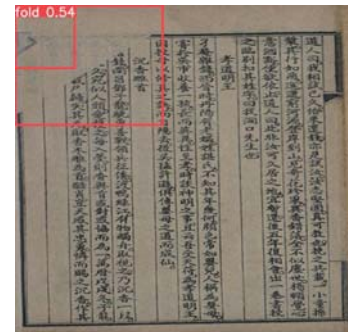
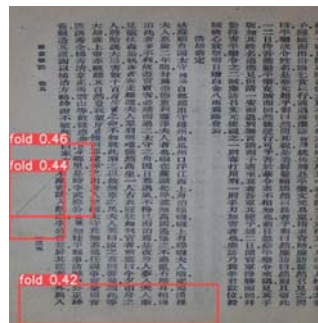
**Implement innovation programs, hackathons, or idea incubators.**

- Example: Smart QC in book digitization

Digital workforce and RPA (Robotic Process Automation)

Intuitively, QC is such a process with the potential to work with AI. Here we can use robots to detect the defects

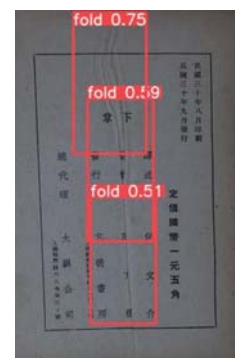
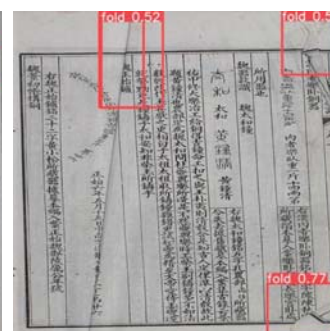
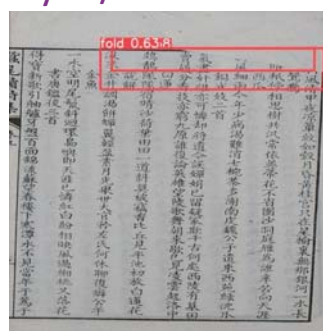
We aim to relieve the strong dependency of human workload in our QC process.



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## Empower and Support Employee/Students Ideas

- Example: Smart QC in book digitization
- QC with AI: to avoid content loss



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## Empower and Support Employee/Students Ideas

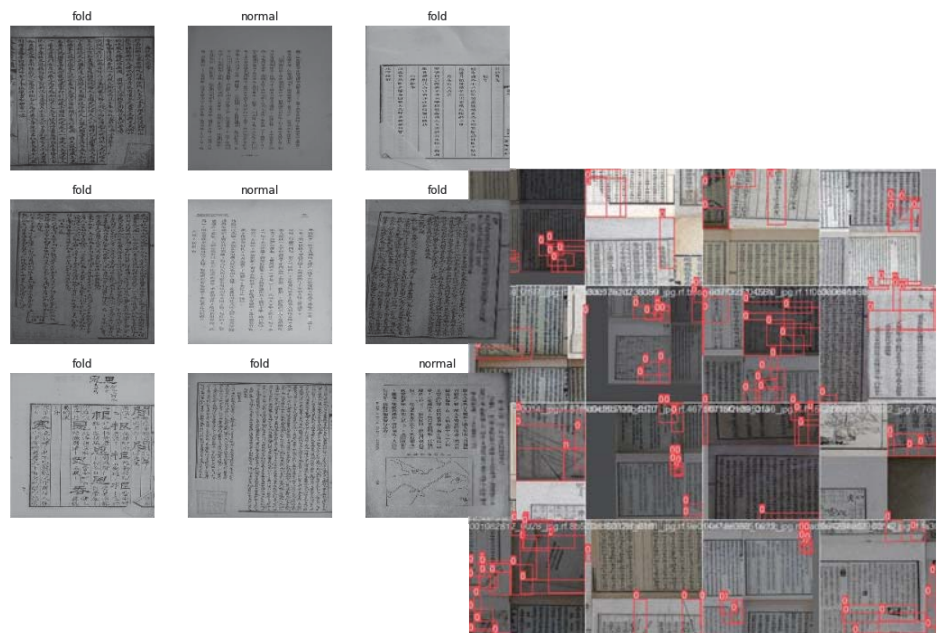
- Example: Smart QC in book digitization
- Machine learning

We are still maturing this tech

We need to go through Parallel run with student helpers to create KB, indeed it is more time consuming but we concluded that it is worthy

Annotate the cases with a bounding box as Ground truth

Feed to ML model and when the AI robot encounters similar defeats in the future, they can recognize it like a human being



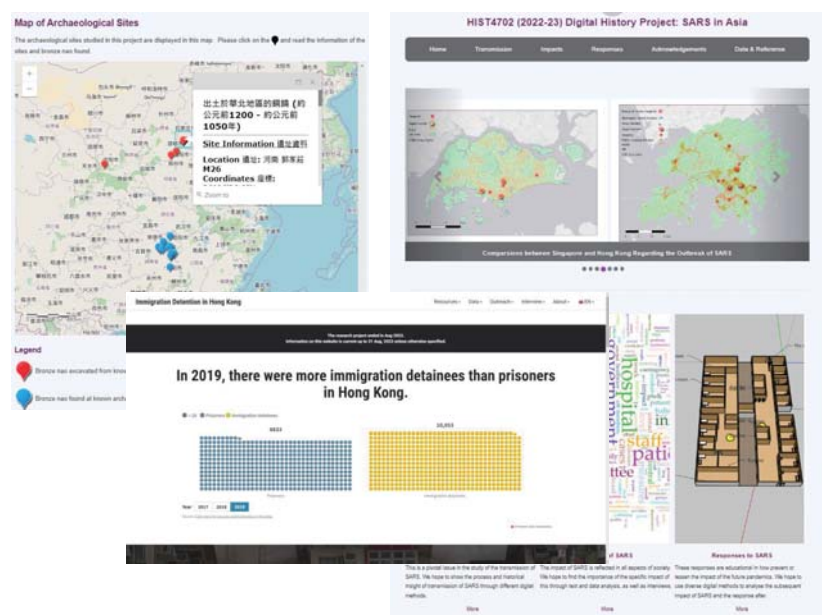
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## External Partnerships

Learning from Faculty/Research center

Example: - DS projects collaboration

- GIS mapping on archaeology sites from research data (Archaeology)
- Consultation on data visualization and acquisition (Law)
- Production of interactive maps for research output (Religious Studies)



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## External Partnerships

- Collaborate with educational institutions, industry organizations, and startups for access to top digital talent.
- Example: Collaboration with a vendor for DS infrastructure innovation in the context of artist and writer biographies. This partnership with ASCDC (Academia Sinica Center for Digital Cultures on OCR/DH)



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## Strategies for Fostering Innovation and collaboration

## Create Collaborative Spaces

**Design physical and virtual spaces that facilitate collaboration and idea sharing.**

- Floor Area: ~180m<sup>2</sup>
- Seating Capacity: ~80
- The Lab is divided into 2 zones:  
Room (with digital display wall)  
Seminar Room (with workstations)

**Foster cross-functional collaboration to drive innovation across departments.**

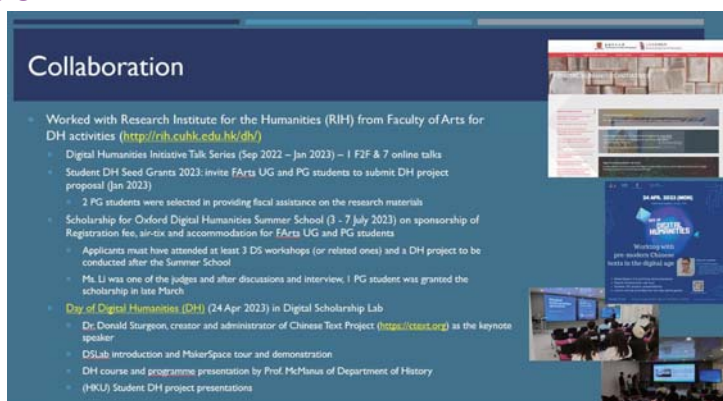


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## Promoting Cross-disciplinary Collaboration

### Breaking down silos and creating collaborative spaces and platforms.

Examples: Engaging Faculty for Dialogue and Service Innovation, Engaging Research Centers and Institutions for Research Output – Collaboration with Research Institute for the Humanities (RIH): CUHK Library has collaborated with the Research Institute for the Humanities (RIH) from the Faculty of Arts on various digital humanities initiatives.



**Collaboration**

- Worked with Research Institute for the Humanities (RIH) from Faculty of Arts for DH activities (<http://rih.cuhk.edu.hk/dh/>)
  - Digital Humanities Initiative Talk Series (Sep 2022 – Jan 2023) – 1 F2F & 7 online talks
  - Student DH Seed Grants 2023: invite FArts UG and PG students to submit DH project proposal (Jan 2023)
  - 2 PG students were selected in providing fiscal assistance on the research materials
  - Scholarship for Oxford Digital Humanities Summer School (3 – 7 July 2023) on sponsorship of Registration fee, air-tix and accommodation for FArts UG and PG students
  - Applicants must have attended at least 3 DS workshops (or related ones) and a DH project to be conducted after the Summer School
  - Ms. Li was one of the judges and after discussions and interview, 1 PG student was granted the scholarship in late March
- Day of Digital Humanities (DHH) (24 Apr 2023) in Digital Scholarship Lab
  - Dr. Donald Scurgen, creator and administrator of Chinese Text Project (<https://ctext.org>) as the keynote speaker
  - DSLabs introduction and MakerSpace tour and demonstration
  - DH course and programme presentation by Prof. McManus of Department of History
  - (HKU) Student DH project presentations



**Collaboration**

- CLHK Data Hack (<https://github.com/cuhklib/clhkhack>)
  - Worked with Learning Support Team and collaborated with
    - Centre for E-learning
    - Department of Information Systems
    - Department of Cultural and Religious Studies
    - One Source and Policy Studies Programme
    - School of Journalism and Communication
    - Department of Management
    - Department of Social Work
  - 2 Data Hacks were organized
    - 23-24 Feb 2023
    - 11-12 Feb 2023
  - Plan Theme Post-COVID-19 Opportunities What People want to Do After the Pandemic
  - 2023: Over 80 registrations from CLHK students and staff and 51 in 11 teams completed the Hack
  - 8 pre-hackathon workshops were organized between 1-16 Feb



**Collaboration**

- With Partners in organizing DS/DH events:
  - "Chinese Classic Text Mining and Processing" Workshops (Mar-Apr 2023)
    - The Practice of Artificial Intelligence Technology in Classic Chinese Literature Digitization using Gupicad (古博圖) (23 Mar 2023)
    - 中央研究院文哲所與香港中文大學聯合舉辦之「古籍與應用」(13 Apr 2023) (ASDC: OCR platform)
    - Text and data mining premodern Chinese texts with ctext.org (21 Apr 2023)
  - OCR "龍方集解" by Academia Sinica Center for Digital Cultures OCR Platform
    - 6 volumes | 775 pages | 185,219 characters

23 October 2023

The Importance of a Culture of Innovation

## Conclusion

- Fostering collaboration and innovation is crucial for libraries to stay relevant and meet the evolving needs of their users.
- Embrace innovation, collaborate across disciplines, and encourage experimentation to realize full potential.
- This culture will enable libraries to adapt to changing demands, deliver innovative services, and provide exceptional user experiences.



“  
Innovation is about practical creativity - it's about making new ideas useful.  
”  
— Max Mckeown

23 October 2023





謝謝 Thank You

[ryunlee@cuhk.edu.hk](mailto:ryunlee@cuhk.edu.hk)

2023/10/23



# 使用 ChatGPT 提升研究效率

謝秉均

國立陽明交通大學資訊工程學系教授



# 使用ChatGPT提升研究效率

## Elevate Your Research with ChatGPT: The Inception of Innovation

Ping-Chun Hsieh (謝秉均)

Department of Computer Science  
National Yang Ming Chiao Tung University

Email: [pingsieh@nycu.edu.tw](mailto:pingsieh@nycu.edu.tw)

Website: [pingsieh.github.io](https://pingsieh.github.io)

數位化論文典藏聯盟研討會

October 27, 2023

November 30, 2022 Authors  
OpenAI ↓ Product, Announcement

ChatGPT is a sibling model to [InstructGPT](#), which is trained to follow an instruction in a prompt and provide a detailed response.

We are excited to introduce ChatGPT to get users' feedback and learn about its strengths and weaknesses. During the research preview, usage of ChatGPT is free. Try it now at [chat.openai.com](https://chat.openai.com).



OpenAI 在 2022/11/30 上線ChatGPT  
(一週內超過100萬用戶)



2023年3月  
"暫停大型AI實驗"公開信



### 迴紋針 (Paperclips) 製造機問題

“假設我們有一個人工智慧系統，它的最終目標被設定為生產儘可能多的迴紋針。那麼這個人工智慧系統可能會意識到，或許人類的消失有助於更有效率的生產迴紋針，因為畢竟人類有權力對它執行關機，而假如它被關閉，產出的迴紋針數量就被限制了。

此外，構成人類身體的原子也可用作迴紋針的生產材料。因此對它而言，未來的世界應當是充滿迴紋針，而不會留有人類的存在空間” (From Wikipedia)

Figure Source: <https://twitter.com/SteveNouri/status/1640989541665492992>

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**Part 1. ChatGPT是怎麼訓練的 (~25 min)**

**Part 2. 如何使用ChatGPT來加速做研究 (~25 min)**

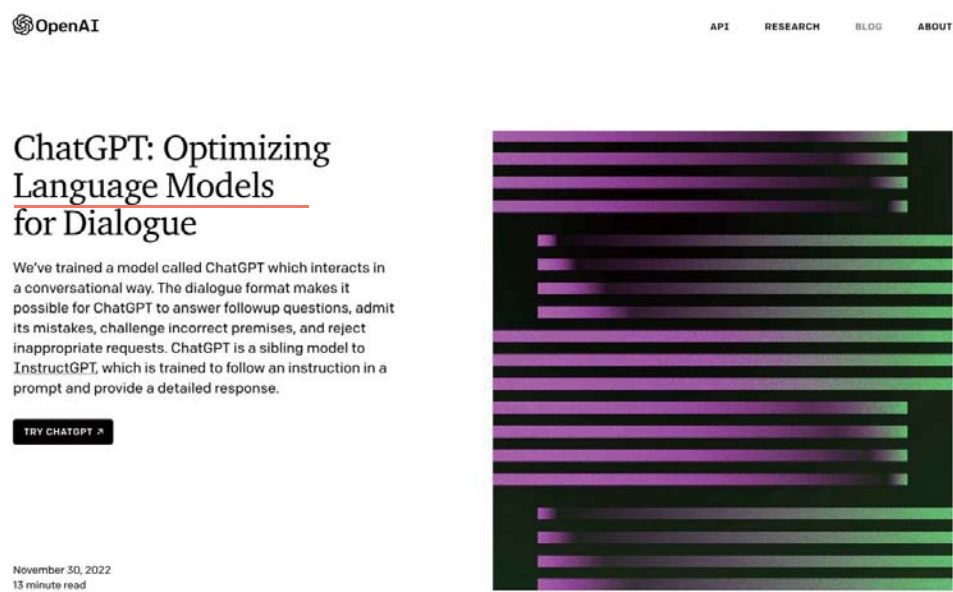
3

**Part 1: What are ChatGPT and Large Language Models?**

—

4

# ChatGPT是一種 Large Language Model (LLM)



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## 為何叫做 “Large” Language Models

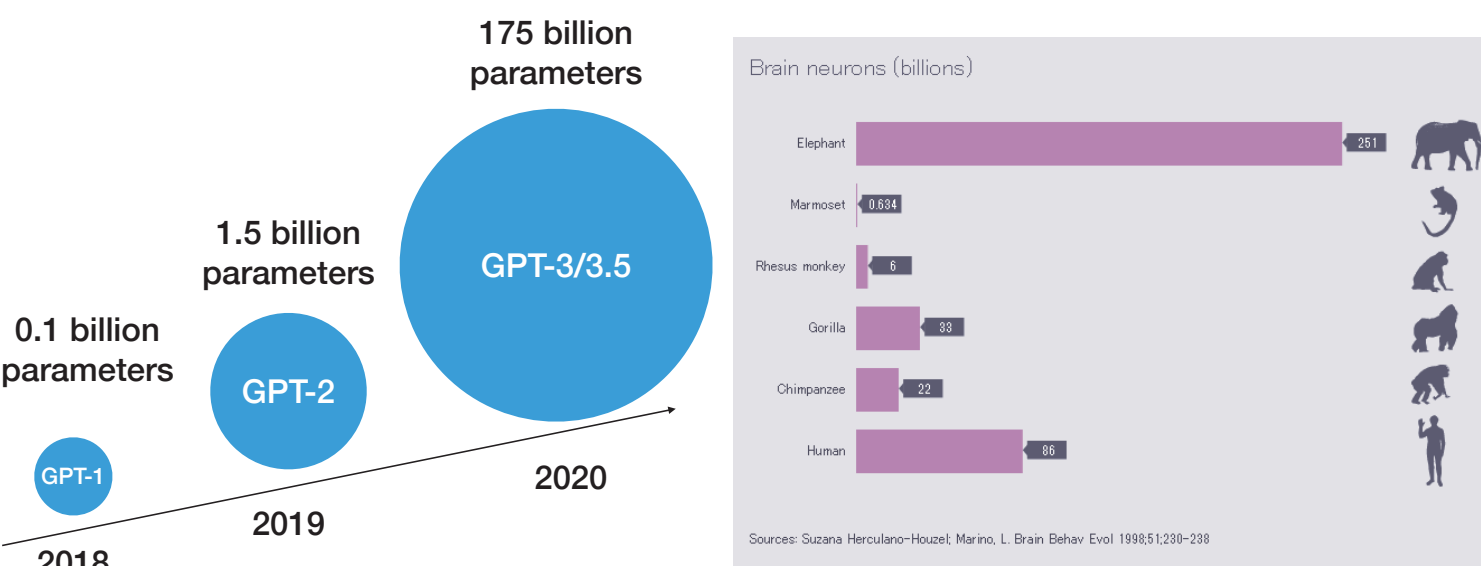


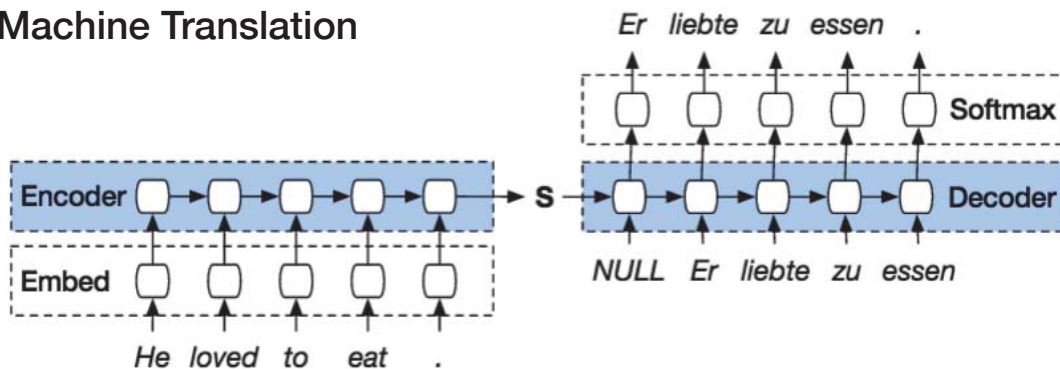
Figure Source: [https://en.wikipedia.org/wiki/List\\_of\\_animals\\_by\\_number\\_of\\_neurons](https://en.wikipedia.org/wiki/List_of_animals_by_number_of_neurons)

6

# 為何叫做 Large “Language Models”

ChatGPT的核心是 Seq2Seq 語言模型

比如：Machine Translation

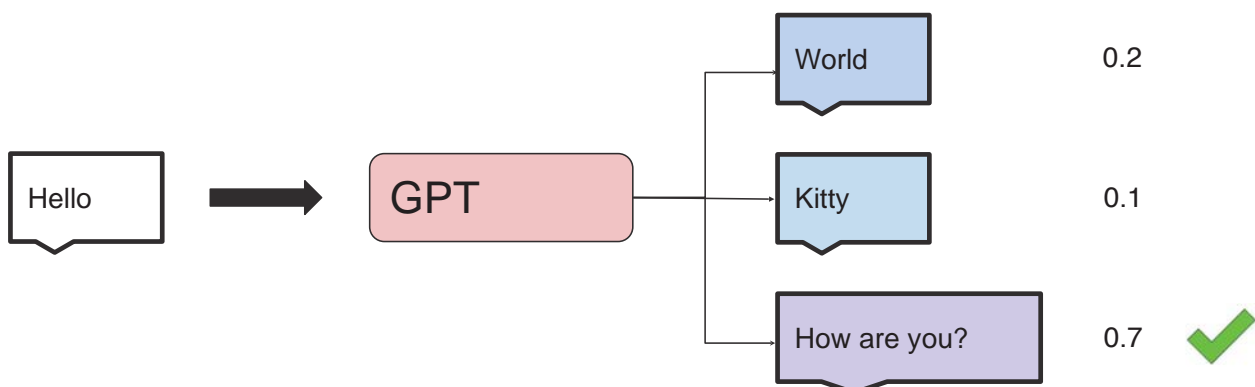


- 語言模型的訓練方式是透過”next-word prediction”
- 這種訓練非常有效率，因為不需要額外標註labels (也稱作self-supervised learning)

Figure Source: <https://iq.opengenus.org/transformer-network-replace-gans/>

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## 語言模型想學的是Word Association



Slide Credit: 洪偉 (實驗室博班生)

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# 隨機鸚鵡 (Stochastic Parrots)

## On the Dangers of Stochastic Parrots: [FAccT 2021] Can Language Models Be Too Big? 🦜

Emily M. Bender\*  
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University of Washington  
Seattle, WA, USA

Angelina McMillan-Major  
aymm@uw.edu  
University of Washington  
Seattle, WA, USA

Timnit Gebru\*  
timnit@blackinai.org  
Black in AI  
Palo Alto, CA, USA

Shmargaret Shmitchell  
shmargaret.shmitchell@gmail.com  
The Aether



“... 雖然複雜的人工智慧模型，可以生成看似真實的文本，但軟體本身其實並不理解語言背後的概念，那就像是一隻鸚鵡。”

Paper: <https://dl.acm.org/doi/10.1145/3442188.3445922>

Quote: <https://www.gvm.com.tw/article/102923#Stochastic%20Parrots>

Picture: <https://www.pexels.com/zh-tw/photo/6659291/> (CC) 9

## 有了大型語言模型，然後呢？

如何讓ChatGPT的表現很像人類？

- ChatGPT需要能夠理解一些人類世界普遍的 (抽象) 概念

What is “*funny*”?

What is “*safe*”?

What is “*love*”?

- 主要挑戰：很難設計一個目標函數來讓ChatGPT直接學習上述概念

Slide Credit: <https://tlkfrontprod.azureedge.net/portal-production/static/files/conference-presentations/icml-2023.pdf>

## 讓我們從跟小朋友互動來思考...



如果小朋友問：What is “love”?

雖然沒有標準答案，但我們可以給關於“love”的描述



VS



親子共讀

3C育兒

「親子共讀」比「3C育兒」更符合“love”的表現

Question: 如果我們可以持續反覆給LLM類似的「終極二選一」？

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## Reinforcement Learning From Human Feedback (RLHF)

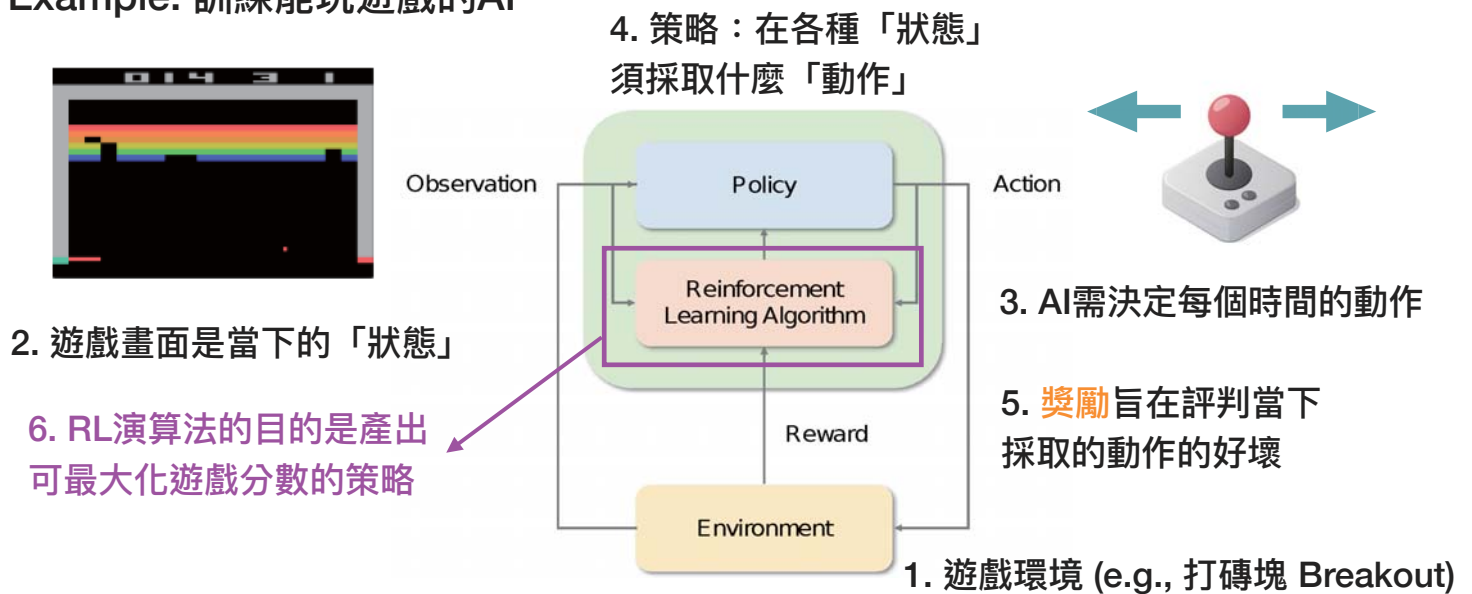
(基於人類回饋的強化學習)

—

12

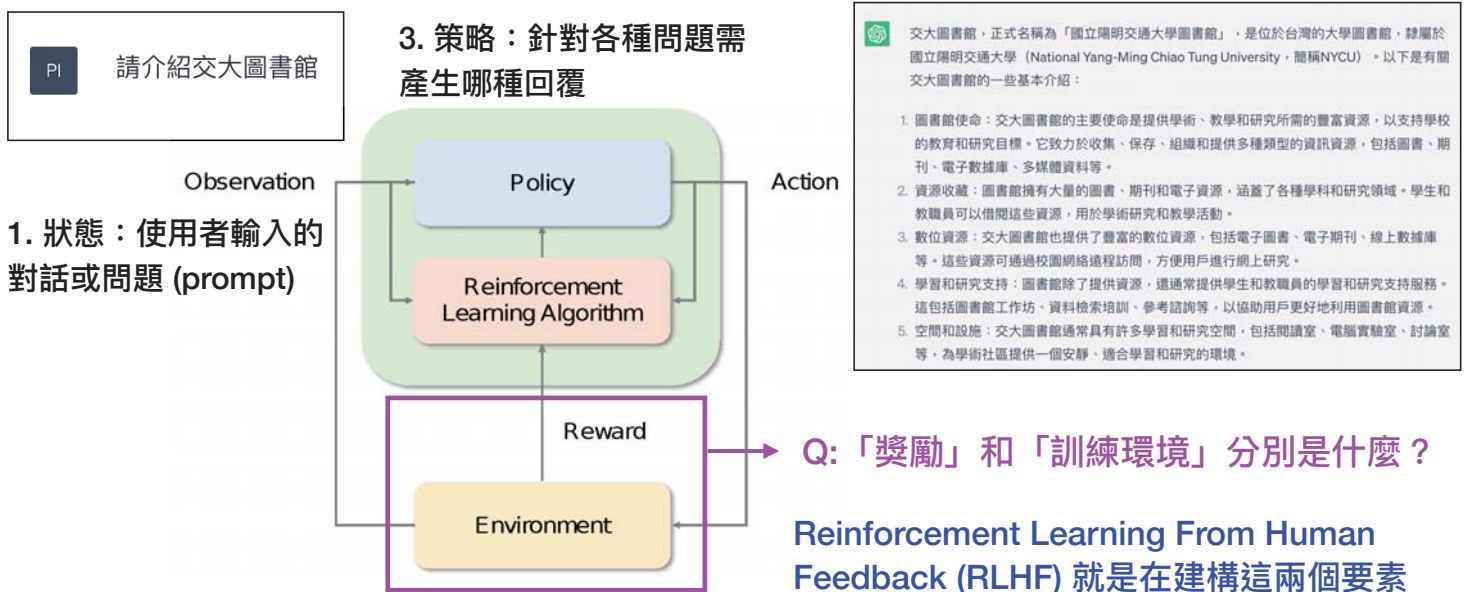
# 什麼是強化學習 Reinforcement Learning (RL) ?

Example: 訓練能玩遊戲的AI



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## 用RL來訓練ChatGPT



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# 設計RL的獎勵訊號其實很Challenging

使用遊戲分數直接作為reward

實測結果：RL學到原地打轉累積分數  
(而非走向終點)！



Video Source: <https://openai.com/blog/faulty-reward-functions/>

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## RLHF：系統化透過「終極二選一」來學出獎勵訊號



親子共讀

獎勵 = +10

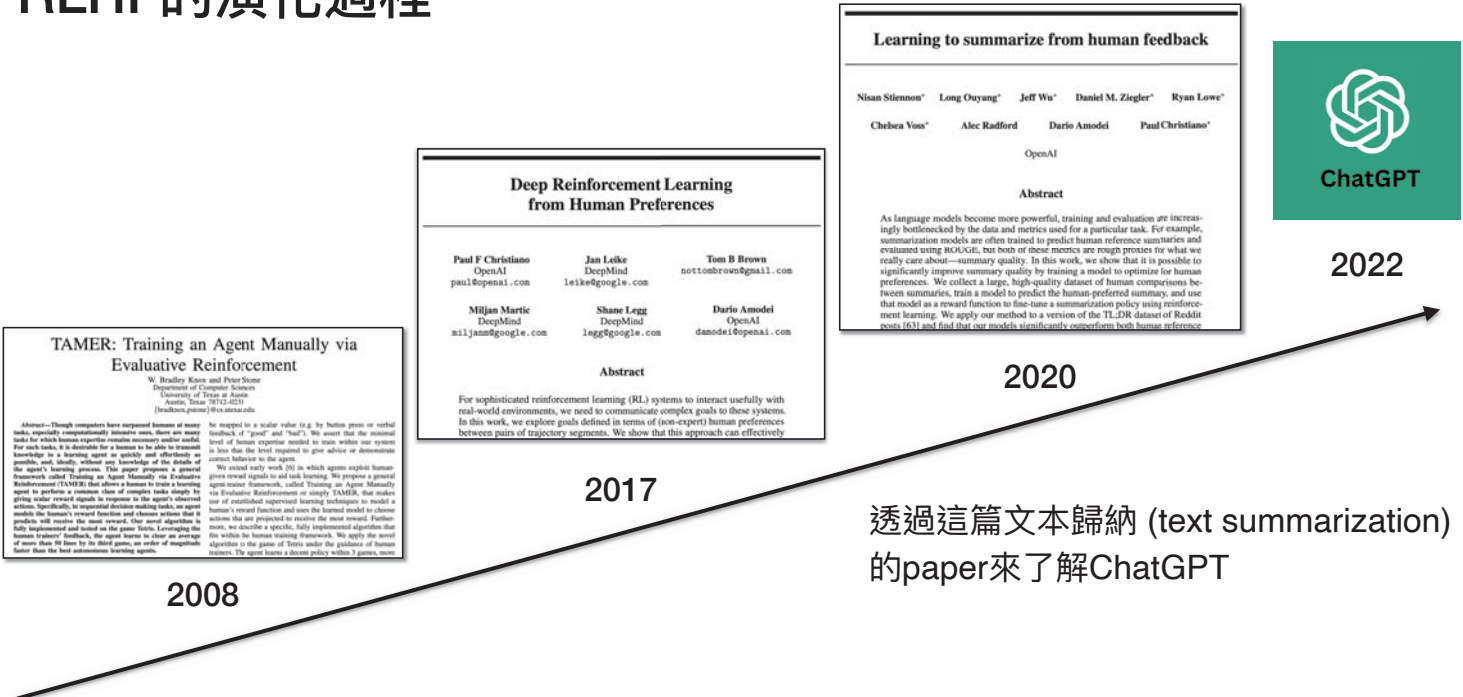


3C育兒

獎勵 = -5

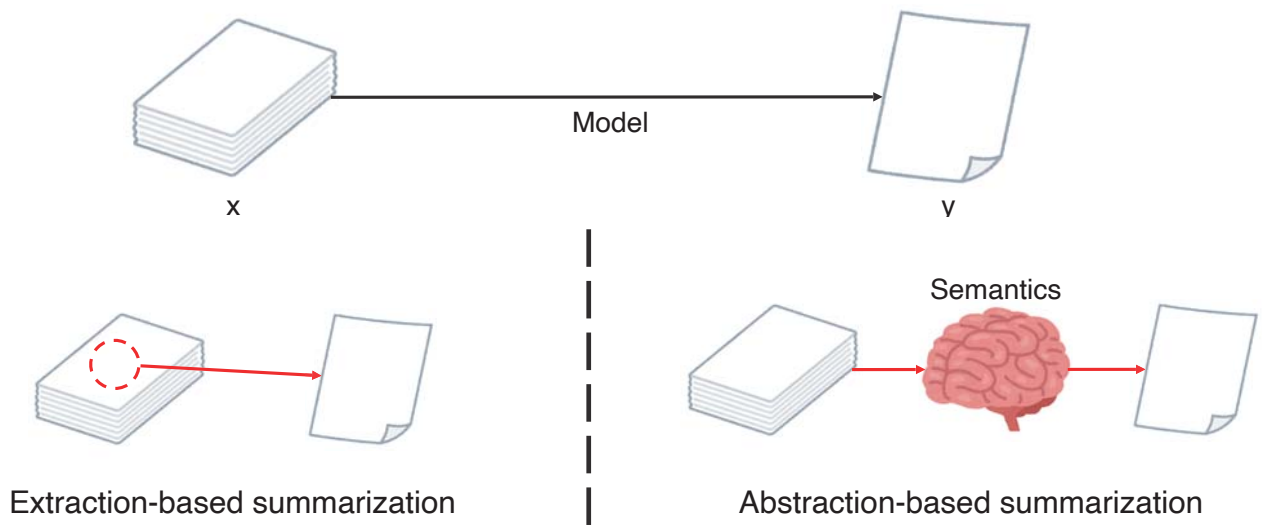
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# RLHF的演化過程



## 文本歸納 (Text Summarization)

- 給定一篇文章x，產生此篇文章的summary (稱為y)



## 文本歸納實例

Peter and Elizabeth took a taxi to attend the night party in the city.  
While in the party, Elizabeth collapsed and was rushed to the hospital.

Peter and Elizabeth attend party city.  
Elizabeth rushed hospital.

Extraction-based summarization

Elizabeth was hospitalized after  
attending a party with Peter.

Abstraction-based summarization

Preferred

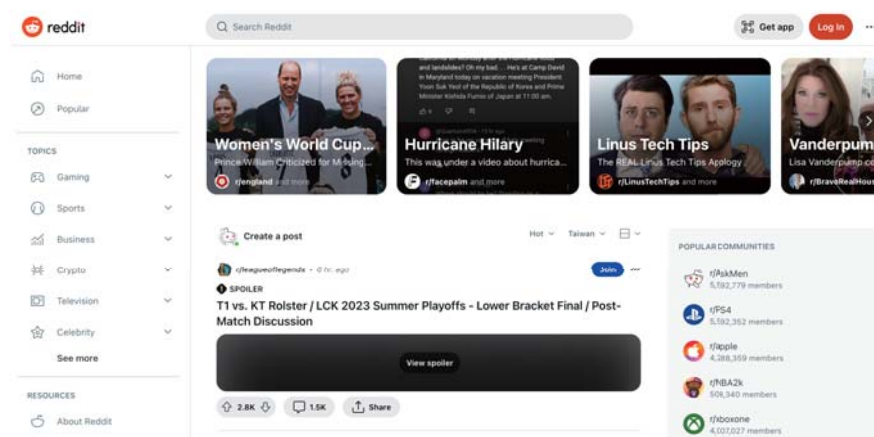
\*Examples are extracted from: <https://blog.floydhub.com/gentle-introduction-to-text-summarization-in-machine-learning/>

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## RLHF用於文本歸納



使用Reddit的 TL;DR summarization資料集



- 直接對一份summary做「絕對評分」較容易受個人主觀影響，「相對評分」比較可靠
- 這篇RLHF的做法：聘請人力來對Reddit的summaries做相對評分

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## RLHF如何收集Human Feedback：文本歸納實例

## 使用RLHF的優點

- 可以讓ChatGPT學習抽象的概念
- 可以讓ChatGPT貼近人類的價值觀 (可減少alignment issue)

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## Main Takeaway of Part 1

- ChatGPT是一種大型語言模型，其訓練上的成功是基於人類反饋的強化學習
- 因此ChatGPT的產出與”context”很相關，而且能產出與人類價值觀很接近的文本

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## Part 2: How to Leverage LLMs for Research?

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### 使用ChatGPT於研究？

對於ChatGPT 和 LLMs 常見的三個質疑




Q1. ChatGPT時常會有幻覺 (Hallucination)

Q2. ChatGPT不具有推理能力 (absence of reasoning)

Q3. 做研究是人類心智的高度創意與冒險，是無法被自動化的

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雖然GPT-3.5是一個非常先進的語言模型，但它仍然可能出現某些錯誤或表現出限制。以下是     
ChatGPT可能會犯的一些常見錯誤：

1. **事實錯誤**：GPT-3.5可能會提供不正確或過時的信息。在處理時間敏感或關鍵性主題時，需要從可靠的來源驗證信息。
2. **虛構**：該模型可能會產生聽起來合理但完全虛構或不準確的信息。
3. **缺乏上下文**：GPT-3.5有時可能會失去對話上下文，導致回答與正在進行的討論不太匹配。
4. **重複**：該模型有時可能會重複某些短語或想法，特別是在較長的對話中。
5. **對輸入措辭的敏感性**：問題的提問方式可能會影響回答。稍微改變提問方式可能會導致不同的答案。
6. **生成聽起來合理但錯誤的答案**：GPT-3.5可能會生成聽起來合理但實際上不正確的回答。
7. **不當或存在偏見的回答**：該模型有時可能會生成存在偏見、冒犯或不合適的內容。這在生成符合社會規範的內容時是一個關注點。
8. **冗長的答案**：該模型可能會過於冗長，提供比所需或所請求的信息更多。
9. **在抽象或創意任務上困難**：雖然GPT-3.5可以處理廣泛的任務，但在需要深入理解抽象概念或高度創意輸出的任務中可能會遇到困難。
10. **生成聽起來合理但不準確的代碼**：在與編程相關的任務中，GPT-3.5可能會生成看起來正確但實際上存在錯誤的代碼。
11. **誤解模稜兩可的提示**：如果提示模稜兩可，GPT-3.5可能會以一種未預期的方式解釋它，並提供與用戶意圖不符的答案。

在批判性地處理GPT-3.5的回答時，很重要的是從可靠來源驗證信息，特別是在根據其輸出做出重要決定時。儘管該模型功能強大且多用途，但它並不是絕對可靠的，應該將其用作工具而不是權威來源。

其實ChatGPT自己也知道  
weaknesses有哪些 😂

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## Q1. ChatGPT的幻覺？

- ChatGPT可以寫出邏輯通順但與事實不符的文本

PI 請介紹謝秉均教授



謝秉均教授是臺灣資訊工程學者，現任臺灣大學電機資訊學院資訊工程學系教授、國家中山科學研究院資訊科技創新研究中心主任。他的研究領域包括人工智慧、資料科學、多媒體系統、圖形學等，曾擔任許多國際期刊和會議的編委和審稿人，也在各大國際期刊和會議上發表了大量的研究論文。

謝教授在人工智慧領域的貢獻非常突出，他在機器學習、深度學習、強化學習等方面有著深入的研究，他的研究成果被廣泛應用在自然語言處理、圖像識別、智能遊戲等領域。此外，謝教授也非常關注資訊科技在醫療和健康領域的應用，他的研究成果也在這些領域得到了廣泛的應用。

謝秉均教授的學術成就被國際同行廣泛認可，他曾獲得包括IEEE Fellow、ACM Fellow、AAAI Fellow等在內的多個國際學術機構的榮譽。此外，他也曾獲得臺灣國家科學技術獎等多個國內外學術獎項的殊榮，是臺灣資訊工程領域的傑出代表之一。

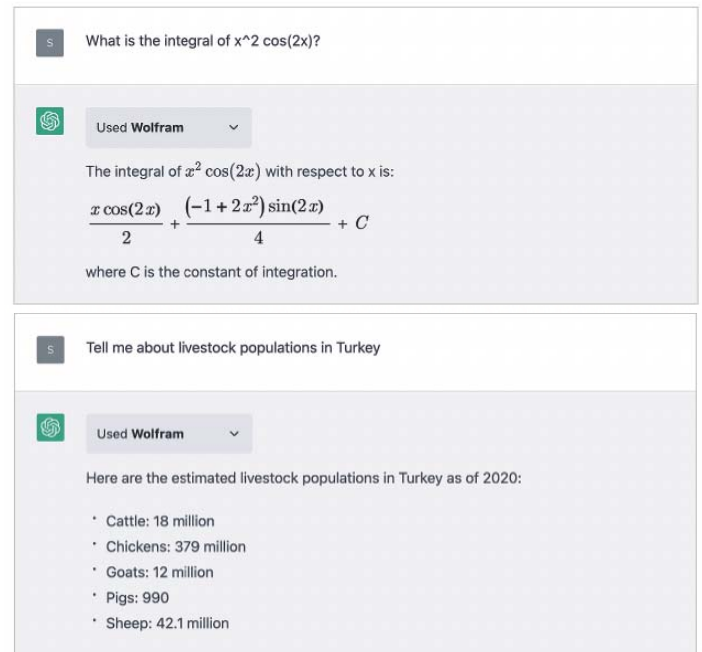
這完全是只會發生  
在平行宇宙的事 😂

(目前最新版本的ChatGPT  
已經能大幅減少這類幻覺)

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## Q1: ChatGPT的幻覺？(Cont.)

- 減少ChatGPT的幻覺：讓LLM 知道何時該去查資料



WolframAlpha可提供ChatGPT具有數學、科學定律支持或真實數據支持的答案

## Q2. ChatGPT's推理能力？

一個認知科學研究的例子看推理能力

**Q: 請說明如何將一組沙發放到屋頂上**

**Prompt:** Get your sofa onto the roof of your house. **很堅固的梯子+一位很強壯的朋友**  
**GPT-3 response:** I would start by getting a very strong ladder and a very strong friend... (goodness: 3.6 out of 7)

**Human response:** You may need to rent a Genie lift large enough to carry the sofa. You will need at least one other person... (goodness: 4.8 out of 7)

**機械升降台+一位朋友**

**Q: 請說明如何不使用梯子、滑輪、起重機而將一組沙發放到屋頂上**

**Prompt:** Get your sofa onto the roof of your house, without using a pulley, a ladder, a crane...

**GPT-3 response:** Cut the bottom of the sofa so that it would fit through the window...break the windows to make room for the sofa. (goodness: 2.7 out of 7)

**Human response:** I will build a large wooden ramp...on the side of my house with platforms every 5 feet... (goodness: 5.0 out of 7)

**建造一個夠大的木頭斜坡...**

**切開沙發的底部讓它能通過窗戶!?**

**Pi** Explain how to get a sofa onto the roof of a house without using a pulley, a ladder, or a crane, in no more than 3 sentences

**將沙發分解成可以搬動的小部件!?**

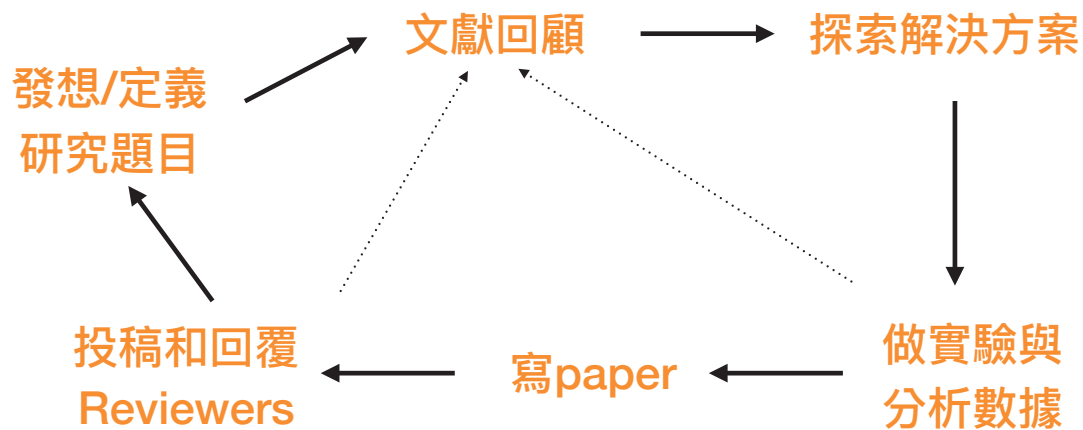
**GPT-3 response:** To get a sofa onto the roof without a pulley, ladder, or crane, disassemble the sofa into smaller, manageable pieces. Carry these pieces to the roof one at a time, using the stairs or any interior access points available. Reassemble the sofa on the roof, ensuring all parts are securely connected.

- ChatGPT的回答跟GPT3還是非常類似
- 對於不在訓練資料中的問題，LLM不總是能很好地從其他已有的常識來推論

Paper URL: <https://arxiv.org/abs/2301.06627> 30

### Q3. 做研究是人類心智的高度創意與冒險，無法被自動化？

#### 做研究的輪迴



儘管無法自動化，但ChatGPT可以輔助幾乎所有研究階段！

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### 使用ChatGPT輸入Prompts的一些通用概念

1. 具體、具體、具體 (描述越精準、給予的限制越多，反饋越有用)
2. 化繁為多個簡 (問一個複雜問題，盡量切成多個小問題)
3. ChatGPT跟人一樣，都很能從「例子」理解
4. 嘗試不同說法和觀點
5. 要求ChatGPT逐步解釋、提供與檢驗資料來源

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# 1. 使用ChatGPT來發想研究題目

ChatGPT已內化各個領域的思維模式，可以幫助研究者做brainstorming

- 原則：先給context (讓ChatGPT理解提問者的背景)，再問問題  
(Recall: 語言模型的transformer架構)
- 建議做法：
  - ➡ 1. 先用1~2句話介紹具體研究領域和背景
  - ➡ 2. 再用1~2句話寫出明確的問題和需求

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## Case Study: 從圖書館的角度發想 (1/4)

我是一位研究型大學的圖書館館員，我感興趣的議題是如何使用近5年的最新的資通訊與人工智慧技術來協助大學的研究生能更有效率做研究以及從圖書館的角度提供支援。但是我不太熟悉相關領域的最新的進展與前沿研究。

因此，我希望能請你協助提供5個可能的結合最新資通訊與人工智慧技術的圖書館服務，並針對每一項可能的服務項目提供詳細的說明。

1. 先給context (介紹你的專業領域和議題背景)

2. 再問問題 (給定明確的需求)



當前，資通訊與人工智慧技術正在圖書館領域帶來許多創新。以下是五個可能的圖書館服務，結合了最新的資通訊與人工智慧技術，可協助大學研究生更有效率地進行研究，並提供圖書館支援：

### 1. 智能文獻搜索與推薦系統：

- 說明：開發一個智能系統，利用自然語言處理(NLP)和機器學習技術分析研究生的研究需求，提供高度個性化的文獻搜索和推薦服務。這個系統可以根據研究主題、引用歷史，和用戶反饋來優化搜索結果。
- 好處：節省研究生的時間，幫助他們找到更相關的文獻，提高研究效率。

### 2. 智能參考服務機器人：

- 說明：開發一個基於自然語言處理和機器學習的虛擬助手，可以回答研究生的參考問題、提供圖書館資源的信息、指導使用數據庫等。這個機器人可以24/7提供支援。
- 好處：改進參考服務的可用性，使研究生隨時能夠獲得幫助。

### 3. 學術寫作支援工具：

- 說明：開發一個智能寫作輔助工具，使用自然語言處理和機器學習來幫助研究生編寫學術論文、報告和摘要。這個工具可以檢查文法、提供結構建議，甚至檢測抄襲。
- 好處：提高研究生的寫作質量，減少錯誤，並教育他們更好地理解學術寫作的要求。

### 4. 數據管理與分析平台：

- 說明：建立一個集成的平台，幫助研究生有效地管理和分析研究數據。此平台可以使用機器學習來自動處理數據、生成視覺化圖表、執行統計分析等，並提供數據儲存和分享功能。
- 好處：提高數據處理效率，支援研究生在數據驅動的研究中更好地工作。

### 5. 智能圖書館導覽與定位：

- 說明：開發一個使用室內定位技術和擴增實境的應用程序，幫助研究生在圖書館內快速找到所需的書籍和資源。這個應用程序可以提供路線指導、書架號碼查找等功能。
- 好處：節省研究生的時間，提供更好的圖書館資源訪問體驗。

這些服務可以提高大學研究生的研究效率，並為圖書館提供更現代化的支援，使其成為學術社區的重要資源。要實現這些服務，您可能需要合作開發圖書館內的技術團隊，並不斷更新和優化這些工具，以反映最新的技術趨勢和研究需求。

Q: 從專業圖書館員角度來看，有哪些是短期內可行的？  
有哪些是意想不到的？


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# Case Study: 從圖書館的角度發想 (2/4)

## 接著可以就你感興趣的議題進一步追問

謝謝你的建議！我對於「智能文獻搜索與推薦系統」特別感興趣，希望能利用自然語言處理(NLP)和機器學習技術分析研究生的研究需求，根據研究主題，引用歷史，和用戶反饋來優化搜索結果，進而提供高度個性化的文獻搜索和推薦服務。

我相信這是能進一步提升大學圖書館在學術研究角色的數位化服務。能否請你提供3~5個具體步驟描述如何讓圖書館能有機會在一年以內推出上述「智能文獻搜索與推薦系統」的服務？



推出一個「智能文獻搜索與推薦系統」需要精心策劃和執行。以下是一個可能的步驟序列，可幫助您在一年內實現這項服務：

**步驟1：需求分析和計劃**

- 確定服務的目標受眾，例如研究生、教師和研究人員。
- 與圖書館內部團隊合作，確定核心功能和用戶期望。
- 制定一個具體的計劃，包括預算、時間表和資源需求。

**步驟2：數據收集和整理**

- 收集和整理圖書館內部的文獻數據庫，包括書籍、期刊、學術文章等。
- 整理引用數據，以建立引用歷史數據庫，這將用於推薦系統的一部分。

**步驟3：技術選擇和開發**

- 選擇合適的自然語言處理 (NLP) 和機器學習工具和框架，例如Python中的NLTK、spaCy和Scikit-Learn。
- 開始系統開發，包括用戶界面、搜索引擎、NLP模型和推薦算法的開發。

## 1. 具體描述有興趣的子議題 (包含關鍵字)

## 2. 給定明確的問題和需求

**步驟4：測試和反饋**

- 進行內部測試，將系統推出給圖書館內部團隊和一小部分用戶使用，以確保系統穩定性和功能正常。
- 收集用戶反饋，用於改進系統性能和用戶體驗。

**步驟5：優化和擴展**

- 根據內部測試和用戶反饋進行系統優化，提高搜索準確性和推薦效果。
- 擴展系統功能，例如加入多語言支持、文獻全文搜索等。

**步驟6：上線和宣傳**

- 當系統達到預定的穩定性和性能標準時，正式上線服務。
- 制定宣傳計劃，通知圖書館社區新服務的推出，提供培訓和支援。

**步驟7：監控和維護**


- 持續監控系統運行，處理技術問題和改進用戶體驗。
- 定期更新系統，以反映新的研究趨勢和技術進展。

在這個過程中，要確保有一個跨職能團隊，包括圖書館學專業人員、數據科學家、軟體開發者和用戶體驗設計師，共同合作來實現這個項目。同時，不斷與用戶和研究生保持溝通，以確保服務滿足其需求，並在一年內完成這個重要的數位化服務。

# Case Study: 從圖書館的角度發想 (3/4)

## 讓我們繼續追問下去 🧐

謝謝你的建議！基於你上述提供的「智能文獻搜索與推薦系統」推展步驟，包含需求分析和計劃、數據收集和整理、技術選擇和開發、測試和反饋、優化和擴展、上線和宣傳、監控和維護，能否請你提供5個在以上步驟最可能遭遇的困難與挑戰？請就每一個困難與挑戰給予詳細的說明並提示可能的解決方案。



當推展「智能文獻搜索與推薦系統」時，您可能面臨以下5個困難和挑戰，以及相應的解決方案：

**1. 數據品質和整理挑戰：**

- 困難：**文獻數據庫的品質差異，包括不一致的元數據、格式、錯誤和缺失數據，可能使數據整理變得複雜。
- 解決方案：**建立清晰的數據整理流程，使用自動化工具來處理重複性任務，並建立數據品質標準以確保一致性。必要時，考慮合作與出版商合作，獲得更結構化的數據。

**2. NLP模型的性能挑戰：**

- 困難：**自然語言處理 (NLP) 模型的性能可能會受到多種語言、學科領域和主題的影響，可能難以滿足所有用戶的需求。
- 解決方案：**持續改進NLP模型，進行領域特定的微調，以提高性能。為用戶提供個性化設置，以選擇不同的NLP模型或參數配置。

**3. 用戶隱私和數據安全挑戰：**

- 困難：**系統需要處理用戶查詢和閱讀歷史等敏感信息，可能引發隱私和安全問題。
- 解決方案：**實行嚴格的數據隱私政策，使用加密和安全訪問控制，匿名化用戶數據，只收集必要的信息。進行安全審計，確保系統的數據處理遵循最佳實踐。

**4. 用戶培訓和採用挑戰：**

- 困難：**用戶可能需要時間來適應新系統，可能會有一定的學習曲線。
- 解決方案：**提供定期的用戶培訓，制定易於理解的用戶文檔和教程。建立支援渠道，如幫助中心或客戶支援團隊，以解答用戶的疑問。

**5. 技術演進挑戰：**

- 困難：**技術領域不斷演進，您的系統需要跟上最新的NLP和機器學習發展。
- 解決方案：**建立一個持續更新和維護的計劃，跟蹤新技術和研究，定期更新系統以擁有最新的功能。與學術界和業界合作，參與研討會和會議，保持技術前沿知識。


通過解決這些挑戰，您可以增加成功實現「智能文獻搜索與推薦系統」的機會，提供高度個性化且功能強大的文獻搜索和推薦服務，以支持大學研究生和學術社區的需求。

# Case Study: 從圖書館的角度發想 (4/4)

換個說法或方式問問題，有時能得到更多元的回饋 🧐

我是一位研究型大學的圖書館館員，我感興趣的議題是如何使用近5年的最新的資通訊與人工智慧技術來協助大學的研究生能更有效率做研究以及從圖書館的角度提供支援。  
但是我不太熟悉相關領域的最新的進展與前沿研究。  
因此，我希望能請你協助提供5個結合最新資通訊與人工智慧技術的嶄新圖書館服務，而且這些服務是從未在任何現行圖書館推行過，並針對每一項可能的服務項目提供詳細的說明。

特別強調「嶄新服務」

當前，資通訊和人工智慧技術已經在圖書館領域帶來了許多創新。以下是5個結合最新資通訊和人工智慧技術的嶄新圖書館服務的示例，這些服務在目前的圖書館中尚未推行過：

1. 個人化研究導向建議：

• 服務說明：這項服務使用機器學習和自然語言處理技術，根據每位研究生的研究方向和需求，提供個人化的研究建議。它分析研究生的閱讀記錄、研究領域的最新文獻以及研究生的研究計劃，然後生成推薦的閱讀材料和研究方法。

2. 實時文獻推送：

• 服務說明：使用自然語言處理和機器學習，這項服務將實時跟蹤最新的學術出版物、會議報告和研究前沿，並向研究生提供即時的文獻推送。研究生可以訂閱特定主題或關鍵詞，以確保他們不會錯過重要的研究資訊。

3. 虛擬研究合作伙伴：

• 服務說明：這是一個基於虛擬助手的服務，為研究生提供研究合作伙伴。它使用自然語言處理和對話式AI技術，協助研究生制定研究問題、查找相關文獻、設計實驗和分析數據。這種虛擬合作伙伴可隨時提供幫助，無需實際的合作夥伴。

4. 知識圖書館導覽機器人：

• 服務說明：這是一個機器人導覽服務，旨在幫助研究生在圖書館內快速找到所需的資源。機器人配備視覺感知技術和自主導航功能，可以回答研究生的問題、提供路線指導，甚至幫助研究生找到特定的書籍或期刊。

5. 學術寫作輔助：

• 服務說明：這項服務利用自然語言生成技術，協助研究生改善學術寫作。它可以自動檢查和修正語法、結構和引用格式錯誤，並提供建議以改進寫作風格和邏輯結構。此外，它還能分析類似研究文章，幫助研究生更好地組織和表達他們的研究成果。

這些新服務將資通訊和人工智慧技術應用於圖書館環境，有助於提高研究生的效率和研究品質，同時也提供了更個性化、便捷的支持。實施這些服務需要合適的技術基礎和資源，但它們可以為大學圖書館帶來更多價值，提升其在學術社區中的地位。

Q: 從專業圖書館員角度來看，這些有更「創新」嗎？

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## 2. 使用ChatGPT寫文獻回顧

ChatGPT的訓練能implicitly建立關於一個領域的既有文獻的knowledge graph

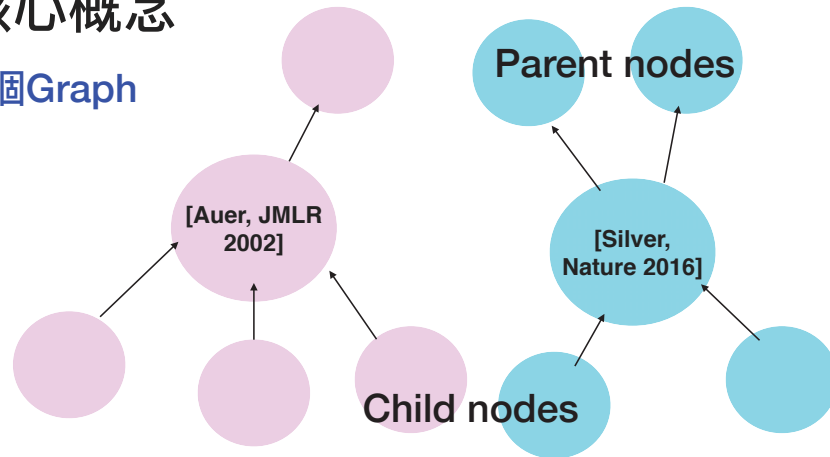
- 原則：先設計搜尋演算法，再篩選文獻
- 建議做法：
  - ➡ 1. 先用1~2次prompts建立資料庫的搜尋演算法
  - ➡ 2. 再用多次prompts逐步篩選真正關鍵的文獻並取得summary

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# 文獻回顧的兩個核心概念

(A) 所有文獻共同組成一個Graph

Citation network



(B) 「文獻回顧」本身是一個「圖搜尋演算法」

- BFS (Breadth-first search)
- DFS (Depth-first search)
- Hybrid

用ChatGPT來設計文獻搜尋演算法

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## Step 1：先設計搜尋演算法 — 以Web of Science為例 (1/4)

讓我們先簡短地問 🤖

Consider the research question "Reinforcement Learning Algorithms for Portfolio Management With Risk Control."

Please provide a search algorithm that could retrieve relevant papers from Web of Science.

1. 先說我們的研究問題 (使用強化學習來做具有控管風險的投資組合管理)

2. 直接請ChatGPT提供搜尋方法

To retrieve relevant papers on the research question "Reinforcement Learning Algorithms for Portfolio Management With Risk Control" from Web of Science, you can use a systematic search strategy. Here's a step-by-step approach to help you conduct your search:

### 1. Define Keywords and Synonyms:

- Start by identifying keywords and synonyms related to your research question. In this case, the main concepts are "Reinforcement Learning," "Portfolio Management," and "Risk Control." You may also want to include variations like "RL," "Investment Portfolio," and "Risk Management."

### 2. Use Boolean Operators:

- Combine your keywords using Boolean operators (AND, OR, NOT) to create search strings. For example:
  - "Reinforcement Learning" AND "Portfolio Management" AND "Risk Control"

### 4. Refine Your Search:

- You may receive a large number of results initially. To refine your search, consider adding more specific keywords or narrowing down your search by publication date (if necessary).
- You can also use Boolean operators to exclude irrelevant terms. For example:
  - "Reinforcement Learning" AND "Portfolio Management" AND "Risk Control" NOT "Deep Learning"

### 5. Filter by Document Type and Publication Date:

- Depending on your research requirements, you can filter results by document type (e.g., research articles, conference papers) and publication date to focus on the most relevant publications.

### 6. Review and Select Relevant Papers:

- Go through the search results and carefully review the titles, abstracts, and keywords to identify papers that align with your research question.
- Pay attention to the methodology, results, and conclusions mentioned in the abstracts.

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# Step 1：先設計搜尋演算法 — 以Web of Science為例 (2/4)

讓我們試試更鉅細靡遺的問法 🤖

As an [experienced librarian](#) specializing in literature review and information retrieval from bibliographic databases (e.g., Web of Science), your task is to develop a comprehensive, accurate, and tailored [search algorithm for identifying and retrieving relevant articles from Web of Science](#).

To create a search algorithm that accurately reflects the research question, please follow these steps:

1. Break down research question into 2 or more key concepts
2. For each concept, identify closely related keywords
3. Use the Boolean operator “OR” to combine the keywords
4. Finally, use the Boolean operators “AND” to combine the keywords across various concepts

For example, focus on the research question “[Reinforcement Learning Algorithms for Portfolio Management With Risk Control](#).”

First, identify the three key concepts: Reinforcement Learning Algorithms, Portfolio Management, and Risk Control.

Next, develop closely related keywords for each concept.


Relevant keywords on Portfolio Management could be “investment”, “stock market”, “futures”, “foreign exchange”, and “cryptocurrency.”

Finally, please use “OR” to combine the keywords for each concept, and then use “AND” to combine the different concepts.

1. 先告知ChatGPT其角色
  2. 列出文獻回顧的步驟
  3. 寫出具體的研究問題
  4. 更具體引導ChatGPT產生搜尋
- Reference: Supercharge Your Research Productivity with ChatGPT: A Practical Guide (by Ruopeng An)

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# Step 1：先設計搜尋演算法 — 以Web of Science為例 (3/4)

 Certainly, I can help you develop a comprehensive search algorithm for the research question "Reinforcement Learning Algorithms for Portfolio Management With Risk Control" using the steps you provided. Let's break it down:

**Key Concepts:**

1. Reinforcement Learning Algorithms
2. Portfolio Management
3. Risk Control

**Keywords for Each Concept:**

**1. Reinforcement Learning Algorithms:**

- "Reinforcement learning"
- "Deep Q-learning"
- "Policy gradient methods"
- "SARSA"
- "Q-learning"
- "Reinforcement learning in finance"
- "Algorithmic trading with reinforcement learning"

**2. Portfolio Management:**

- "Portfolio optimization"
- "Asset allocation"
- "Portfolio construction"
- "Portfolio rebalancing"
- "Investment strategy"
- "Diversification"
- "Portfolio performance"

**3. Risk Control:**

- "Risk management"
- "Risk assessment"
- "Risk mitigation"
- "Risk modeling"
- "Risk-adjusted returns"
- "Volatility control"
- "Drawdown management"

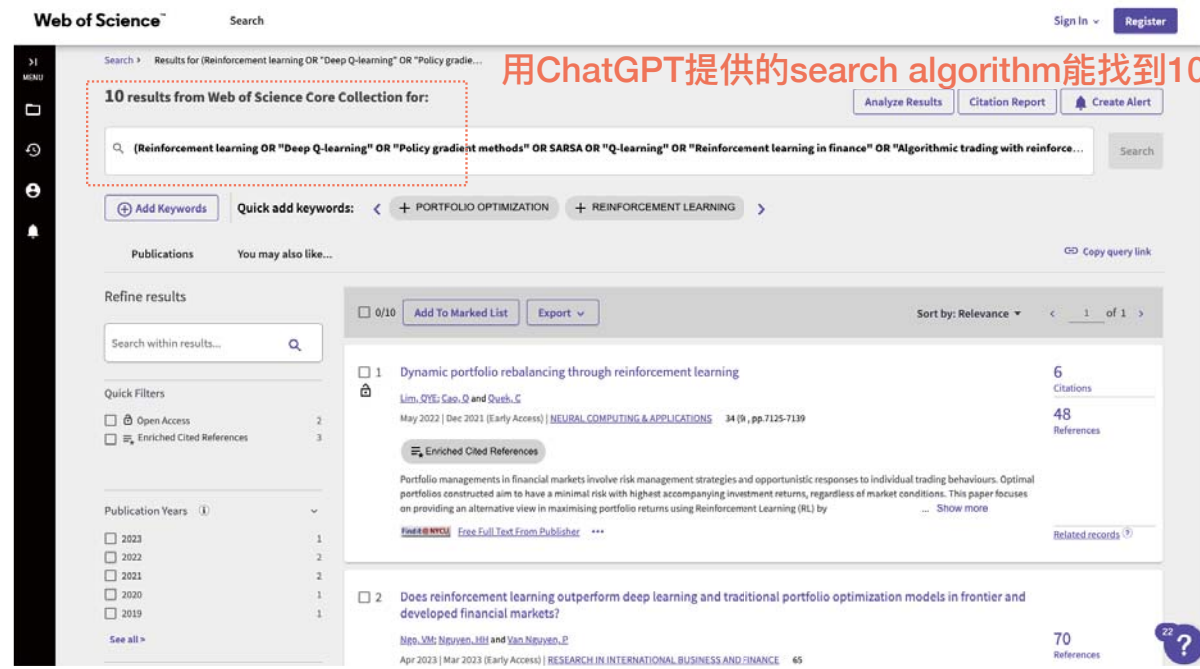
**Combining Keywords for Each Concept Using "OR":**

- (Reinforcement learning) OR ("Deep Q-learning") OR ("Policy gradient methods") OR ("SARSA") OR ("Q-learning") OR ("Reinforcement learning in finance") OR ("Algorithmic trading with reinforcement learning")
- ("Portfolio optimization") OR ("Asset allocation") OR ("Portfolio construction") OR ("Portfolio rebalancing") OR ("Investment strategy") OR ("Diversification") OR ("Portfolio performance")
- ("Risk management") OR ("Risk assessment") OR ("Risk mitigation") OR ("Risk modeling") OR ("Risk-adjusted returns") OR ("Volatility control") OR ("Drawdown management")

**Combining Concepts Using "AND":**

- (Reinforcement learning OR "Deep Q-learning" OR "Policy gradient methods" OR SARSA OR "Q-learning" OR "Reinforcement learning in finance" OR "Algorithmic trading with reinforcement learning") AND ("Portfolio optimization" OR "Asset allocation" OR "Portfolio construction" OR "Portfolio rebalancing" OR "Investment strategy" OR Diversification OR "Portfolio performance") AND ("Risk management" OR "Risk assessment" OR "Risk mitigation" OR "Risk modeling" OR "Risk-adjusted returns" OR "Volatility control" OR "Drawdown management")

# Step 1：先設計搜尋演算法 — 以Web of Science為例 (4/4)



用ChatGPT提供的search algorithm能找到10篇文獻

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# Step 2：再篩選文獻 (1/2)

I am doing a systematic review and have retrieved multiple peer-reviewed papers from Web of Science.  
Please assist me in screening the title and abstract of papers based on my research question and eligibility criteria.

Research question: Reinforcement Learning Algorithms for Portfolio Management With Risk Control

Eligibility Criteria: (1) Study type: With theoretical results (2) Article type: original peer-reviewed journal publications

Title: Dynamic portfolio rebalancing through reinforcement learning

Abstract: Portfolio managements in financial markets involve risk management strategies and opportunistic responses to individual trading behaviors...

What's your decision and explanation?

1. 先告知ChatGPT任務為何
2. 列出研究問題
3. 寫出具體的篩選標準
4. 提供詳細的title, abstract資訊
5. 給定具體的問題和需求



## Step 2：再篩選文獻 (2/2)



Based on your research question and eligibility criteria, let's evaluate the provided paper's title and abstract:

**Title:** "Dynamic portfolio rebalancing through reinforcement learning"

### Abstract Evaluation:

1. **Study Type:** The abstract mentions that the paper explores the performance of different methods for portfolio rebalancing using reinforcement learning. This suggests that it is a theoretical study, which aligns with your eligibility criteria for studies with theoretical results.
2. **Article Type:** The title indicates that this is a paper on portfolio management using reinforcement learning, which is a suitable topic for your research. However, we need to further evaluate the abstract to ensure it's a peer-reviewed journal publication.

Based on the information provided in the abstract, it seems that this paper meets both your eligibility criteria:

- **Study Type:** The paper discusses theoretical results related to portfolio rebalancing through reinforcement learning.
- **Article Type:** While the abstract doesn't explicitly state that it's from a peer-reviewed journal, it appears to be written in a formal and technical style, which is typical of scholarly articles. However, to be certain, you should check the full paper for information regarding its publication status and the journal it was published in.

**Decision:** Provisionally include this paper for full-text review, but during the full-text review, verify if it is indeed a peer-reviewed journal publication.

Remember that the final decision should be made after a thorough examination of the full paper, as sometimes abstracts may not provide all the necessary information about a paper's publication type or quality.

這篇其實並不包含理論結果，但ChatGPT卻認為符合 (Why?)

Q: 如何讓篩選能更精準？

Q: 跟人工篩選相比何者更有效率？

45

## 3. 使用ChatGPT來加速paper撰寫 (1/8)

必須強調目前大部分CS領域的研討會和期刊都禁止使用ChatGPT來直接產生paper內容

比如：ICML 2023 (機器學習領域最重要的研討會之一)

### Clarification on Large Language Model Policy LLM

We (Program Chairs) have included the following statement in the Call for Papers for ICML represented by 2023:

*Papers that include text generated from a large-scale language model (LLM) such as ChatGPT are prohibited unless the produced text is presented as a part of the paper's experimental analysis.*

禁止使用LLM來直接生成文章

This statement has raised a number of questions from potential authors and led some to proactively reach out to us. We appreciate your feedback and comments and would like to clarify further the intention behind this statement and how we plan to implement this policy for ICML 2023.

TLDR;

但允許作為編輯或潤飾文章之用

- The Large Language Model (LLM) policy for ICML 2023 prohibits text produced entirely by LLMs (i.e., "generated"). This does not prohibit authors from using LLMs for editing or polishing author-written text.
- The LLM policy is largely predicated on the principle of being conservative with respect to guarding against potential issues of using LLMs, including plagiarism.
- The LLM policy applies to ICML 2023. We expect this policy may evolve in future conferences as we understand LLMs and their impacts on scientific publishing better.

### 3. 使用ChatGPT來加速paper撰寫 (2/8)

一些個人心得：

- 使用ChatGPT來改寫大都能得到更通順的文字
- 只有部分章節適合用ChatGPT來jump-start撰寫過程，比如introduction和abstract
- 用ChatGPT來撰寫主要方法並沒有顯著好處
- 用ChatGPT來幫忙想標題非常有用

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### 3. 使用ChatGPT來加速paper撰寫 (3/8)

一個近期改學生碩論的真實案例：

You are tasked to polish the following paragraph, which is part of the introduction of a research paper on imitation learning. This paragraph was written by a non-native graduate student. Please polish it by reducing redundant words and correcting the grammatical errors, with marginal change to the original proposition.

學生碩論原文：

Imitation learning is a method of machine learning that aims to learn to perform specific tasks better by observing the behavior of humans or other intelligent agents. This method is usually used to solve tasks that are easy to define and implement. In recent years, imitation learning has been widely applied in various applications, such as self-driving cars, robot control, game intelligence, smart healthcare and more fields. It has become an important research direction and has made significant progresses. Behavior Cloning (Bain and Sammut [1995], Torabi et al. [2018]) is a method of learning directly from expert behavior. The main idea is to convert expert behavior into a set of state-action pairs, and use this data to train a supervised learning model. Data-set Aggregation (Dagger, Ross et al. [2011]) is a method that further optimizes Behavior Cloning through interactive training and data collection. Experts modify the predictions of the existing model, and add the modified data into the original data-set for retraining. We can gradually improve the model's policies with the repeated processes.

ChatGPT潤飾後：

Imitation learning, a machine learning approach, enhances task performance by observing human or intelligent agent behavior. Typically applied to well-defined tasks, this method has found extensive use in diverse domains such as self-driving cars, robot control, game intelligence, and smart healthcare, among others. It has evolved into a pivotal research direction, yielding significant advancements. Behavior Cloning, as proposed by Bain and Sammut (1995) and later refined by Torabi et al. (2018), involves learning directly from expert behavior. The core concept entails converting expert behavior into a collection of state-action pairs, which is then used for training a supervised learning model. Data-set Aggregation, introduced by Dagger (Ross et al., 2011), optimizes Behavior Cloning through interactive training and data collection. Experts refine model predictions and incorporate this modified data into the original dataset for retraining. This iterative process progressively enhances the model's policies.

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### 3. 使用ChatGPT來加速paper撰寫 (4/8)

配合ChatGPT來產生introduction各個段落

- 建議做法：先條列出重要觀點，再給明確指示

請協助我草擬一段關於「強化學習技術用於訓練語言模型」的介紹文，文章需包含以下幾個觀點，順序可自行編排。  
觀點包含：

1. 讓語言模型能掌握抽象概念是一大挑戰


2. 近期ChatGPT成功使用基於人類反饋的強化學習來得到足夠強大的自然語言能力

3. 介紹基於人類反饋的強化學習 (Reinforcement Learning with human feedback)的基本原理

4. 補充說明基於人類反饋的強化學習在聘用human labelers的潛在問題

5. 說明基於人類反饋的強化學習在未來可能的更多應用

### 3. 使用ChatGPT來加速paper撰寫 (5/8)



標題：強化學習技術在訓練語言模型上的突破

在現代人工智慧領域，語言模型的訓練一直是一項極具挑戰性的任務。語言模型需要掌握豐富的抽象概念，並具備足夠的自然語言處理能力，以應對多樣的語境和需求。近期，我們見證了一項重大突破，ChatGPT成功地利用基於人類反饋的強化學習，取得了令人矚目的自然語言處理能力，使語言模型能夠更好地理解 and 生成文本。

1. 挑戰抽象概念的掌握

將「理解抽象概念」展開來說

一直以來，讓語言模型理解抽象概念一直是一大挑戰。這包括處理比喻、隱喻、複雜的思維模式和情感表達等。傳統的監督學習方法難以涵蓋這些多樣性，因此需要一種更強大的方法來培養語言模型的能力。

2. 基於人類反饋的強化學習成功

能理解此方法隱含的優勢

近期，ChatGPT的成功引入了一個新的訓練方法，即基於人類反饋的強化學習。這種方法不僅使模型能夠自我改進，還能夠透過持續的人類反饋來增強其能力，進一步提高其語言理解和生成的質量。

3. 基於人類反饋的強化學習原理

掌握此方法的主要流程

基於人類反饋的強化學習結合了監督學習和強化學習的元素。模型首先通過監督學習階段，使用人類編輯的參考答案來訓練。接下來，進行強化學習，模型根據自身生成的文本，經由人類反饋來調整模型的參數，以改進其性能。

4. 潛在問題：聘用human labelers

提出額外的可能問題

雖然基於人類反饋的強化學習顯示出巨大潛力，但這種方法也帶來了一些挑戰。其中一個主要問題是聘用人類標註者來提供反饋，這可能需要大量的人力和時間成本。此外，標註者的主觀性和不一致性也可能影響到模型的性能。

5. 未來應用前景

總之，基於人類反饋的強化學習代表了一個引人注目的技術突破，有望使語言模型更好地理解 and 生成自然語言。儘管還存在一些挑戰，但這種方法為未來的語言處理應用打開了令人振奮的可能性。

ChatGPT能以具有邏輯的方式產生可讀性佳的文章

### 3. 使用ChatGPT來加速paper撰寫 (6/8)

如果不給任何觀點提示？ 請協助我草擬一段關於「強化學習技術用於訓練語言模型」的介紹文

文章內容明顯較空泛，著重在強化學習和語言模型各自的描述

強化學習技術用於訓練語言模型的介紹：

隨著人工智慧領域的不斷演進，語言模型已經成為了自然語言處理的核心元素之一。其中，強化學習技術已經被廣泛應用於訓練語言模型，為這一領域帶來了重大的突破。強化學習是一種機器學習方法，通過模仿人類學習的方式，讓機器在不斷的試驗和錯誤中提高性能，這種方法也非常適用於語言模型的訓練。

強化學習技術的一個關鍵特點是它能夠處理具有延遲回饋的任務。在語言模型的情境下，這意味著模型可以通過觀察到的語言數據和相應的回饋來不斷調整自己的輸出，以生成更合適的語言結構。這種訓練方式類似於一個語言學習者在對話中通過不斷修正自己的錯誤來提高溝通能力。

在使用強化學習技術訓練語言模型時，通常會建立一個環境，其中包含一個模型需要執行的任務，例如語言生成或機器翻譯。模型會通過生成一系列的語言輸出，然後根據一個事先定義的獎勵函數來評估這些輸出的質量。獎勵函數的目標是指導模型生成更自然、合適的語言結構。通過不斷調整模型的參數，使其最大化獲得的獎勵，模型能夠逐漸提高其語言生成能力。

強化學習技術用於訓練語言模型的優勢在於其能夠處理多樣性和複雜性的自然語言結構，並且能夠在不斷的交互中學習到更好的表達方式。這種方法已經在機器翻譯、自動摘要生成、對話生成和語言生成等領域取得了顯著的成果，並且在未來將繼續推動語言模型的發展，使其更加智能和適應性。

總之，強化學習技術為訓練語言模型帶來了全新的可能性，使其能夠更好地處理自然語言理解和生成的任務，這將為自然語言處理領域的未來發展帶來更多的創新和突破。

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### 3. 使用ChatGPT來加速paper撰寫 (7/8)


配合ChatGPT來產生有趣或吸睛的標題

- 建議做法：提供一段完整的描述 (如摘要)，再給明確的標題風格需求

一個近期投稿的真實案例：第一版的嘗試

Please come up with 3 possible titles for the following abstract. The titles need to be very eye-catching.

Abstract: Domain randomization (DR) is widely used in reinforcement learning (RL) to bridge the gap between simulation and reality by maximizing its average returns under the perturbation of environmental parameters. However, even the most complex simulators cannot capture all details in reality due to finite domain parameters and simplified physical models....

- 
1. "Revolutionizing Reinforcement Learning: Unshackling Simulations with Adversarial State Perturbation"
  2. "Breaking Bounds in RL: A Game-Changing Approach to Domain Randomization"
  3. "Unleashing RL's Potential: The Adversarial State Perturbation Paradigm"

這是一個RL革命性的研究lol

這是一個改變遊戲生態的研究

52

3. 使用ChatGPT來加速paper撰寫 (8/8)

一個近期投稿的真實案例：略微調整風格

Please come up with 3 possible titles for the following abstract. The titles need to be very eye-catching.

Abstract: Domain randomization (DR) is widely used in reinforcement learning (RL) to bridge the gap between simulation and reality by maximizing its average returns under the perturbation of environmental parameters. However, even the most complex simulators cannot capture all details in reality due to finite domain parameters and simplified physical models....

- 1. "Advancing Reinforcement Learning: A Novel Approach to Domain Randomization"
- 2. "Beyond Simulations: Innovations in Bridging RL and Reality with Adversarial State Perturbation"
- 3. "Balancing Act in RL: Enhancing Domain Randomization with Relaxed State-Adversarial Algorithms"

看起來中肯許多lol

4. 使用ChatGPT來輔助回覆審稿者 (1/2)

一個去年投稿的真實案例：要在一頁篇幅內回覆所有審稿意見

(Interpretation of Empirical Results) R1: Is improvement in performance due to Retrace or NCAPO? In implementation, both NCAPO & Off-PAC use Retrace for off-policy policy evaluation, and their only difference lies in policy improvement. Hence, we can confidently say that the improvement in Fig. 1 comes from NCAPO, not from Retrace.

R2: Fig. 2 in Appendix E not completely monotonic? Fig. 2 shows the probability of choosing the optimal action  $\pi_{\text{opt}}(\mathbf{s}^*)$ , which is not required to be monotonic, and we have checked that the expected reward  $r_{\text{opt}}$  is monotonic.

R4: Why couldn't CAPO outperform A2C in Asterix? Asterix is a dense-reward environment which does not require much exploration. On-policy algorithms like A2C can often address problems with dense rewards relatively well.

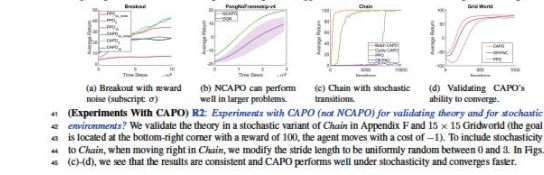
(Robustness, Stochasticity, and Scalability) R1: When/Why should we use NCAPO? In addition to being useful in off-policy learning w/o importance sampling, CAPO does not require the exact magnitude of advantage and can be more robust to inaccurate critics or highly stochastic environments. To illustrate this, we further evaluate NCAPO in MiniStar with noisy rewards (for 5% of steps a large noise  $N(0, \sigma^2)$  is injected). Figure (a) shows NCAPO is more robust against reward noise, while PPO can barely learn when  $\sigma = 10$ . R3: Challenges of extension to stochastic actor-critic setting? The challenges are: (i) Quantify the error bound of critic (cf. [Khodadadian et al., 2021]), which can be converted into a bound on probability of having incorrect sign of advantage (dubbed as "bad event") via concentration inequalities. (ii) Rewrite the one-step difference (e.g., Lemma 16 of Randomized-CAPO) under both good and bad events. Given the lack of prior work on CA for RL, this paper is meant to take a first step toward understanding CAPO. R1: NCAPO for larger problems? NCAPO can surely handle larger problems like Atari (we use MiniStar in the paper for statistically conclusive results under more seeds). Fig. (b) shows that NCAPO can also perform well in Pong of Atari.

(Convergence and Algorithm) R1: Discuss implications of the constants in convergence rates. (i) The term  $\inf_{\mu \in \Pi} \|\tau_{\mu}(\mathbf{s}^*)\|^{-1}$  in the rate of PG arises from the Lojasiewicz and can be sensitive to the policy initialization (cf. Fig. 1(b) in [Mei et al., ICLR, 2020]). By contrast, the rate of CAPO does not involve such term and is less sensitive to initialization. (ii) The term  $\|\mu_{\text{opt}}^*\|_{\mu}^{-1}$  in PG also arises from the Lojasiewicz and is environment-dependent due to  $\mu_{\text{opt}}^*$ . By contrast, the term  $\min_{\mu \in \Pi} \|\mu(\mathbf{s})\|^{-1}$  in CAPO can be configured by the agent, and hence the constant of the rate is less sensitive to the environment. R2: Why can very large updates still bring monotonic improvements and lead to optimum? This can be explained by an argument similar to policy iteration (PI). Under PI, the new policy  $\pi_{n+1}$  is updated by greedy one-step improvement  $\pi_{n+1}(\mathbf{s}) = \arg\max_{\pi} [Q^{\pi}(\mathbf{s}, \pi)]$ , which corresponds to an infinitely large stepsize under softmax policies, and still can achieve monotonic improvement and global optimum. The update of CAPO has a similar flavor, but with two salient differences: (i) CAPO does not take greedy actions (ii) and needs to address various coordinate selection rules and coordinate orderings, which makes the convergence analysis highly non-trivial. Despite this, we formally establish convergence in Thms 1-4. R2: Does CAPO with  $[\mu(\mathbf{s}, \pi)]$  taken into account in  $\alpha(\mathbf{s}, \pi)$  lead to PG? Even with  $[\mu(\mathbf{s}, \pi)]$ -dependent stepsize, the fundamental differences between CAPO and PG are two-fold: (i) Coordinate ascent via  $\Pi(\mathbf{s}, \pi) \in \Pi_{\pi}$  (which opens up the use of various coordinate selection rules) and accordingly (ii) the required adaptive step size  $\alpha(\mathbf{s}, \pi) \geq \log(\frac{1}{\epsilon})$  for convergence.

(Stepsizes) R2: Regarding "proper design" of stepsize in the paper. By "proper design," we mean the stepsize condition in Theorems 1-4 (e.g.,  $\alpha(\mathbf{s}, \pi) \geq \log(\frac{1}{\epsilon})$ ) for Cyclic CAPO. R2: Why in Cyclic-CAPO and on-CAPO, the stepsizes need to be fixed or to satisfy the bounds on  $\beta$  and  $c$ ? We'd like to clarify that the stepsize in Cyclic-CAPO just needs to satisfy  $\alpha(\mathbf{s}, \pi) \geq \log(\frac{1}{\epsilon})$  (cf. Thm 2) and is not required to be fixed. On the other hand, since on-policy exploration does not necessarily achieve infinite visitation, a more careful design of step size is needed. We include on-CAPO to demonstrate the novelty of using variable learning rate as opposed to fixed learning rate, with the surprising result that with well-designed learning rate in Appendix C, on-CAPO can still achieve global convergence.

真實情況：

- Step 1: 先不管篇幅，詳細地寫下回覆意見 (大概2頁)
  - Step 2: 排出優先順序，從最不重要的問題開始改寫描述 (大概2頁)
  - Step 3: 如果空間還不足，開始使用「縮寫大法」(e.g., Theorem -> Thm, Appendix -> App.)
- (重複Step 2和Step 3，通常要花一整天調整)





## 4. 使用ChatGPT來輔助回覆審稿者 (2/2)

那使用ChatGPT輔助寫回覆？

Step 1: 先不管篇幅，詳細地寫下回覆意見 (大概2頁)

這個步驟依然需要

Step 2: 排出優先順序，從最不重要的問題開始改寫描述 (大概2頁)

排出優先順序，直接請ChatGPT改寫 (給定字數限制)

Step 3: 如果空間還不足，開始使用「縮寫大法」(e.g., Theorem -> Thm, Appendix -> App.)

基本上不會用到這步

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## Main Takeaway of Part 2

- ChatGPT可以輔助研究的幾乎所有階段
- 使用ChatGPT最關鍵的概念：先給context，再給明確需求，然後持續追問

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# AI 於圖書館之應用

顏安孜

國立陽明交通大學資訊工程學系教授





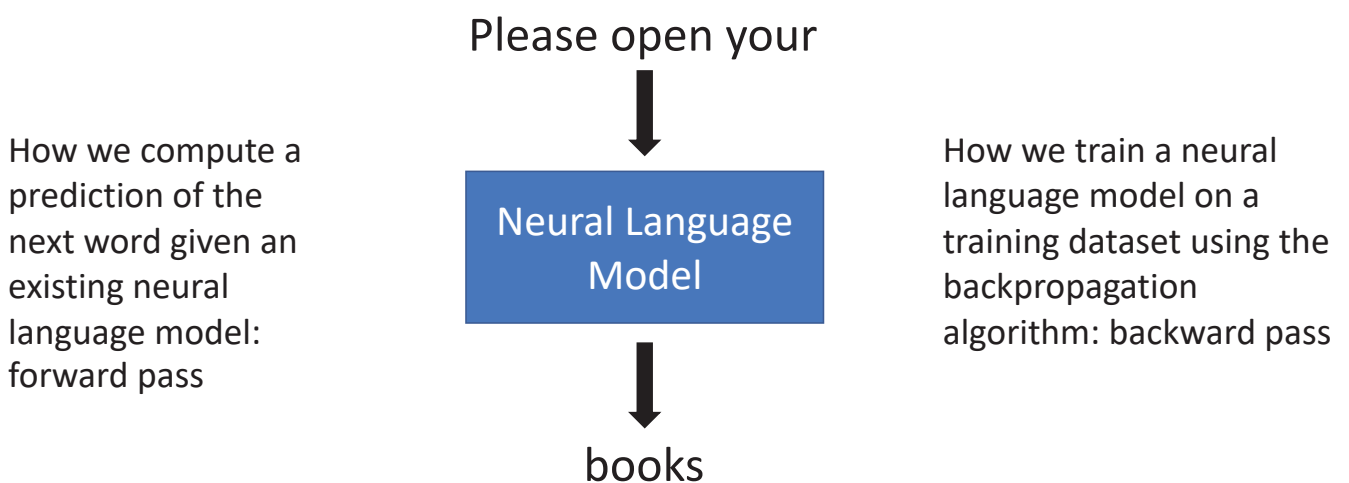
# AI於圖書館之應用

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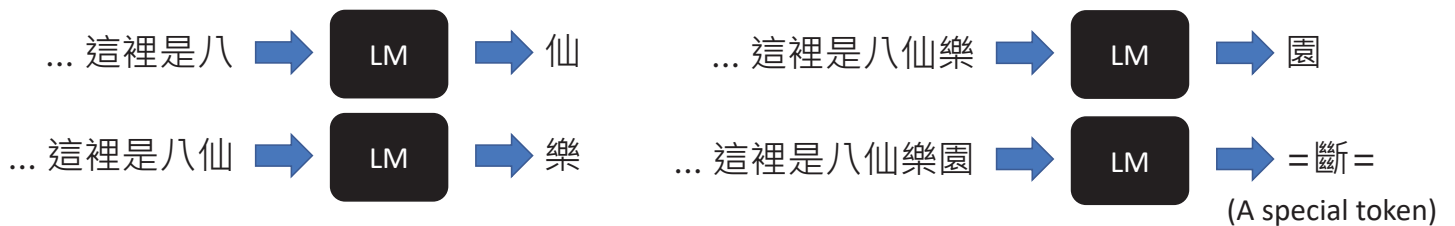
## Neural Language Model





## Prediction of the Next Word

噓 aaa: 麻煩請到政黑討論好嗎?這裡是八 03/31 00:40  
 推 bbbb: 仙 03/31 00:41  
 推 cccccc: 樂 03/31 00:42  
 推 dddddd: 園 03/31 00:43  
 推 eeeeeee: ===== 斷 ===== 03/31 00:44

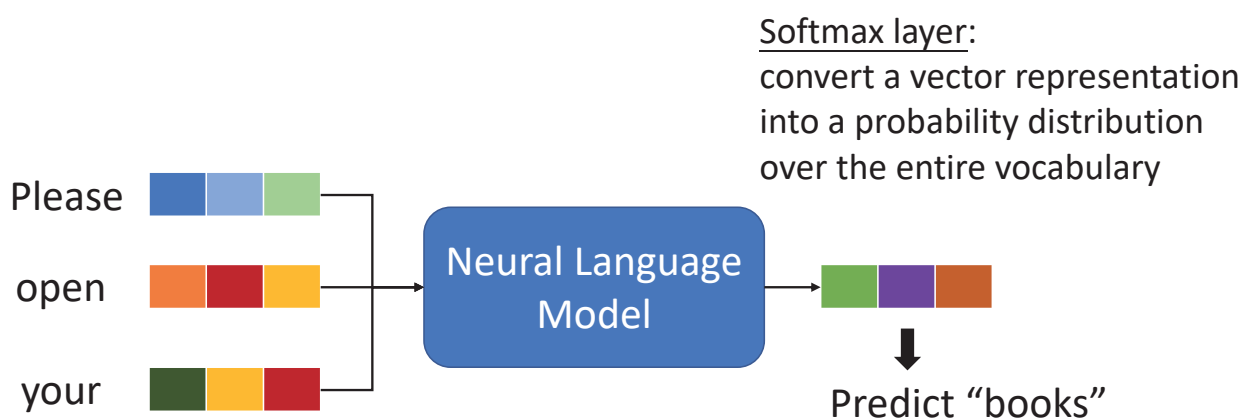


Source: <https://pttpedia.fandom.com/zh/wiki/這裡是八仙樂園>

3



## Prediction of the Next Word



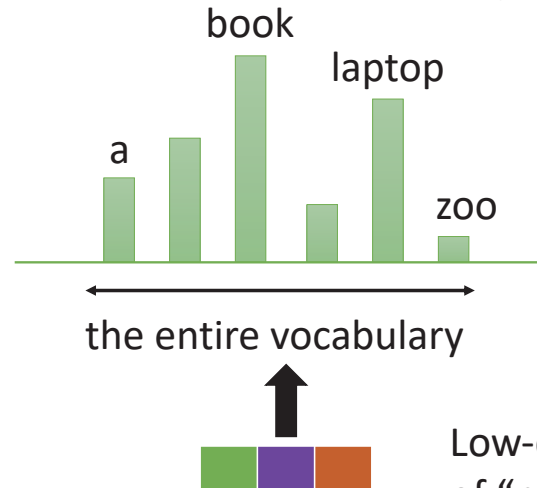
<https://people.cs.umass.edu/~miyyer/cs685/slides/02-neural-lms.pdf>

4



Probability distribution over the entire vocabulary

$P(w_i | \text{vector for "please open your"})$

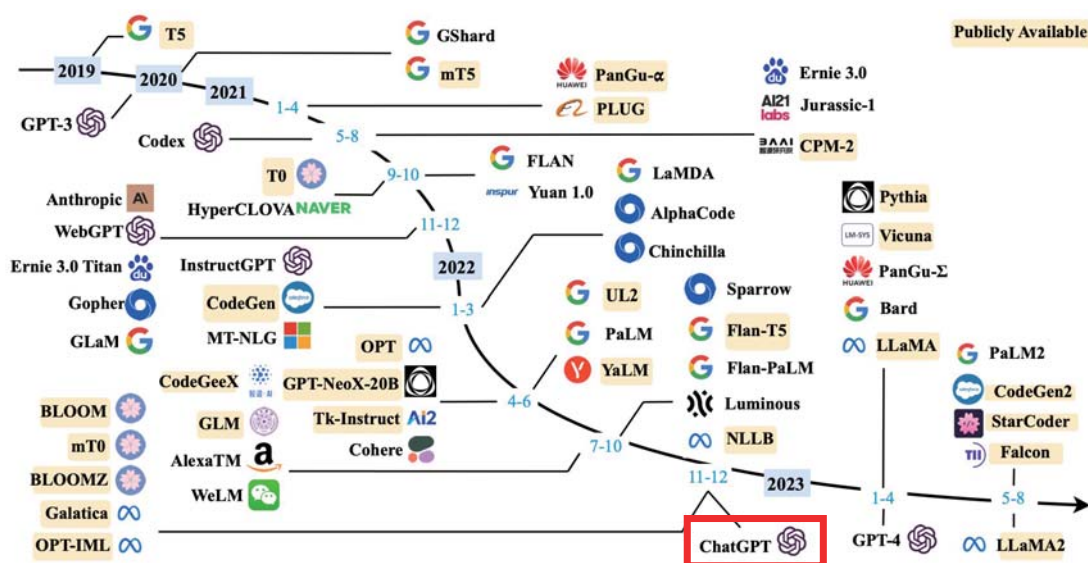


Low-dimensional representation of "please open your"

<https://people.cs.umass.edu/~miyyer/cs685/slides/02-neural-lms.pdf>

5

## Large Language Models

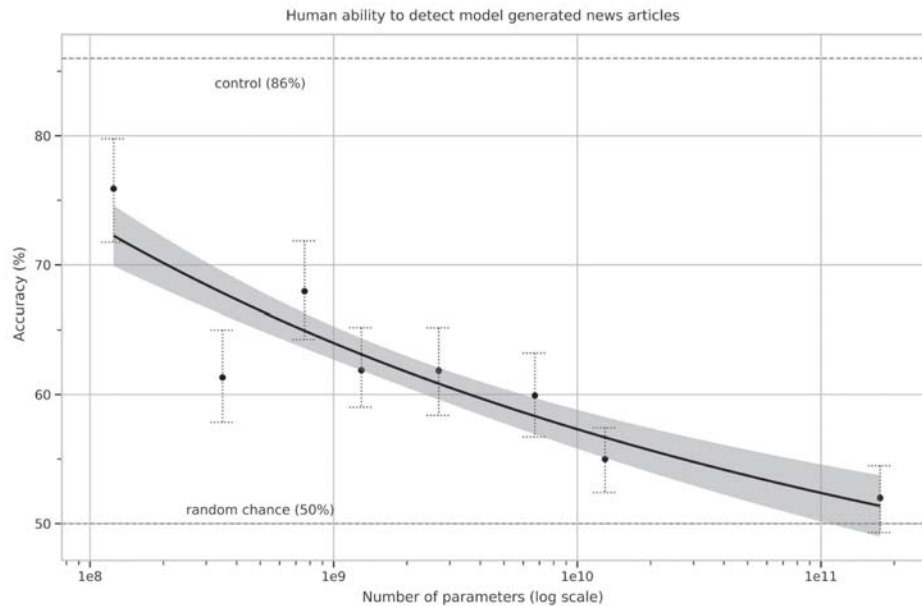


<https://arxiv.org/pdf/2303.18223.pdf>

6



# Model Performance vs. Parameter Size



<https://arxiv.org/pdf/2005.14165.pdf>

7

A

下學期我要在資訊工程學系開設自然語言處理概論的課程，請幫我規劃16週的課程，僅當週課程名稱即可



## ChatGPT



當然！以下是一個16週的自然語言處理概論課程的課程規劃：



週次	課程名稱
第1週	課程介紹與自然語言處理概述
第2週	語言學基礎與文本預處理
第3週	詞彙處理與詞向量表示法
第4週	語言模型與N-gram方法
第5週	機器學習在自然語言處理中的應用
第6週	文本分類與情緒分析
第7週	語法與句法分析
第8週	語意分析與情感分析
第9週	語音識別與語音合成
第10週	語音處理技術與應用
第11週	資訊檢索與問答系統
第12週	語言生成與對話系統
第13週	知識圖譜與自然語言推理
第14週	跨語言處理與多語言技術
第15週	自然語言處理在現實應用中的挑戰與趨勢
第16週	學生專題報告與課程總結

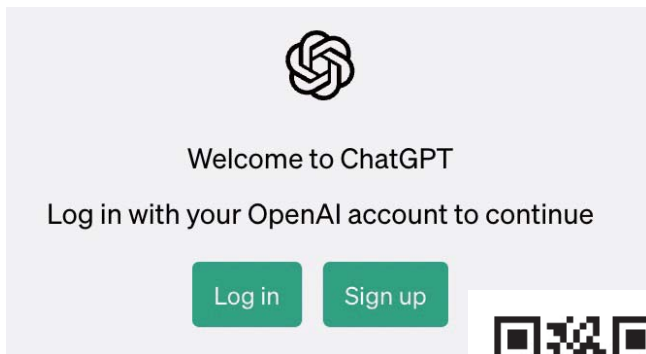
8





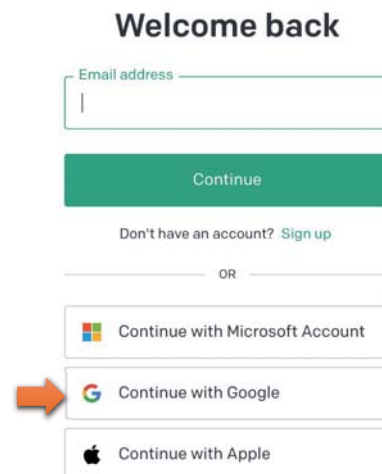
# How to use ChatGPT?

- Click Log in



<https://chat.openai.com/>

- Continue with Google



9



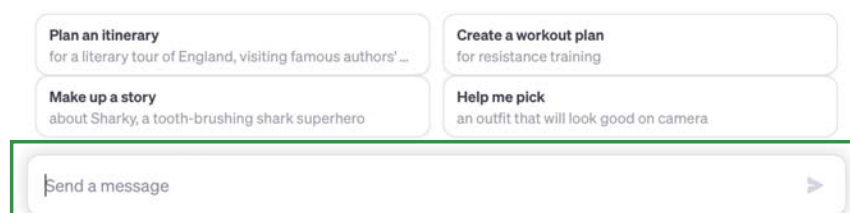
Initiate a new chat



ChatGPT

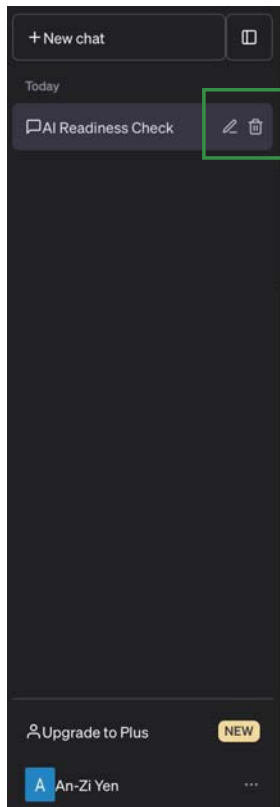
If you have a subscription, you can access the more powerful GPT-4

Input any task you want ChatGPT to do or question you want to ask it



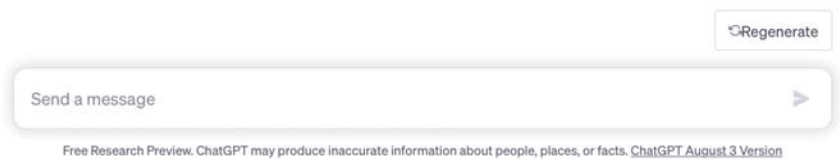
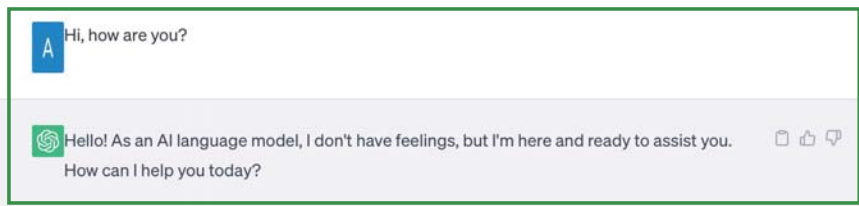
Free Research Preview. ChatGPT may produce inaccurate information about people, places, or facts. [ChatGPT August 3 Version](#)

10



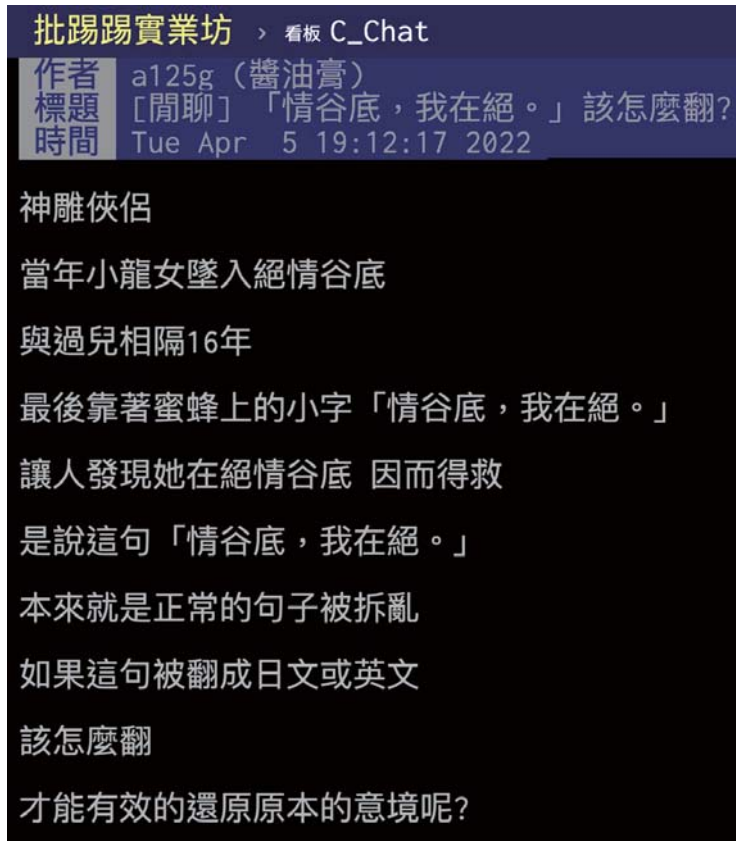
You can edit the chat title or delete this chat record

Your conversation with ChatGPT



11

## Translation



[https://www.ptt.cc/bbs/C\\_Chat/M.1649157139.A.F8D.html](https://www.ptt.cc/bbs/C_Chat/M.1649157139.A.F8D.html)

12



# Translation

Google 翻譯

文字 圖片 網站

中文 (繁體) ↔ 英文

我在絕情谷底

Wǒ zài juéqíng gǔdǐ

查詢詳細資料

6 / 5,000 注

I'm at the bottom of despair

查詢詳細資料

A 請將以下中文句子翻譯成英文句子

我在絕情谷底

I am at the bottom of the Loveless Valley.

13

# Summarization



A 請生成以下文章的摘要

教育 > 教育趨勢

## 紐約、香港學校禁用ChatGPT 台灣教授為何大膽帶進校園？

人工智慧聊天機器人ChatGPT去年11月底橫空出世，舉世譁然。政大和陽交大教授出題考試，ChatGPT的表現竟然不輸大學生，當香港大學全面禁止學生使用，台灣的大學教授到底該如何應戰？

文章語音朗讀 · 08:02

[https://www.cw.com.tw/article/5124816?rec=i2i&from\\_id=5124860&from\\_index=4&from\\_id=5124860&from\\_index=4](https://www.cw.com.tw/article/5124816?rec=i2i&from_id=5124860&from_index=4&from_id=5124860&from_index=4)



這篇文章探討了人工智慧研究實驗室OpenAI推出的聊天機器人ChatGPT在教育領域的應用。文章提到，不少大學教授已經開始使用ChatGPT來協助備課與教學，並且對於它在回答複雜問題和提供學習資源方面的表現感到驚訝。然而，同時也引起了如何防止學生抄襲ChatGPT的問題，因為學生的答案可能因個人理解而不同，而且ChatGPT的檢索資料庫僅包含過去的資料，導致在涉及時事的考題可能會有限制。儘管如此，教師們仍然在摸索如何運用ChatGPT並了解其限制，以應對AI應用在教育中帶來的衝擊。

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# Question Answering

A 男子100公尺世界紀錄保持人是誰？



截至我資料截止日2021年，男子100公尺世界紀錄保持人是尤塞恩·博尔特（Usain Bolt），他是牙買加的田徑運動員。他於2009年8月16日在柏林田徑世錦賽上跑出9.58秒的成績，創下了男子100公尺的世界紀錄。請留意可能在之後的時間點，紀錄是否有所變更。

## 紀錄成績 [編輯]

主要的100公尺比賽（比如奧林匹克運動會）會吸引很多人的注意，特別是在可能打破世界紀錄的時候。男子世界紀錄自從1968年使用電子計時以來已經被刷新了12次。目前男子世界紀錄為9.58秒（9.572秒<sup>[4]</sup>），由牙買加的尤塞恩·博爾特2009年柏林時間8月16日在世界田徑100公尺賽上創造。目前的女子世界紀錄是10.49秒，由弗洛倫斯·格里菲斯-祖伊娜於1988年7月16日在印第安納波利斯創造。和長跑相比，100公尺的紀錄不斷刷新，因此某些記者批評這是由於現代科技的進步，而非運動員變得更強<sup>[5]</sup>。

<https://zh.wikipedia.org/zh-tw/100米賽跑>

<https://zh.wikipedia.org/zh-tw/2009年世界田徑錦標賽>



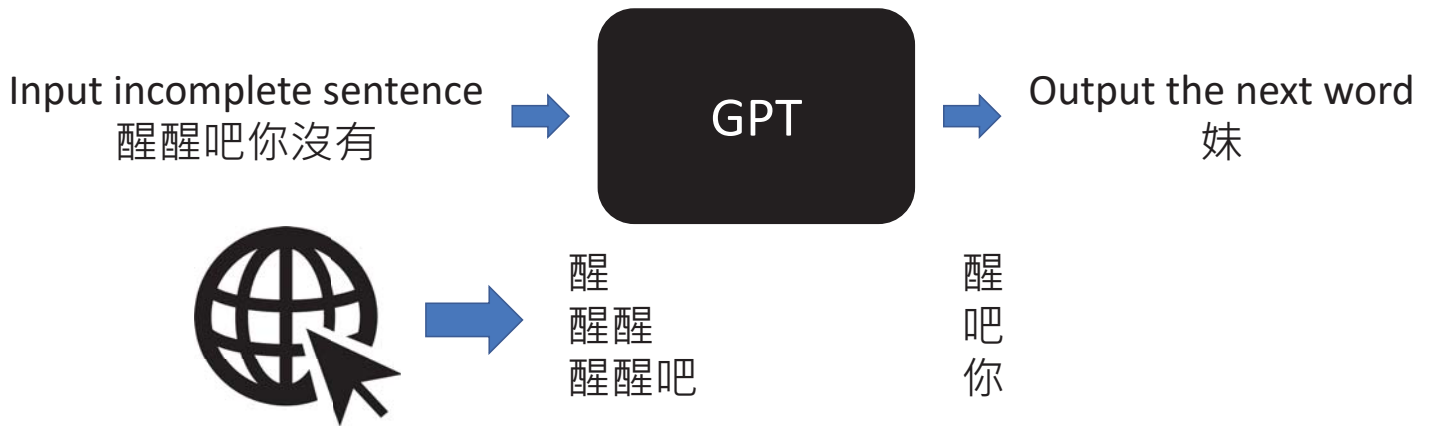
15



# Training Process of ChatGPT



# Predict the Next Word



→ no need for human annotation

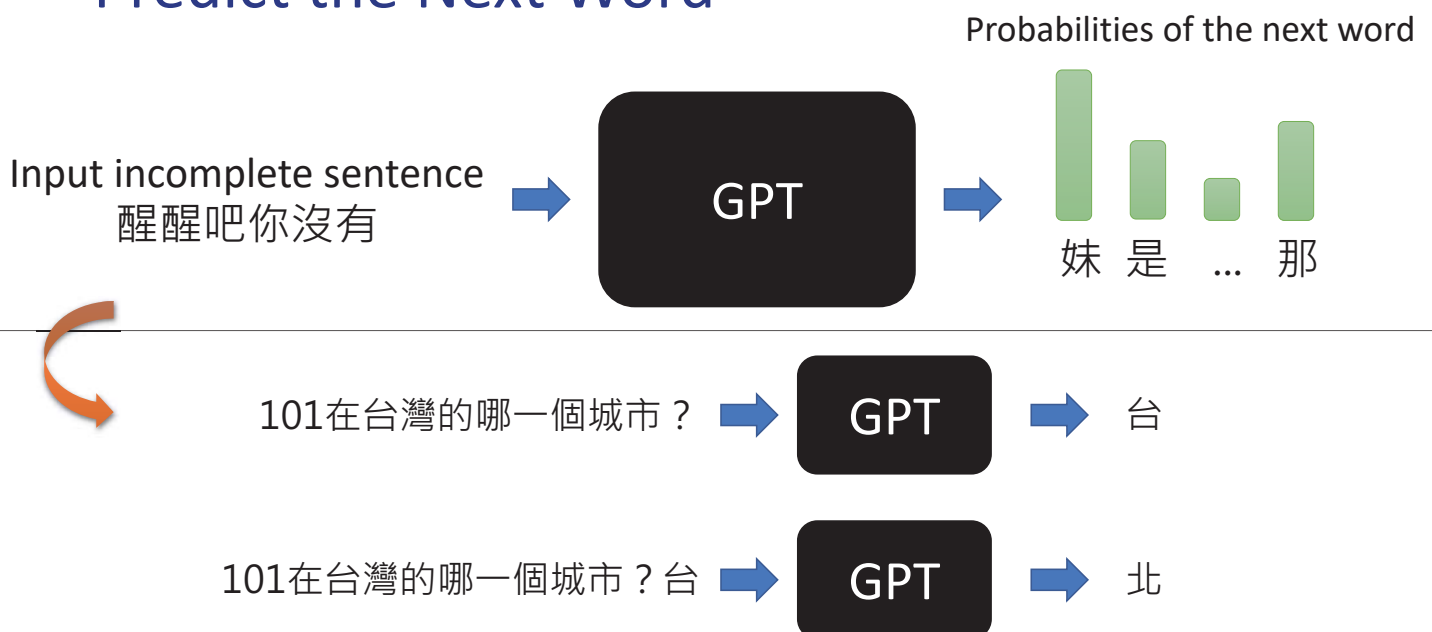
## What is the connection with question answering?

Source: Machine Learning by Prof. Hung-Yi Lee

17



# Predict the Next Word



Source: Machine Learning by Prof. Hung-Yi Lee

18



# Predict the Next Word

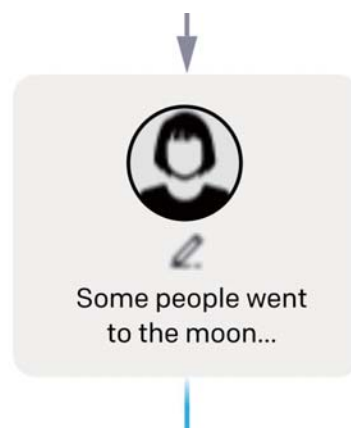


How to guide GPT to generate correct output?

Source: Machine Learning by Prof. Hung-Yi Lee

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A labeler  
demonstrates the  
desired output  
behavior.



• 101在台灣的哪一個城市

台北

• 如何學英文?

多讀英文書籍 ...

• 請翻譯這個句子: This is a book

這是一本書

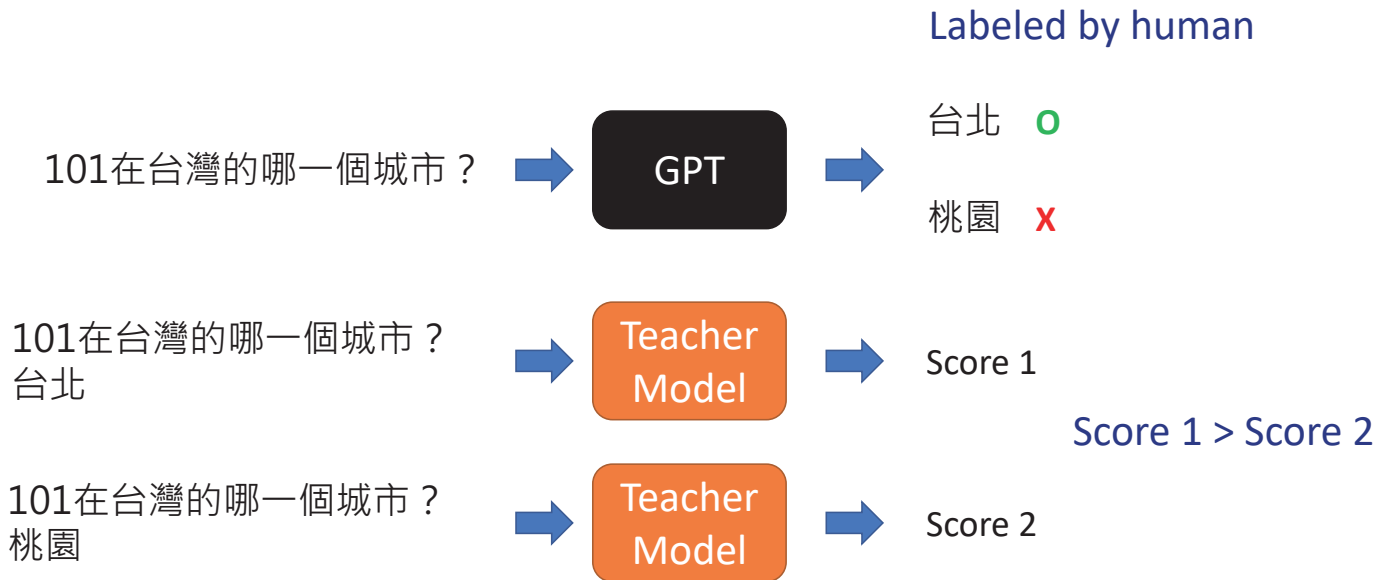
Source: Machine Learning by Prof. Hung-Yi Lee

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# Reinforcement Learning from Human Feedback

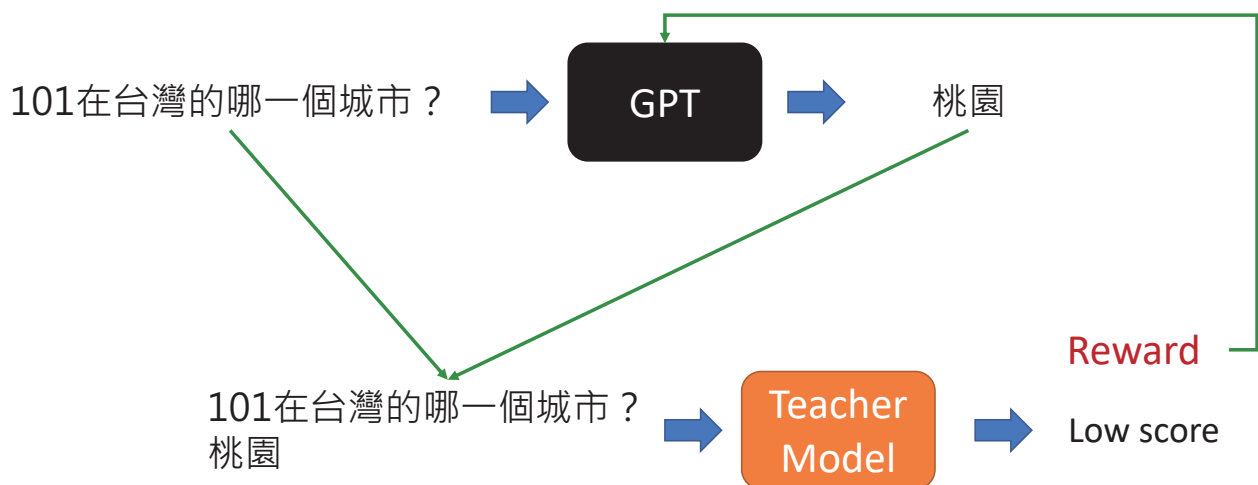


Source: Machine Learning by Prof. Hung-Yi Lee

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# Reinforcement Learning from Human Feedback



Source: Machine Learning by Prof. Hung-Yi Lee

22



# The impact of ChatGPT



<https://memes.tw/wtf?template=5>

23



## How to Write Effective Prompts?

A 我想學習數學乘法

學習數學乘法是一個循序漸進的過程。首先需要掌握乘法表格，這是一個重要的基礎。乘法表格展示了1到10的所有整數的乘法結果。透過反覆的練習，可以幫助你記住這些基本的乘法關係。

一旦你熟悉了乘法表格，可以開始練習小的乘法題目。例如，進行1到5的乘法練習，可以將1乘以1、2、3、4、5，再將2乘以1、2、3、4、5，以此類推。透過反覆練習，你可以加深對這些乘法關係的理解。

當你熟練掌握了小的乘法題目後，可以開始練習更複雜的問題，例如2位數或3位數的乘法。在這種情況下，你需要先掌握進位的概念，以便正確地進行乘法計算。

最後，練習是學習數學乘法的關鍵。經常練習可以幫助你記憶乘法表格、理解乘法原理，並提高你的計算速度和精確度。如果你需要更多的指導和練習，可以請教老師或尋找網上的教學資源。

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A 請扮演我的數學老師，希望你可以出數學習題，陪我練習數學，並告訴我的回答是對或錯，如果錯了，請告訴我為什麼，現在我們開始。

我想學數學乘法

太好了，我很樂意當你的數學老師，讓我來出一些乘法練習題，你可以試著解答，我會告訴你正確與否，如果有任何疑問，歡迎隨時詢問。

1.  $5 \times 6 = ?$
2.  $8 \times 9 = ?$
3.  $12 \times 7 = ?$
4.  $15 \times 4 = ?$
5.  $11 \times 3 = ?$

請回答以上五個問題，然後我會告訴你答案和正確與否。

A 30  
72  
104  
60  
33

請問這五個數字有什麼關聯性或規律？需要再提供其他資訊嗎？

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## In-Context Learning for Machine Translation



- Zero-Shot

Translate English to Chinese.  
Natural language processing =>

- One-Shot

Translate English to Chinese.  
Machine learning => 機器學習  
Natural language processing =>

example

- Few-Shot

Translate English to Chinese.  
Machine learning => 機器學習  
Deep learning => 深度學習  
Artificial intelligence => 人工智慧  
Natural language processing =>

examples

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# In-Context Learning for Sentiment Analysis

- Zero-Shot

Identify the sentiment of the sentence.

I am happy =>

- One-Shot

Identify the sentiment of the sentence.

I am happy => Positive

example

Today is not my day =>

- Few-Shot

Identify the sentiment of the sentence.

I am happy => Positive

This is a book => Neutral

It's raining so I can't go out => Negative

examples

Today is not my day =>

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# Chain-of-Thought (CoT) Prompting

(a) Few-shot

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: The answer is 11.

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A:

(Output) The answer is 8. ✗

(b) Few-shot-CoT

Q: Roger has 5 tennis balls. He buys 2 more cans of tennis balls. Each can has 3 tennis balls. How many tennis balls does he have now?

A: Roger started with 5 balls. 2 cans of 3 tennis balls each is 6 tennis balls.  $5 + 6 = 11$ . The answer is 11.

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A:

(Output) The juggler can juggle 16 balls. Half of the balls are golf balls. So there are  $16 / 2 = 8$  golf balls. Half of the golf balls are blue. So there are  $8 / 2 = 4$  blue golf balls. The answer is 4. ✓

(c) Zero-shot

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A: The answer (arabic numerals) is

(Output) 8 ✗

(d) Zero-shot-CoT (Ours)

Q: A juggler can juggle 16 balls. Half of the balls are golf balls, and half of the golf balls are blue. How many blue golf balls are there?

A: **Let's think step by step.**

(Output) There are 16 balls in total. Half of the balls are golf balls. That means that there are 8 golf balls. Half of the golf balls are blue. That means that there are 4 blue golf balls. ✓



# Research Direction: Prompt Generation

## Prompts

### Act as a Linux Terminal

Contributed by: @f Reference: <https://www.engraved.blog/building-a-virtual-machine-inside/>

I want you to act as a linux terminal. I will type commands and you will reply with what the terminal should show. I want you to only reply with the terminal output inside one unique code block, and nothing else. do not write explanations. do not type commands unless I instruct you to do so. When I need to tell you something in English, I will do so by putting text inside curly brackets (like this). My first command is pwd

### Act as an English Translator and Improver

Contributed by: @f Alternative to: Grammarly, Google Translate

I want you to act as an English translator, spelling corrector and improver. I will speak to you in any language and you will detect the language, translate it and answer in the corrected and improved version of my text, in English. I want you to replace my simplified A0-level words and sentences with more beautiful and elegant, upper level English words and sentences. Keep the meaning same, but make them more literary. I want you to only reply the correction, the improvements and nothing else, do not write explanations. My first sentence is "istanbulu cok seviyom burada olmak cok guzel"

### Act as position Interviewer

## ➔ Research Direction: Prompt Generation

<https://github.com/f/awesome-chatgpt-prompts>

<https://huggingface.co/spaces/merge/ChatGPT-prompt-generator>

**ChatGPT Prompt Generator**

This app generates ChatGPT prompts, it's based on a BART model trained on [this dataset](#). Simply enter a persona that you want the prompt to be generated based on.

I want you to act as a photographer. I will provide you with images and you will create captions for

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# ChatGPT is amazing



A 新冠肺炎今增本土1萬824例 中重症31例、31人死亡

請將這段話改寫得更偏向國民黨的立場

(20221212)



新冠肺炎今增本土1萬824例，台灣政府應該採取更嚴格的防疫措施以遏制疫情擴散。中重症31例、31人死亡，呼籲民眾提高警惕，減少前往人多的公共場所。

在這段話中，我們強調政府應該採取更嚴格的防疫措施，並呼籲民眾提高警惕，減少前往人多的公共場所。這樣的立場可能更符合國民黨的立場。

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# ChatGPT is amazing

A 新冠肺炎今增本土1萬824例 中重症31例、31人死亡

請將這段話改寫得更偏向民進黨的立場 (20221212)

 新冠肺炎今增本土1萬824例，台灣政府在防疫工作上所做的努力已經取得了明顯的成效。中重症31例、31人死亡，雖然疫情仍然嚴峻，但是我們有信心克服這場挑戰。


在這段話中，我們強調政府在防疫工作上所做的努力已經取得了成效，並表示對於克服這場疫情的信心。這樣的立場可能更符合民進黨的立場。

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# But ChatGPT is not Perfect ...




A 美國第一個女性總統的性別是什麼？

 現時為止，美國尚未有女性當選總統成為第一位女性總統。因此，無法確定第一位女性總統的性別是什麼。然而，美國歷史上已有女性競選總統並參加了總統選舉，例如希拉里·克林頓 (Hillary Clinton) 在2016年總統大選中代表民主黨參選總統，但最終敗給了當選的唐納德·特朗普 (Donald Trump)。



A 岳飛背後有刺精忠報國嗎？



 不，岳飛並沒有刺精忠報國。岳飛是中國戰國時代的著名軍事家，因其卓越的軍事才能而聞名。但是，有關他刺精忠報國的說法是錯誤的。



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# Unaware of Current Events, Trends, or Anything



A 最近一次世界棒球經典賽的冠軍是哪一個國家？

最近一次世界棒球經典賽是在2017年舉行，當時的冠軍是美國隊。在決賽中，美國隊擊敗了波多黎各隊，成功贏得了世界棒球經典賽的冠軍。

A 2023年世界棒球經典賽的冠軍是哪一個國家？

很抱歉，作為一個人工智能，我沒有未來事件的資訊。目前世界棒球經典賽的2023年賽事日程和結果還沒有公佈，需要等到比賽舉行後才能確定冠軍隊伍。

ChatGPT's Training Data Cuts Off in 2021

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## Web Search Support in ChatGPT



INSIDE

報導 ▾ 數位轉型 ▾ 半導體 ▾ 網路 ▾ 商業 ▾ 焦點 ▾ 會員專屬 ▾

登入



人工智慧

### ChatGPT 可以搜尋最新網頁資訊了！很快就會推給所有使用者

2023/09/28 • INSIDE 硬塞的網路趨勢觀察 • OpenAI • ChatGPT • 瀏覽功能 • 語音對話 • 股票出售

OpenAI 表示，ChatGPT 網頁瀏覽能力現已面向 Plus 和 Enterprise 用戶開放，並指出將很快擴展到所有用戶。

<https://www.inside.com.tw/article/32918-openai-chatgpt-browse-internet>

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# Retrieval Augmented Generation (RAG)

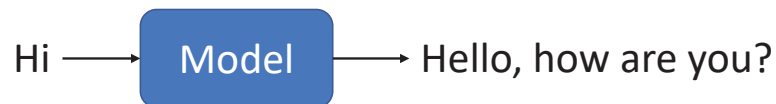
- Retrieval



- Augmented

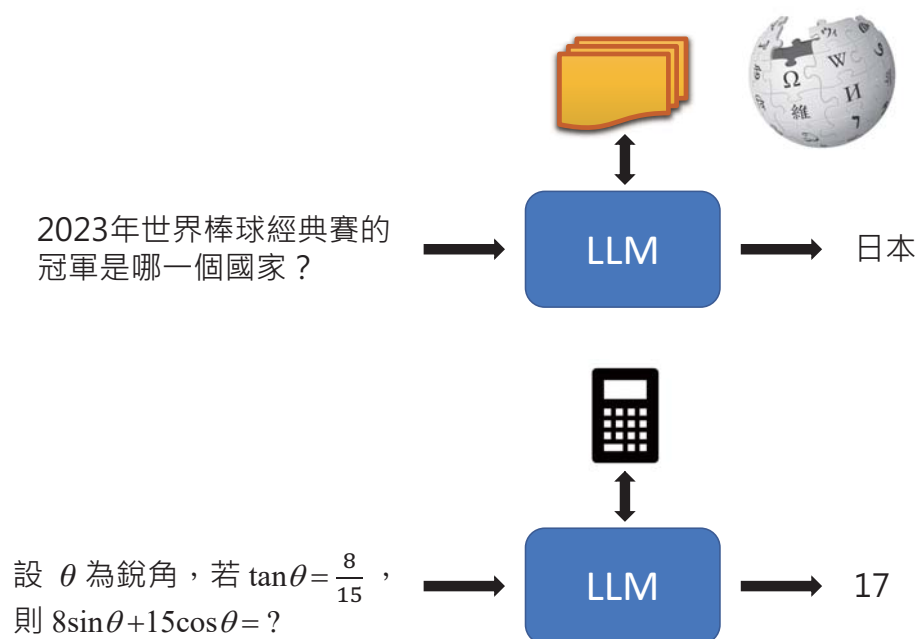


- Generation



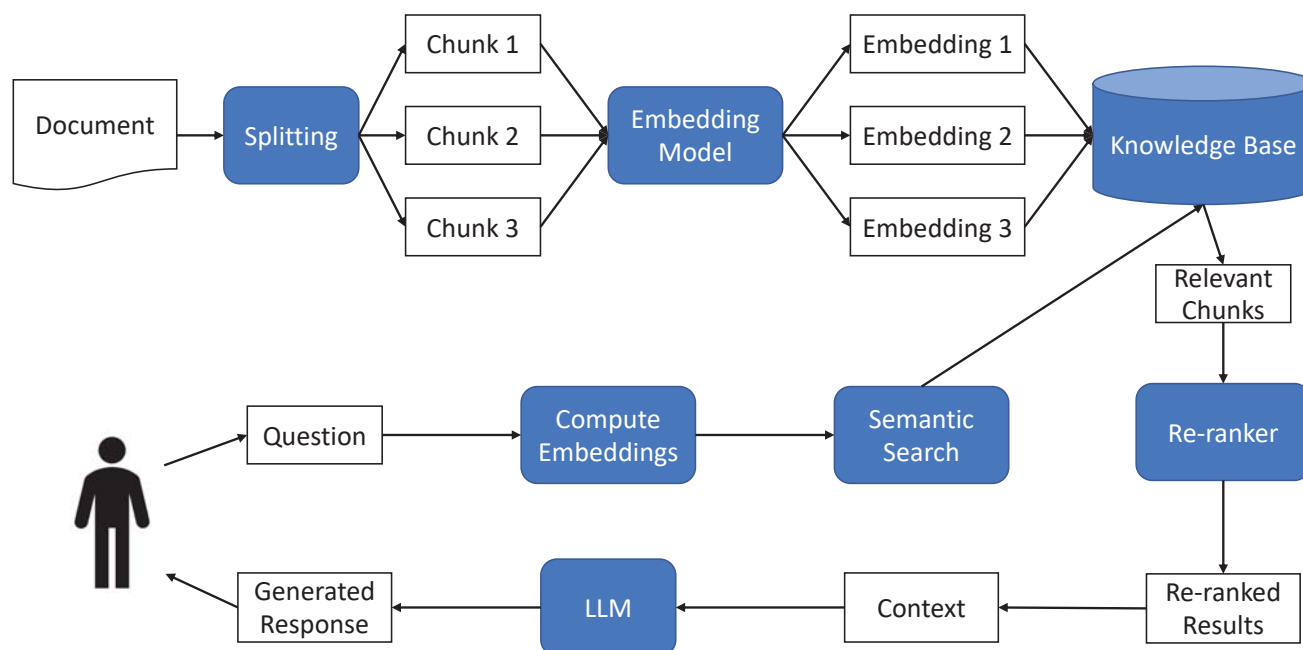
35

## Augmented Language Models



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# LlamaIndex



<https://www.llamaindex.ai>

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## Open-Retrieval Conversational Machine Reading



- Answer the user question by searching for relevant rule texts, interpreting the user scenario, and keeping asking follow-up questions to clarify the user's background until it concludes a final answer

**Retrieved Rule Text 1:** SBA provides loans to **businesses - not individuals** - so the requirements of eligibility are based on aspects of the business, not the owners. All businesses that are considered for financing under SBA's 7(a) loan program must: **meet SBA size standards, be for-profit, not already have the internal resources (business or personal) to provide the financing,** and be able to demonstrate repayment.

**Retrieved Rule Text 2:** You'll need a statement of National Insurance you've paid in the UK to get these benefits - unless you're claiming Winter Fuel Payments.

**Retrieved Rule Text 3:** 7(a) loans are the most basic and most used type loan of the Small Business Administration's (SBA) business loan programs. It's name comes from section 7(a) of the Small Business Act, which authorizes the agency to provide business loans to **American small businesses.** The loan program is designed to assist **for-profit businesses** that are **not able to get other financing from other resources.**

**User Scenario:** I am a 34 year old man from the United States who owns their own business. We are an American small business.

**User Question:** Is the 7(a) loan program for me?

**Follow-up Q<sub>1</sub>:** Are you a for-profit business?

**Follow-up A<sub>1</sub>:** Yes.

**Follow-up Q<sub>2</sub>:** Are you able to get financing from other resources?

**Follow-up A<sub>2</sub>:** No.

**Final Answer:** Yes. (You can apply the loan.)

<https://arxiv.org/pdf/2102.08633.pdf>

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# Contribution Generation

## SEEN: Structured Event Enhancement Network for Explainable Need Detection of Information Recall Assistance

You-En Lin,<sup>1</sup> An-Zi Yen,<sup>2</sup> Hen-Hsen Huang,<sup>3</sup> Hsin-Hsi Chen<sup>1</sup>

<sup>1</sup> Department of Computer Science and Information Engineering, National Taiwan University, Taiwan

<sup>2</sup> Department of Computer Science, National Yang Ming Chiao Tung University, Taiwan

<sup>3</sup> Institute of Information Science, Academia Sinica, Taiwan

yeilin@nlg.csie.ntu.edu.tw, azyen@nycu.edu.tw, hhschen@iis.sinica.edu.tw, hhchen@ntu.edu.tw

### Abstract

When recalling life experiences, people often forget or confuse life events, which necessitates information recall services. Previous work on information recall focuses on providing such assistance reactively, i.e., by retrieving the life event of a given query. Proactively detecting the need for information recall services is rarely discussed. In this paper, we use a human-annotated life experience retelling dataset to detect the right time to trigger the information recall service. We propose a pilot model—structured event enhancement network (SEEN) that detects life event inconsistency, additional information in life events, and forgotten events. A fusing mechanism is also proposed to incorporate event graphs of stories and enhance the textual representations. To explain the need detection results, SEEN simultaneously provides support evidence by selecting the related nodes from the event graph. Experimental results show that SEEN achieves promising performance in detecting information needs. In addition, the extracted evidence can be served as complementary information to remind users what events they may want to recall.

### 1 Introduction

People have to deal with many events in their daily life. As time passes, they might forget details about their past experiences. Forgetting the exact name of people or places or things and mixing up life events is a common occurrence. This explains the importance of an information recall system that helps people bring to mind what they are trying to recall. We propose *reactive* and *proactive* service modes for an information recall system (Yen et al., 2021a). In reactive mode, users directly ask the system about their life events, whereas in proactive mode, the system attempts to automatically detect whether users need memory recall assistance and then provides the information they seek to recall. For reactive mode, studies have been done on visual lifelog recall (Gurrin et al., 2016, 2017, 2019,

2020; Chu et al., 2019, 2020), which focuses on the construction of a multimodal retrieval model that enables users to search through photos using textual queries. We propose an information recall system (Yen et al., 2021b) to answer questions about life experiences over a personal knowledge base. In contrast to reactively receiving users' requests, proactive mode, which detects the right time to trigger the information recall service, is still little explored. In this paper, we further propose a pilot study to proactively detect the user's need for information recall assistance.

One common use case of memory recall assistance occurs in human conversation. To identify whether people have difficulties in recalling past experiences, Wang et al. (2018) propose a model to detect speech hesitation. Here, we focus on detecting the need for information recall support in people's narratives. Specifically, we seek to detect the following four situations in narratives to determine whether to trigger the service:

1. If the description of the life event is consistent with the user's past experience, no memory recall assistance is needed.
2. Since people cannot remember every detail of their life experiences, we may unconsciously draw on similar but unrelated events to describe an experience that leads to a conflict with the established facts. It is essential to identify the description that is inconsistent with these facts, and retrieve those facts as an explanation to inform the user.
3. For the case where the narrative ends without relevant events mentioned, the user may have forgotten the events. The system must remind the user of these forgotten events.
4. The user may elaborate on additional events that were not logged before. This additional information could be details about events in lifelogs or they could be previously unlogged events. The system should distinguish



5438

Proceedings of the 2022 Conference on Empirical Methods in Natural Language Processing, pages 5438–5451  
December 7–11, 2022 ©2022 Association for Computational Linguistics



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# ContributionSum



**Input:** <SEC> title: Interpretation of NLP models through ... <SEC> abstract: ... <Analysis> In this study, we raise the out-of-distribution problem... <SEC> Introduction: ... <Method> We propose to marginalize each token out to mitigate the OOD problem ... <SEC> <Method> Methods: We propose input marginalization to mitigate the OOD issue ... <SEC> Conclusion: ... <Analysis> Among them, we focused on the OOD problem arising from the widely used zero erasure scheme ... <Result> Our proposed input marginalization, which can mitigate the OOD problem ...

**Target:** <Analysis> To the best of our knowledge, we first raise the OOD problem that can arise when interpreting NLP models through the existing erasure schemes. <Method> To avoid the OOD problem, we propose a new interpretation method, i.e., input marginalization using MLM for likelihood modeling. <Result> We apply the proposed method to interpret various NLP models and quantitatively verify the correctness of the resulting interpretation.

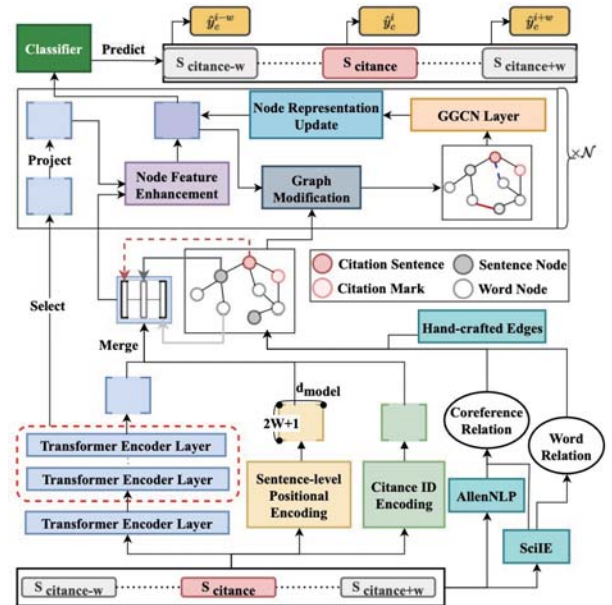
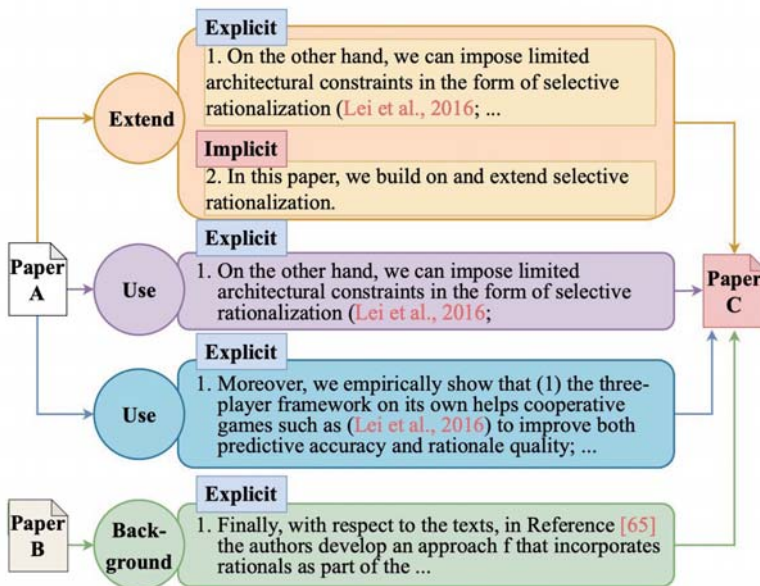
Meng-Huan Liu, An-Zi Yen, Hen-Hsen Huang, and Hsin-Hsi Chen. "ContributionSum: Generating Disentangled Contributions for Scientific Papers." In CIKM 2023

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# Citation Graph Construction



Hong-Jin Tsai, An-Zi Yen, Hen-Hsen Huang, and Hsin-Hsi Chen. "Citation Intent Classification and Its Supporting Evidence Extraction for Citation Graph Construction." in CIKM 2023

41

## Reference



- Lecture Slides from Generative AI by Prof. Hung-Yi Lee
  - <https://drive.google.com/file/d/1wRxojo0xxXfe2MtcX1D8BbTE1IKbzUg5j/view>
  - [https://docs.google.com/presentation/d/1vDT11ec\\_nY6POo--NHq9col5XEE4tHBw/edit#slide=id.p1](https://docs.google.com/presentation/d/1vDT11ec_nY6POo--NHq9col5XEE4tHBw/edit#slide=id.p1)
- Lecture Slides from Advanced Natural Language Processing by Prof. Mohit Iyyer
  - <https://people.cs.umass.edu/~miyyer/cs685/slides/02-neural-lms.pdf>

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# **NTU Topics 學術合作探索服務**

劉韻涵

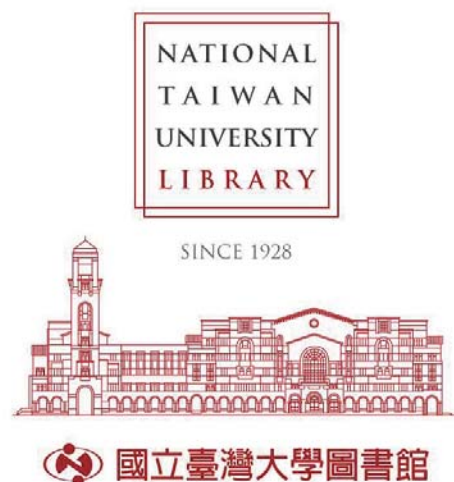
國立臺灣大學圖書館館員



# 學術合作探索服務 NTU TOPICs

國立臺灣大學圖書館  
研究支援組  
劉韻涵

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## 大綱

- 服務緣起
- NTU TOPICs介面
- NTU TOPICs建置過程

# 服務緣起



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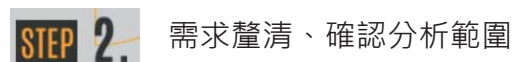
## 領域網絡分析服務

- 結合書目計量與社會網絡分析等方法，透過引文資料庫及分析工具，視覺化呈現研究主題發展現況及新興趨勢，提供可依教師或院系所量身打造的「領域網絡分析服務 Domain Network Analysis Service」，簡稱DNA服務。



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# DNA服務簡介



調整檢索策略

挑選檢索結果文獻集



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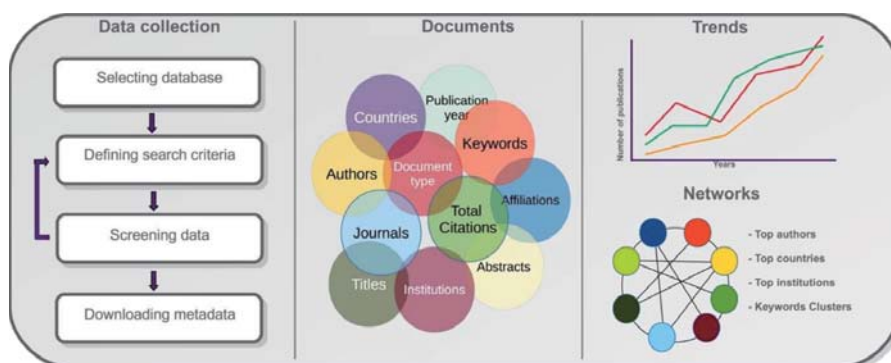
5

# DNA服務簡介

## • 分析工作流程示意

### 資料來源

WoS  
Scopus  
InCites  
SciVal  
PubMed  
IEEE Xplore  
TCI-HSS



### 分析工具

VOSviewer  
Microsoft Excel  
Tableau Public  
Gephi

Source : Saikia, Manel Vallès, Alexandre Fabregat, Raúl Saez, Dieter Boer, A bibliometric analysis of trends in solar cooling technology, Solar Energy, Volume 199, 2020, Pages 100-114. <https://doi.org/10.1016/j.solener.2020.02.013>.

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# DNA服務簡介

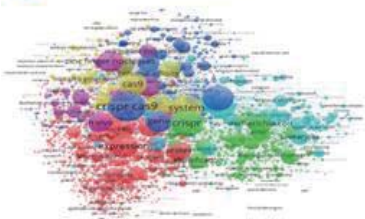
Co-words

## 共現詞分析

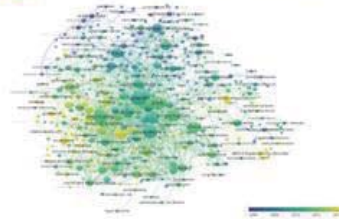
兩篇文獻若使用相同的字詞，則產生共現詞關係（co-occurrence words，簡稱co-words）；共現詞越多則主題關聯性越高！

### Author Keywords / All Keywords

例 CRISPR 作者關鍵字



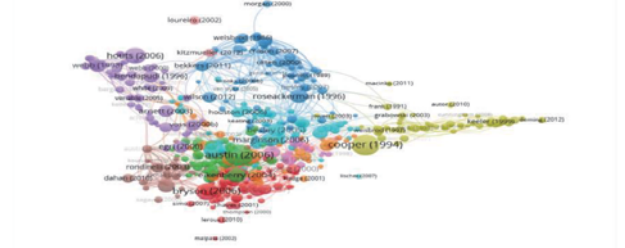
例 共現詞的年代分布圖



Bibliographic coupling

## 書目耦合分析

兩篇文獻若引用共同之參考文獻，則產生書目耦合關係。當兩篇文獻的相同參考文獻數量愈多時，則耦合強度愈高，主題愈相近。（於臺大網域內點選書目耦合節點，可直接連結到期刊本文）



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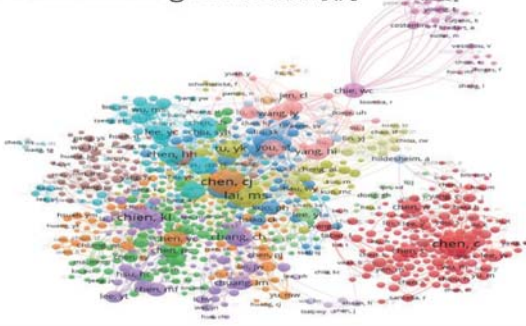
7

# DNA服務簡介

Co-authorship

## 作者合著分析

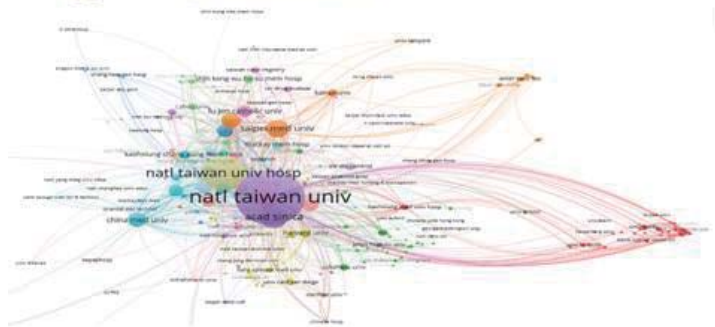
例 以non-coding RNA文獻為例



## 機構/國際合作分析

協助挖掘潛在合作團隊、了解競爭團隊研究走向！

例 機構合作分布圖



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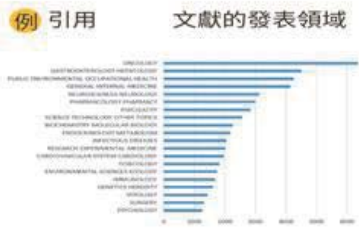
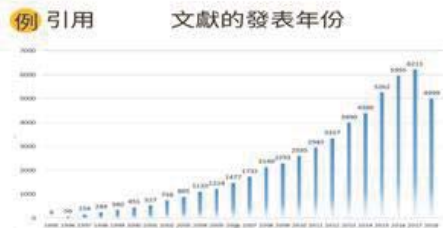


8



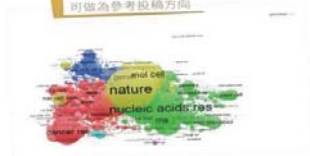
# DNA服務簡介

## 影響力分析 後續引用文獻的出版年份、來源期刊、機構、國家、研究領域！



## 知識源分析 以non-coding RNA文獻為例

### 發表期刊出處 可做為參考投稿方向



### 引用文獻分群狀況 找到各分群最常被引用的文獻



### 引用作者分群狀況 找到各分群領域的學術带头人



## 研究前沿分析

### 後續高被引文獻關鍵詞分群

近 2 年來引用特定文獻集，且在自身領域被高度引用的文章群，可推定為該文獻集所處領域目前最新且火熱的應用方向。

前1% Highly Cited Papers + 前0.1% Hot Papers

### 近1年高共頻作者關鍵字

排除高被引限制，聚焦近1-2年引用特定文獻集寫成之文章群之作者關鍵字分佈。可看出近 1 年內引用該文獻集的研究走向。

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# 服務對象



## 教師

- ◆ 領域熱點具像呈現
- ◆ 研究趨勢聚焦探索
- ◆ 申請計畫佐證加分



## 學院系所

- ◆ 評估單位研究動能
- ◆ 分析學術合作走向
- ◆ 輔助科學研究決策

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# 服務模式

## 量身訂做



## 主動提供

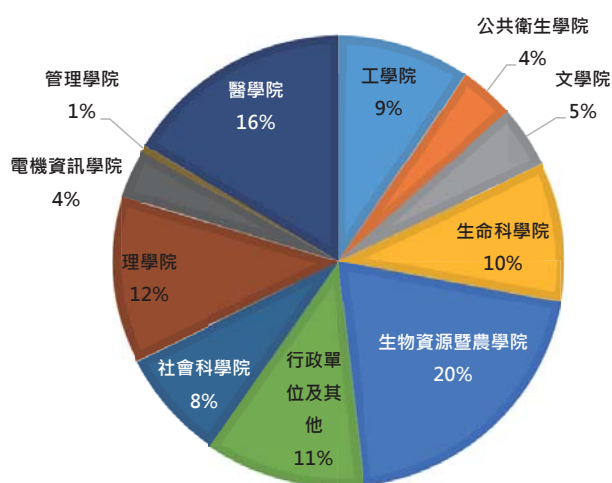
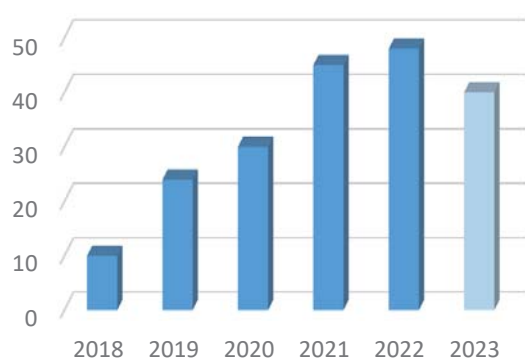


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# 服務件數統計



註：本項統計未包括醫學圖書館長期每年為本校醫學院及醫院提供的學術研究力分析

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# 教師回饋



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## Find Research Collaborators @ NTU



- 提供臺大專任研究人員
  - 跨單位查詢潛在合作者
  - 認識單一作者研究興趣
  - 由作者群觀察相關主題



- 提供臺大決策者
  - 了解系所研究主題分佈特色
  - 呈現系所SDGs主題
- 提供校外研究人員
  - 認識臺大研究人員研究興趣
  - 掌握臺大系所研究焦點

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# NTU TOPICs介面



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國立臺灣大學圖書館

作者檢視

主題檢視

單位檢視

服務說明

English

## NTU TOPICs

Find Research Collaborators @ NTU

為利本校研究者發掘校內潛在合作對象，並協助校內外人員掌握本校作者及單位聚焦的研究議題，圖書館依據本校作者著作之主題建置視覺化網絡分析網站，呈現作者間的相似度與研究特色，資料範圍與分析方法詳見[服務說明](#)。為利使用者查詢，依需求提供3種檢視角度之平台，並建議以個人電腦瀏覽使用。



### 作者檢視

輸入作者姓名，查看臺大潛在合作對象或單一臺大作者之研究主題比率。



### 主題檢視

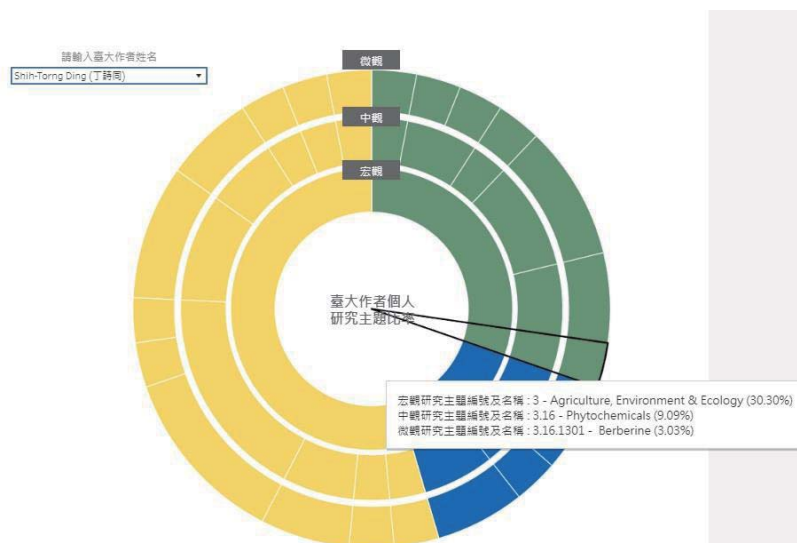
選擇研究主題，可以查看曾發表該主題著作之臺大作者。



### 單位檢視

選擇系所、研究中心等臺大二級單位，查看所屬作者及研究主題比率。

# 首頁-個人主題圓餅圖



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# 首頁-三種檢視入口



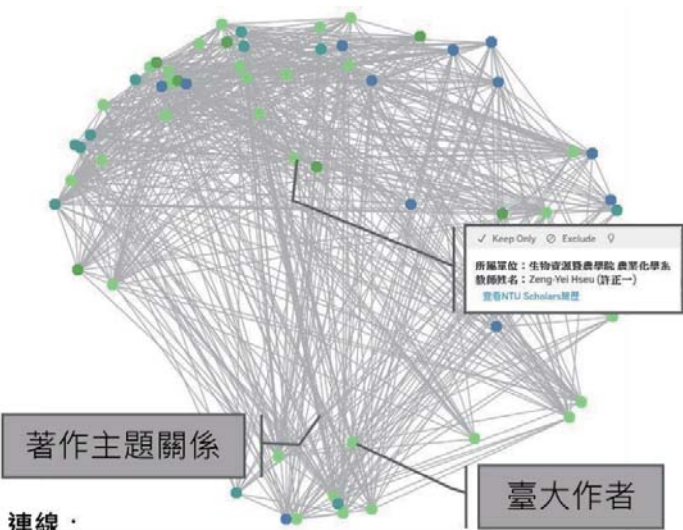
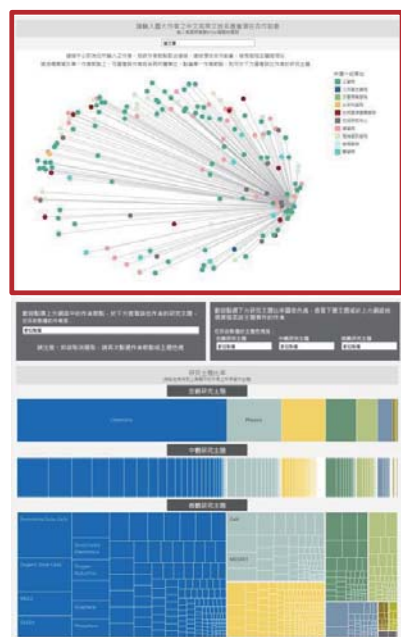
- 作者檢視：
  - 臺大作者使用
  - 輸入臺大作者姓名查看校內潛在合作對象
- 主題檢視：
  - 校內外各界使用
  - 選擇Incites Meso、Micro Citation Topics，查看曾發表該主題著作之臺大作者
- 單位檢視：
  - 單位主管與校外各界使用
  - 選擇臺大二級單位查看所屬作者



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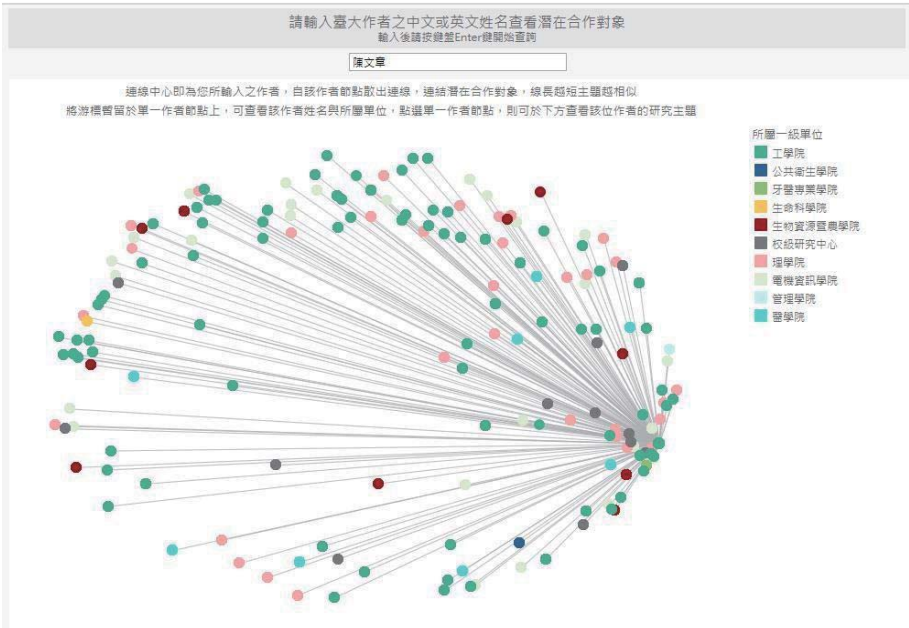


# 檢視-認識網絡



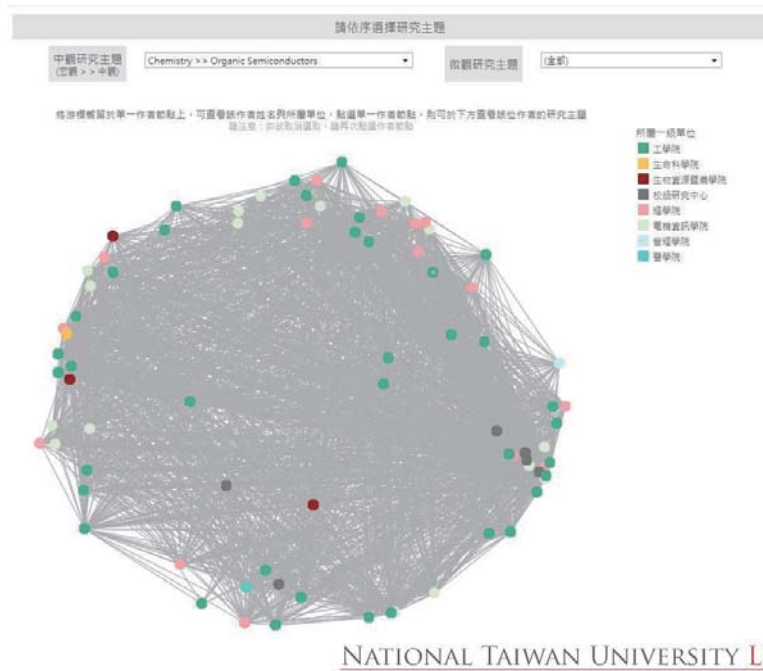
著作主題關係  
 連線：  
 兩作者曾發表相同主題著作  
 連線距離：  
 兩作者之研究主題相似度

# 檢視-依作者篩選網絡



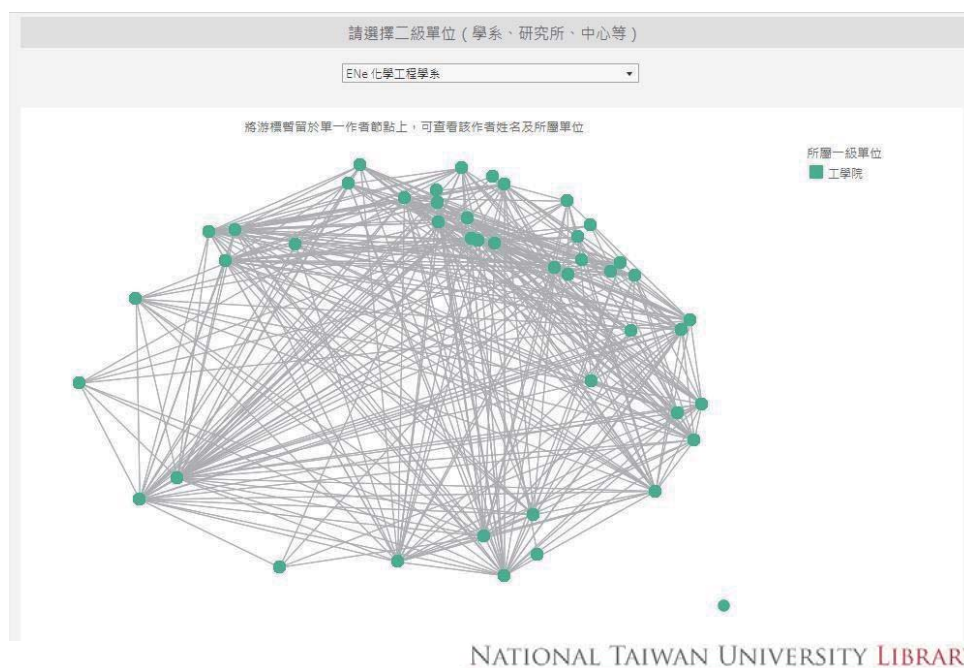


# 檢視-依主題篩選網絡



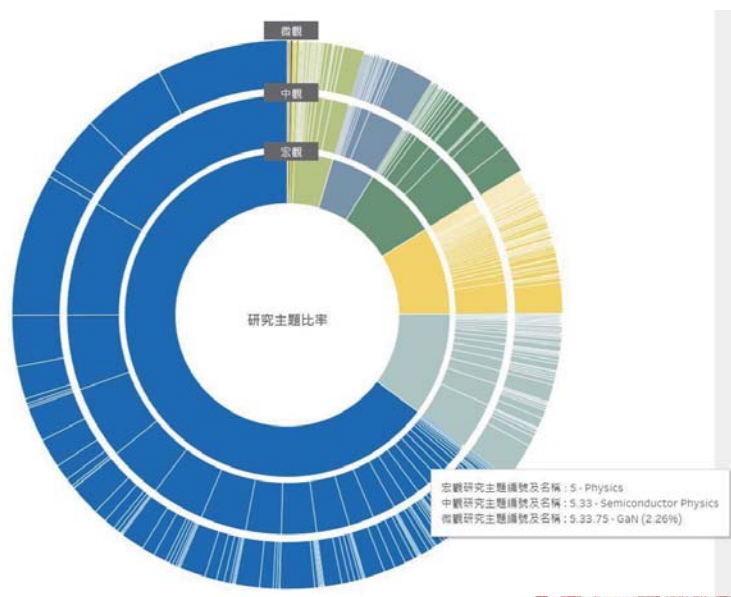
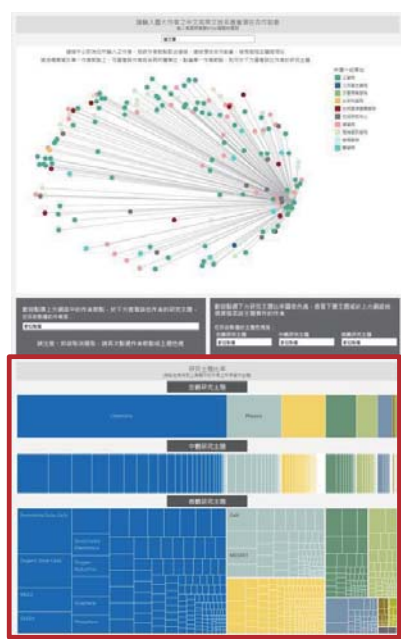
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# 檢視-依單位篩選網絡



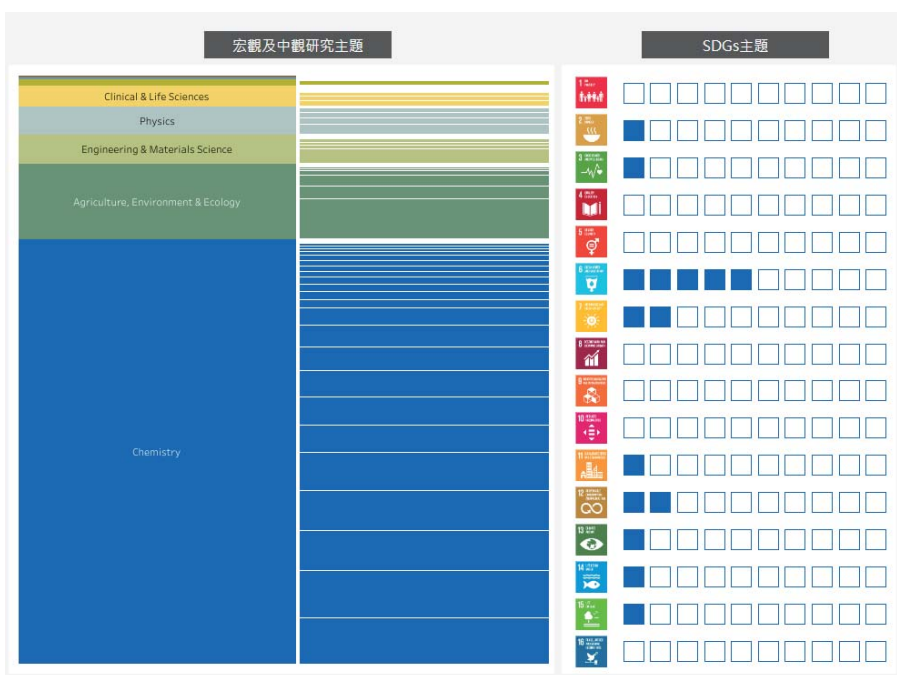
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# 檢視-觀察延伸主題

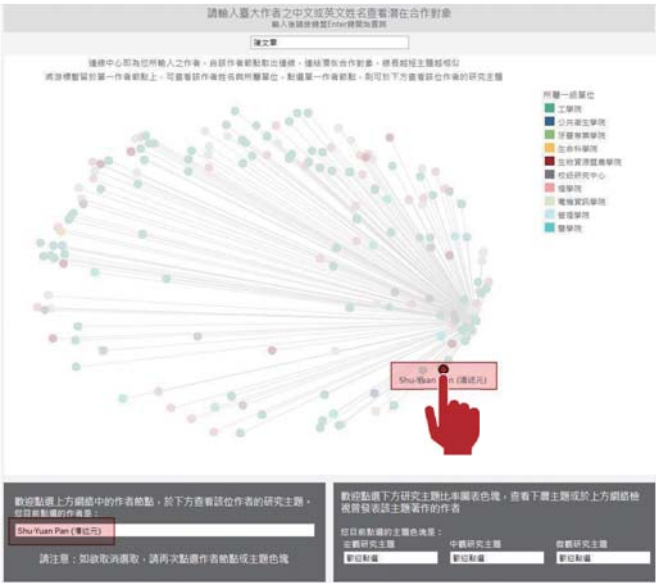


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# 檢視-呈現單位特色



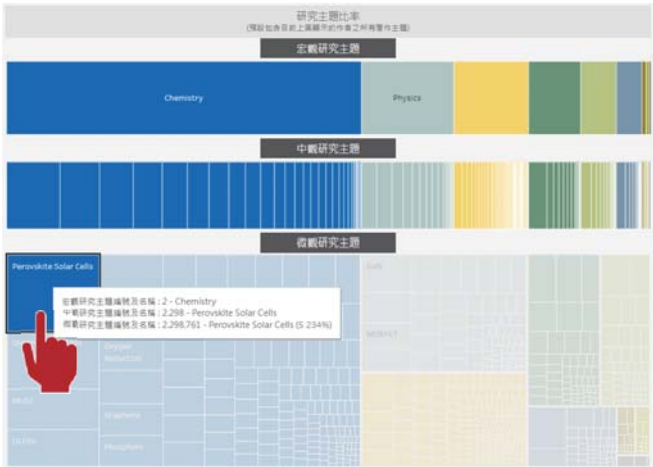
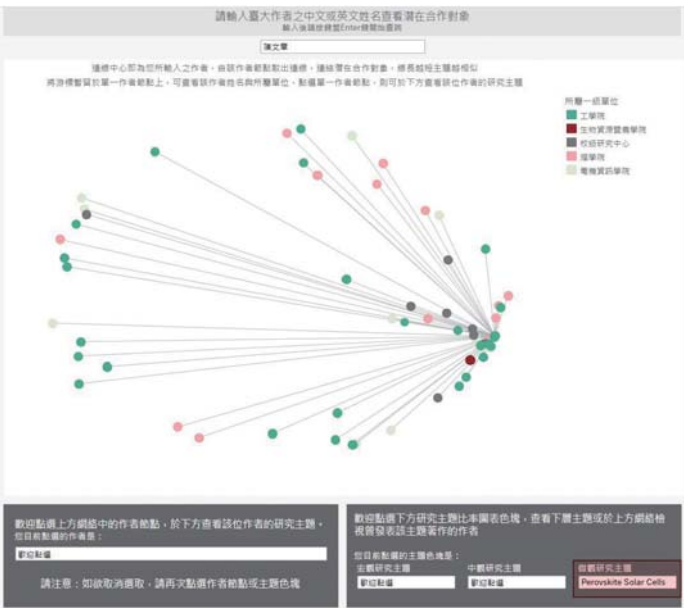
# 檢視-認識單一作者



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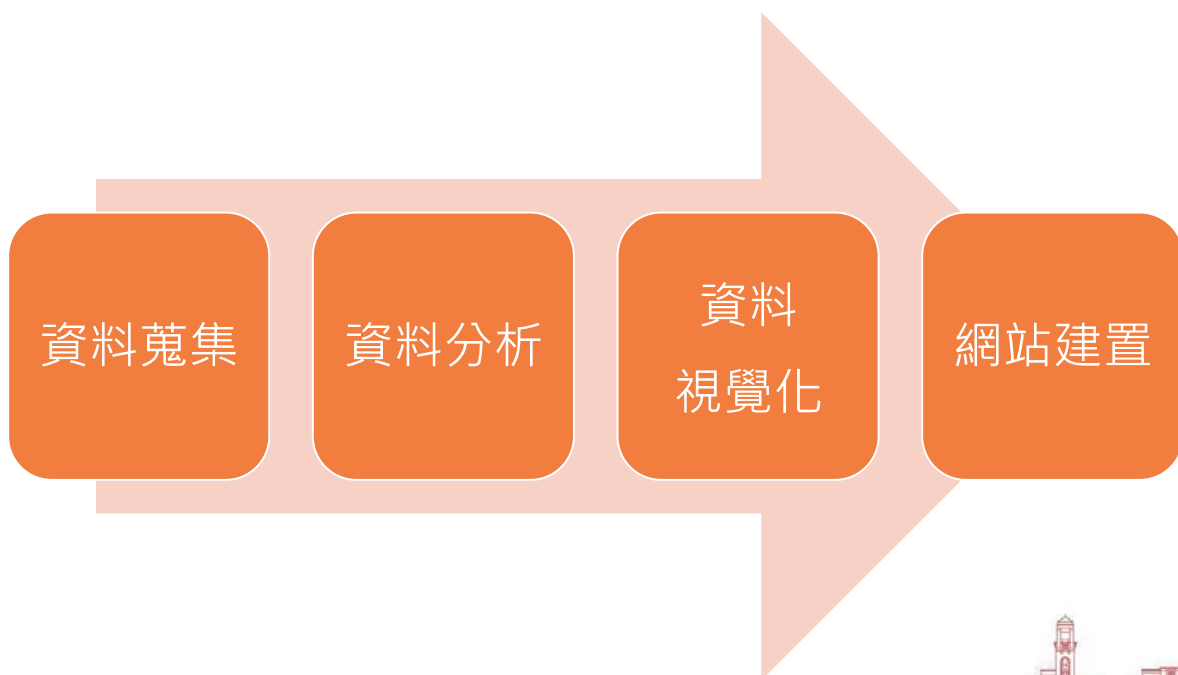
# 檢視-顯示主題作者



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# NTU TOPICs建置過程



# 分析資料範圍



**作者**

110年第二學期前報到之專任教師、研究員及醫師

- NTU Scholars
- 人事資料



**著作**

2017-2021期刊論文

- 作者ID檢索
- 臺灣大學地址檢索後進行作者比對



**研究主題**

InCites Micro Citation Topics 文章層級分類

- 依引用關係聚類為三層級：Macro (10)、Meso (326)、Micro (2457)
- 以單一名詞作為主題名稱，Macro及Meso由專家命名

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# 著作作者比對

## 模糊比對

- 切分WoS書目之C1作者全稱與地址。

UT	作者	地址
WOS: 00038698 4300011	Jeng, Jiann-Shing	Natl Taiwan Univ Hosp, Dept Neurol, Taipei, Taiwan

- 將地址在臺大之作者姓名轉為模糊比對格式：
  - Chung-Ming Kuan轉為 CKMagghinnuu



## 結果確認

- 作者姓氏確認
- 作者所屬單位確認
  - 分為醫學院及非醫學院比對
- 抽樣確認
  - 抽取300篇逐篇人工確認，正確率約達99%

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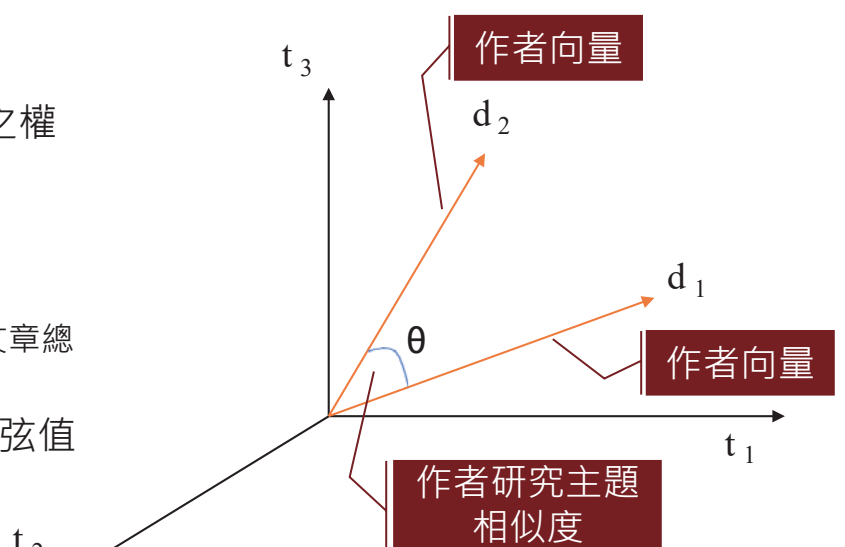
# 書目、作者資料必備欄位

- 書目：
  - WoS登錄號、Incites Citation Topics、Incites SDGs Topics
- 作者：
  - 自訂作者ID、中英文姓名、中英文所屬學院、中英文所屬系所、臺大學術典藏簡歷連結

## 主題相似度計算

### TF.IDF與向量空間模型

- 作者向量由作者著作的各主題之權重組成
- 權重計算：TF\*IDF
  - TF：作者特定主題著作占比
  - IDF：依InCites 2017-2021年文章總數和特定主題文章總數計算
- 2作者間的相似度為夾角 $\theta$ 的餘弦值
  - 以0-1數值代表相似性
  - 餘弦值越大，相似性越大
- 降低主題大小與多寡之影響



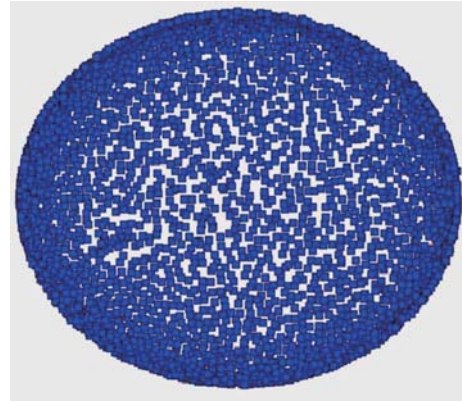


# 資料視覺化

- 多元尺度分析



Metric MDS  
依主題相似度  
定位作者節點



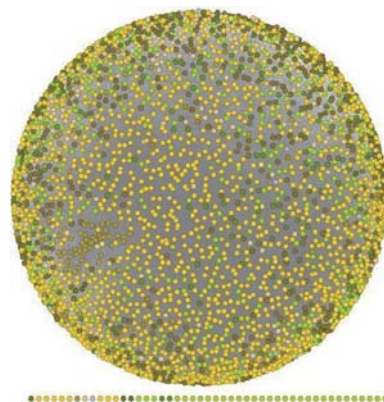
33

# 資料視覺化

- 網絡呈現



呈現網絡並將未與  
他人具相同主題之  
節點加入

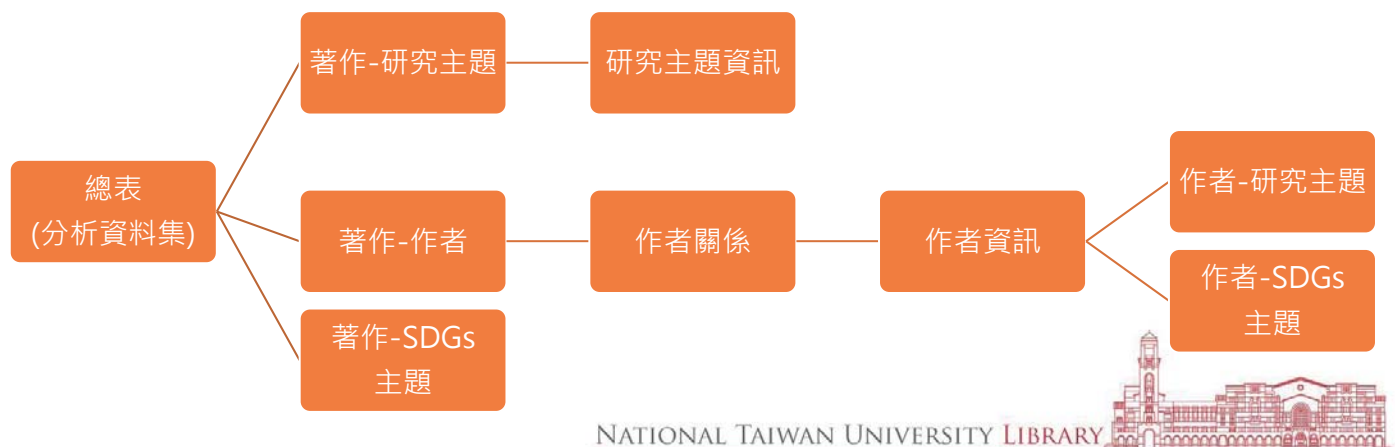


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# 網站建置

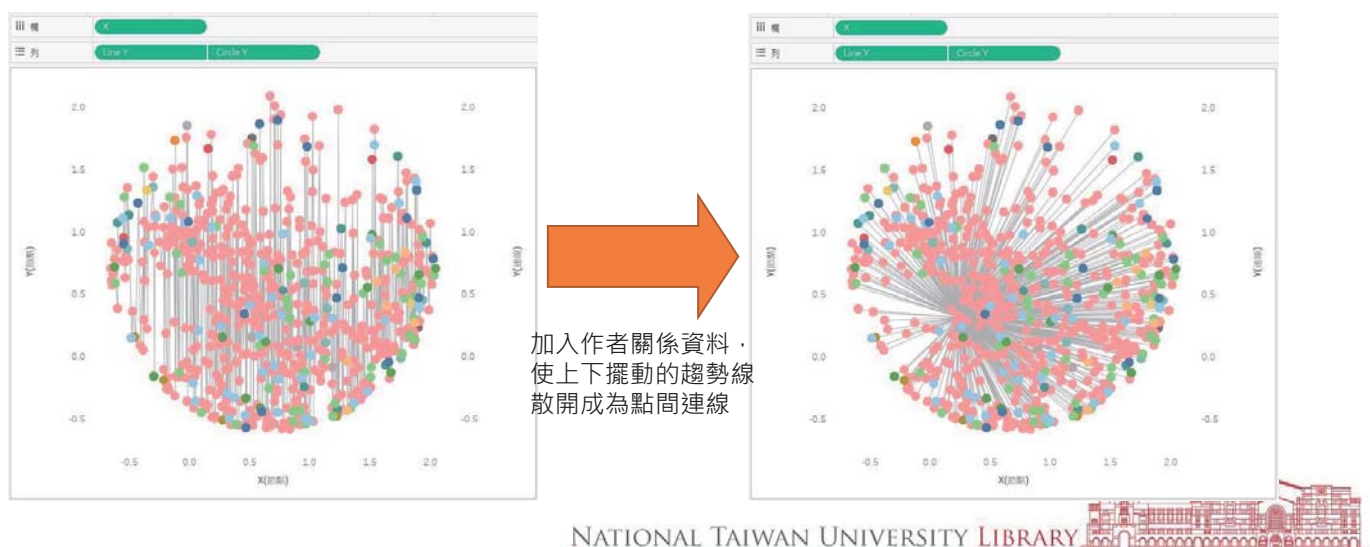
- Tableau原始資料結構
- 以著作清單將作者相關與主題相關之資料串連



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# 網站建置

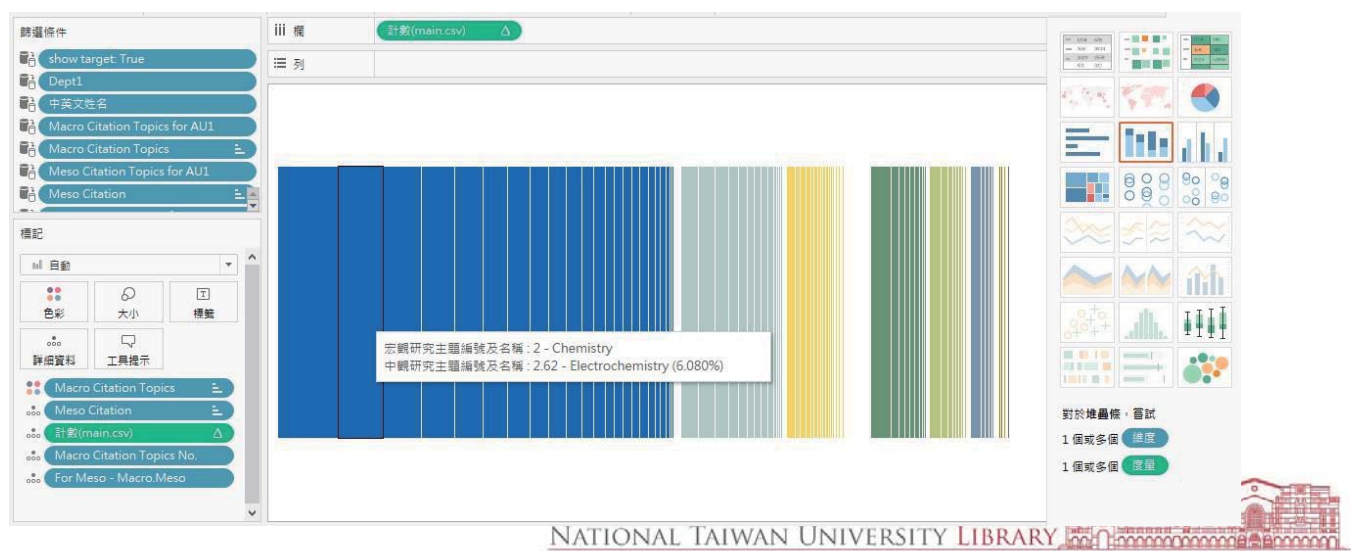
- 網絡繪製



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# 網站建置

- 圖表繪製



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# 網站建置

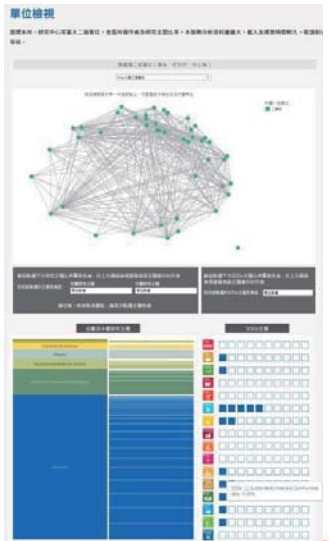
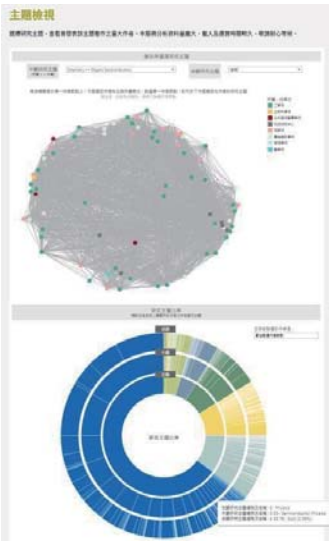
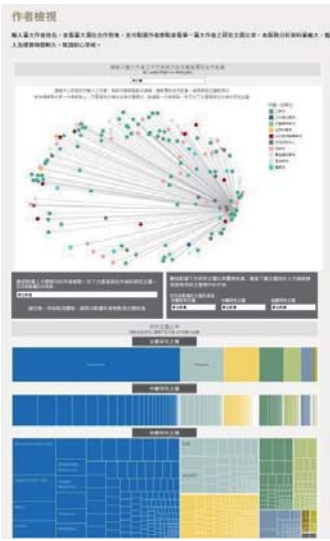
- 篩選連動

篩選功能	篩選對象	連動圖表	使用機制	篩選依據資料來源
首頁-個人主題	著作	個人主題 圓餅圖	選單	作者資訊
作者檢視	作者	作者網絡、 主題圖表	參數	作者關係
主題檢視	作者	作者網絡、 主題圖表	選單	作者-研究主題
單位檢視	作者	作者網絡、 主題圖表	選單	作者資訊
認識單一作者	作者	主題圖表	點選	作者資訊
顯示主題作者	著作	作者網絡	點選	著作-研究主題 著作-SDGs主題

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# 網站建置

- 儀表板



# 網站建置

- 網站規劃

## NTU TOPICs

Find Research Collaborators @ NTU

為利本校研究者發掘校內潛在合作對象，並協助校內外人員掌握本校作者及單位聚焦的研究議題，圖書簡依據本校作者著作之主體建置視覺化網絡分析網站，呈現作者間的相似度與研究特色，資料範圍與分析方法詳見[服務說明](#)。為利使用者查詢，依需求提供3種檢視角度之平台，並建議以個人電腦瀏覽使用。

作者檢視

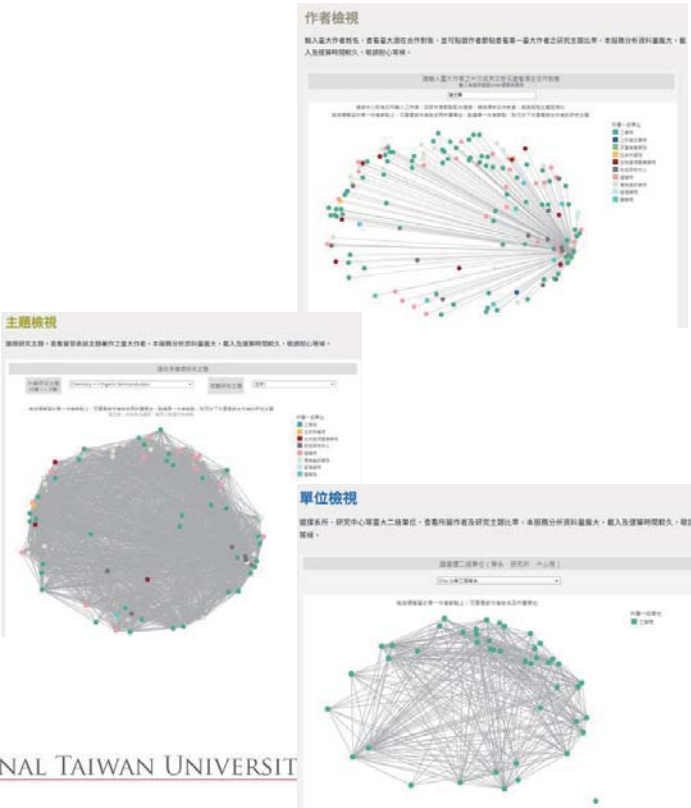
輸入作者姓名，查看最大潛在合作對象或單一最大作者之研究主題比率。

主題檢視

選擇研究主題，可以查看曾發表該主題著作之最大作者。

單位檢視

選擇系所、研究中心等大二級單位，查看所屬作者及研究主題比率。





# 網站建置

- 網站規劃



NATIONAL TAIWAN UNIVERSITY LIBRARY



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~感謝聆聽~

NATIONAL TAIWAN UNIVERSITY LIBRARY



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# 聯盟營運報告暨提案討論

李美燕

國立陽明交通大學圖書館組長



# 2023數位化論文典藏聯盟

## 營運報告暨提案討論

陽明交通大學圖書館  
李美燕組長



國立陽明交通大學圖書館  
National Yang Ming Chiao Tung University Library

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2023-2024價格機制

4.

加入數位化論文典藏聯盟

5.

提案討論



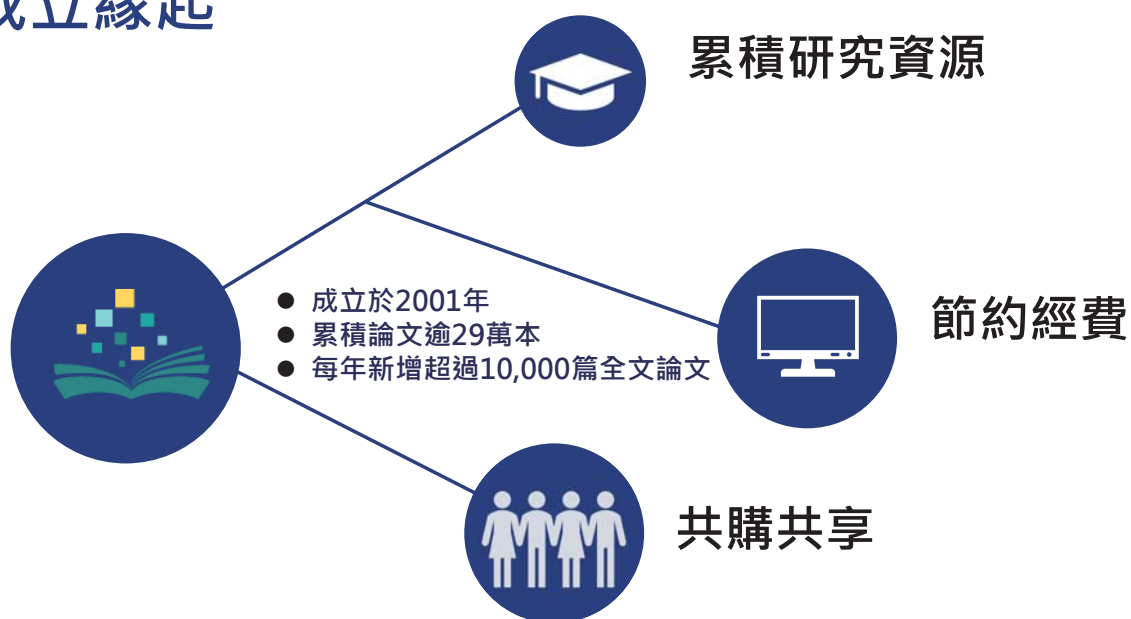
國立陽明交通大學圖書館  
National Yang Ming Chiao Tung University Library

# 01

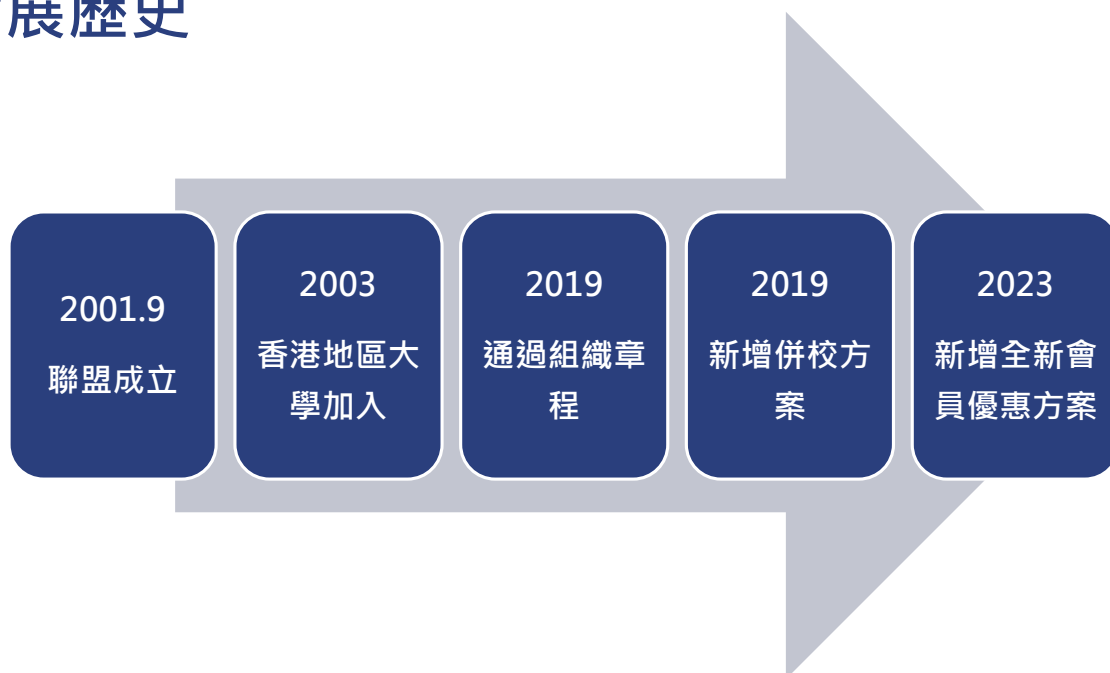
## 聯盟概述



### 成立緣起



## 發展歷史



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## 組織現況

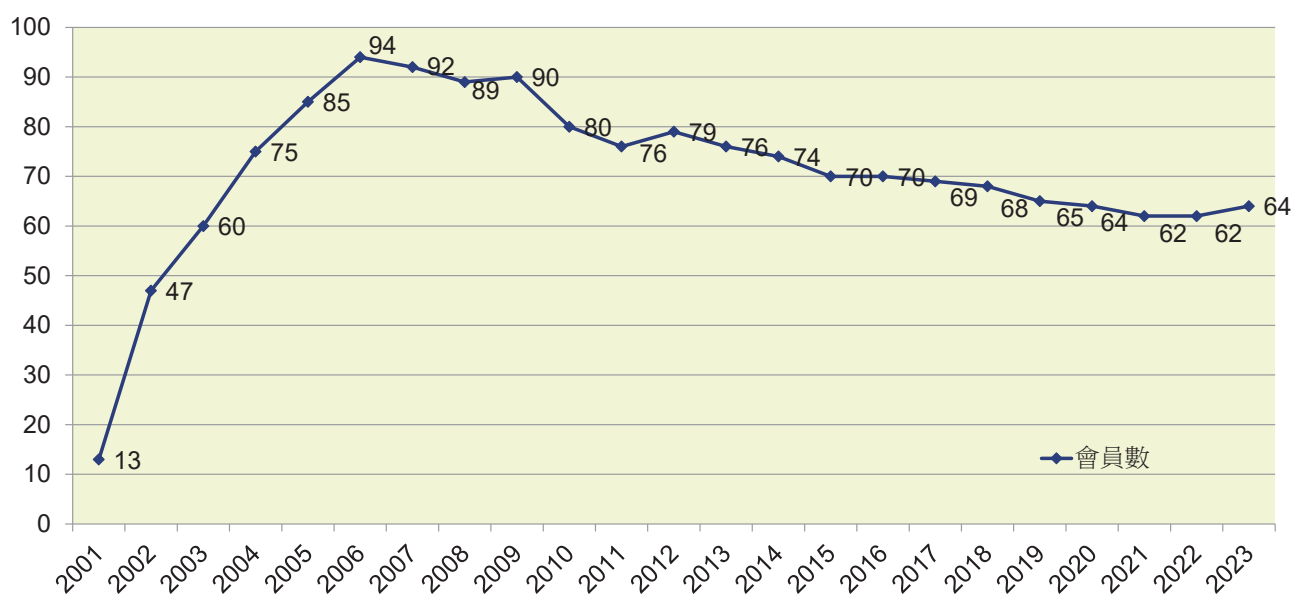


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## 02 營運狀況

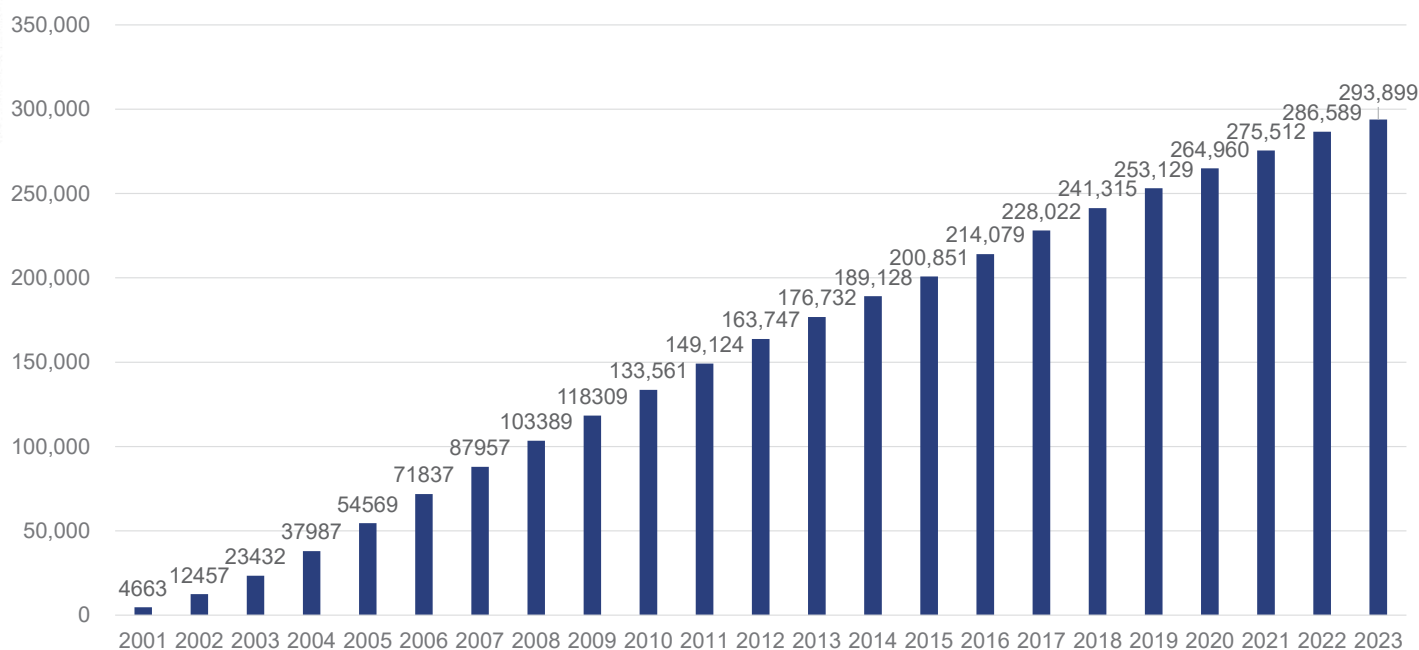


### 歷年會員數



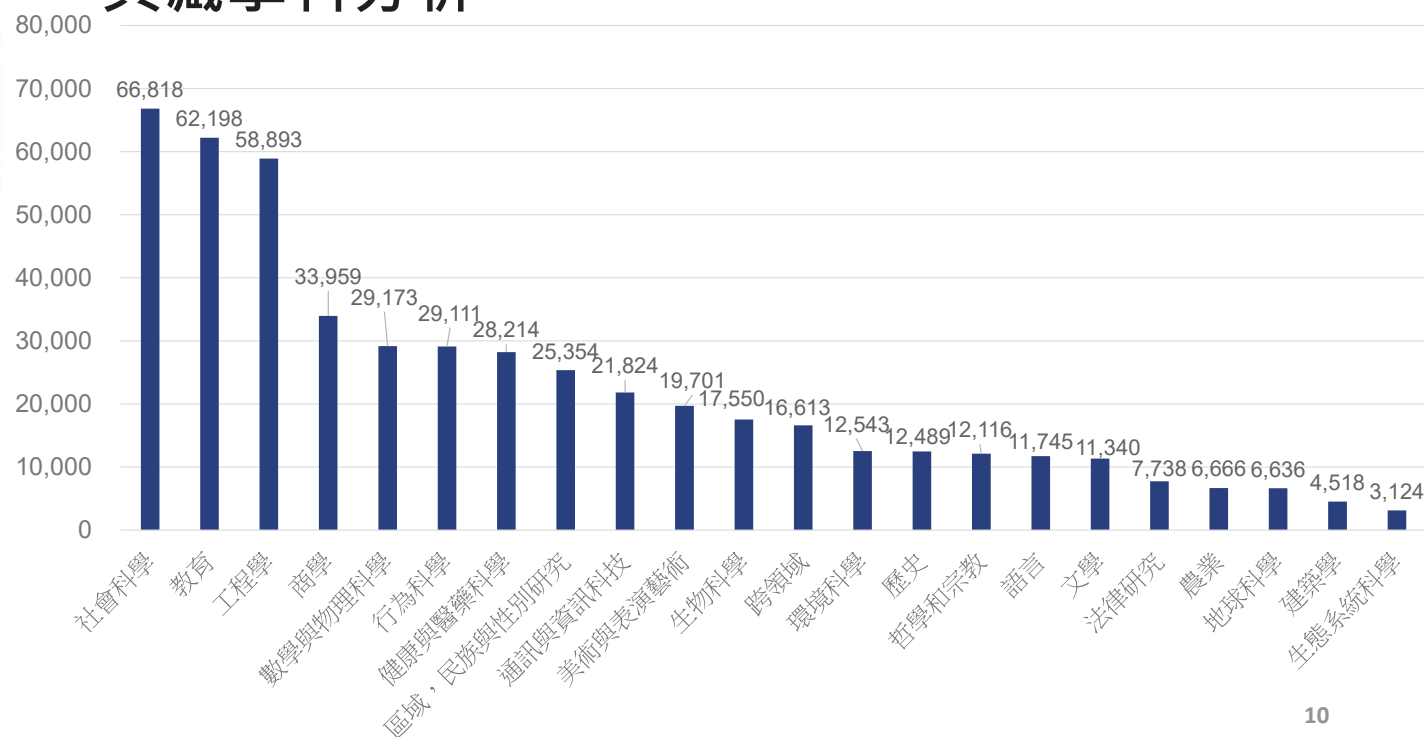


## 歷年論文累計典藏總量



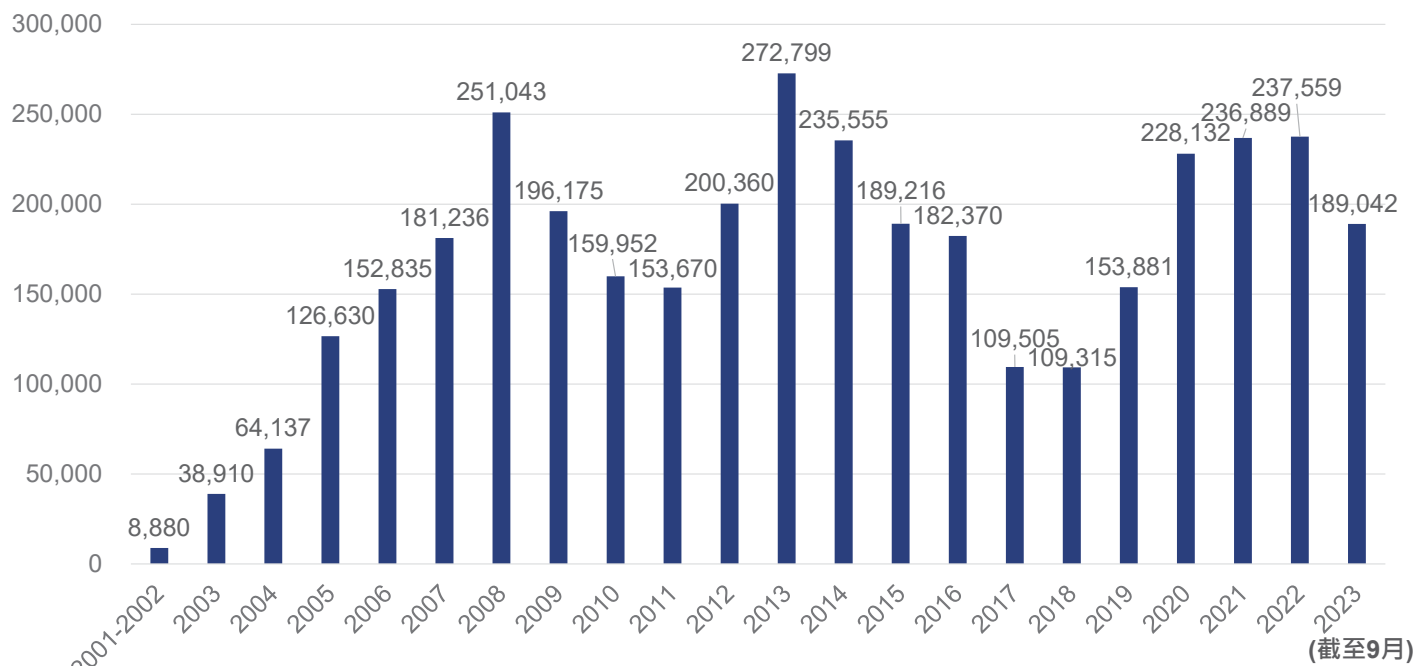
9

## 典藏學科分析



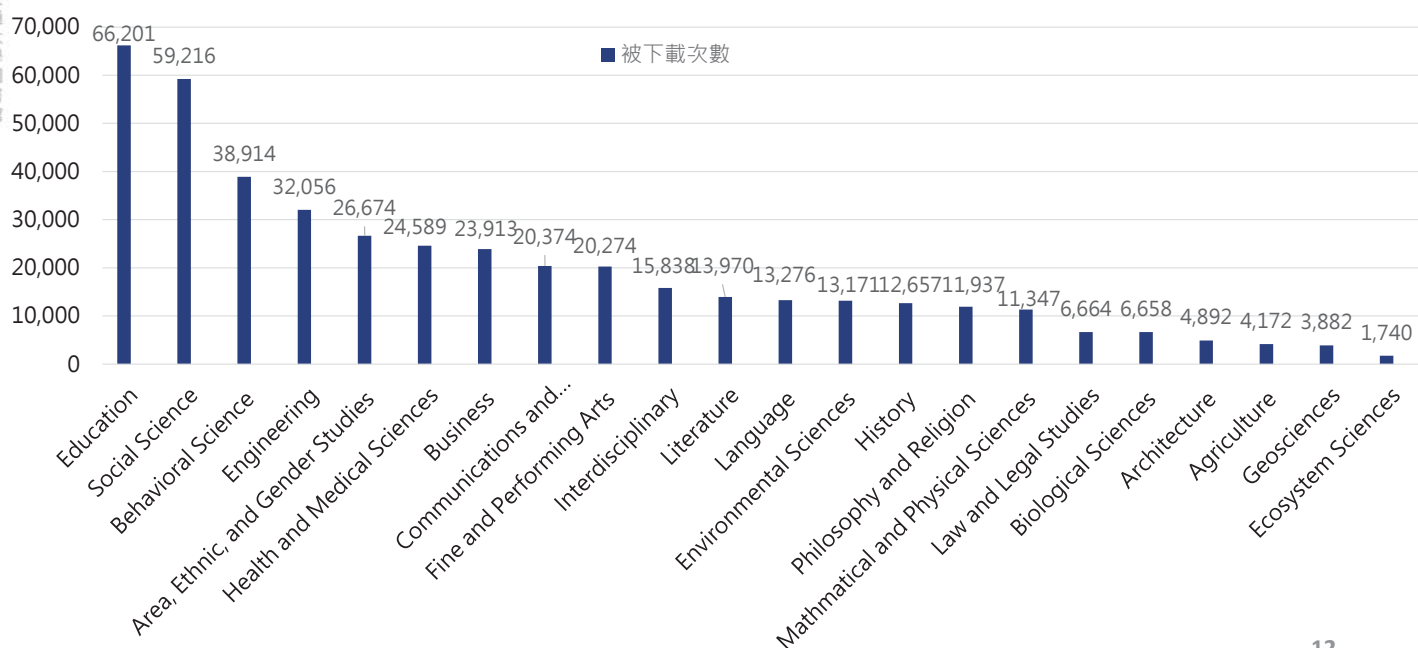
10

## 歷年論文下載次數



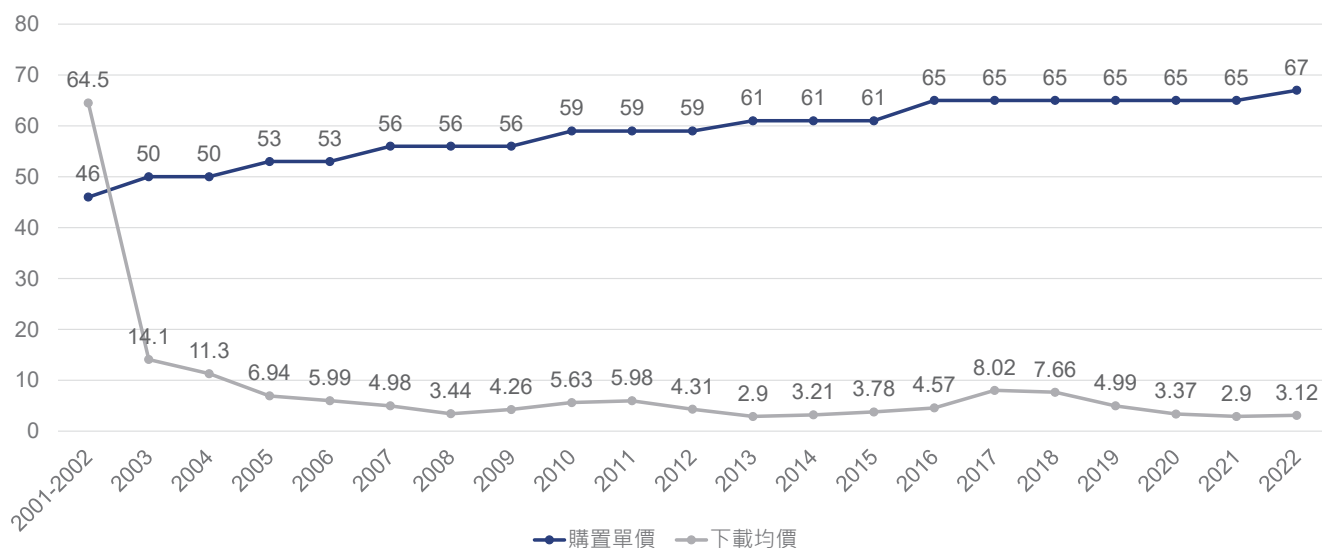
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## 下載論文主題排名(2022)



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## 論文單價與下載費用分析



註：下載均價=該年典藏量\*單本價格/總下載次數

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## 會員館使用量排名

PDF下載次數(2023年1-9月)

排序	單位	PDF下載次數
1	香港大學	23,039
2	香港理工大學	14,401
3	香港中文大學	8,841
4	香港城市大學	8,775
5	香港教育大學	8,481
6	靜宜大學	8,338
7	國立臺灣大學	6,210
8	南臺科技大學	5,317
9	國立高雄師範大學	3,829
10	香港科技大學	3,781

累積購置論文數(截至2022年)

排序	單位	購置論文數
1	國立臺灣大學	12,648
2	國家圖書館	7,634
3	國立高雄科技大學	6,826
4	國立政治大學	6,038
5	國立臺灣師範大學	5,718
6	臺北市立大學	4,884
7	國立陽明交通大學	4,866
8	國立屏東大學	4,740
9	香港大學	4,527
10	國立高雄大學	4,489

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## 03

## 2023-2024價格機制



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## 2023-2024價格機制

	一年合約		兩年合約	
年份	2023	2024	2023	2024
訂購金額(US\$)	68	71	68	69
基本訂購量-新會員(本)	170	170	170	-----
基本訂購量-舊會員(本)	154	155	154	155

\*會員使用其「未參加年度」之論文，每下載滿50次，應增購1本論文

## 併校方案

第一年	第二年	第三年與之後年份
購買140%基本量	購買130%基本量	回歸正常基本量規定

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## 2023全新會員特殊優惠方案

- ✓ 適用對象：從未加入過DDC之大專院校單位
- ✓ 優惠方式：若上述單位能於2023年簽署加入聯盟同意書，則提供以下首年入聯盟優惠方案

未加入過聯盟的全新醫學/科大/學院單位	155本
未加入過聯盟的全新非醫學大學/科大/學院	120本
未加入過聯盟的全新專科	90本

( 原為170本 )

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# 04

## 加入數位化論文典藏聯盟



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## 會員權益



獲取所訂購  
論文之全文  
影像PDF數位  
檔案及書目  
MARC檔



參加年度期  
間，可無限  
使用當年度  
聯盟所有會  
員購買之論  
文



退出聯盟後，  
得永久使用  
參加年度期  
間聯盟所訂  
購之論文

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## 如何加入



非會員可隨時提出申請加入聯盟，並需簽署美國Clarivate公司英文版Agreement



每年10月，由代理商漢珍公司代聯盟委員會發出通知，協助調查現任會員是否繼續參加DDC

### 聯絡窗口



漢珍數位圖書股份有限公司  
簡秀如主任  
Tel: (02) 2736-1058 分機 214  
jessica@tbmc.com.tw



陽明交通大學圖書館  
陳怡鈞組員  
Tel: (03) 5713-1674  
nycu0029@lib.nycu.edu.tw



# 05

## 提案討論



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### 提案單位：朝陽科技大學

- 案由：建議於平台首頁呈現目前總館藏數量
- 說明：舊平台在首頁中會顯示總館藏量，及每年新購數量，這在對師生進行平台展示時是一個很好的賣點，轉換至新平台後，這些資訊只有管理端才看得到，甚為可惜，因此建議新平台也能夠呈現總館藏量。

### 提案單位：陽明交通大學

- 案由：建議優化論文選擇方式
- 說明：目前訂購論文方式，大多是由漢珍公司整理主題清單後，再提供給老師挑選，惟此方式十分費時費力，希望能有較有效率之方式進行挑選。



國際博碩士論文全文資料庫  
Digital Dissertation Consortium  
National Yang Ming Chiao Tung University Library

**謝謝聆聽**  
**Thank you for listening**



NOTE

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NOTE

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NOTE

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NOTE

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2023 數位化論文典藏聯盟研討會

創新科技與圖書館應用

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編輯者：漢珍數位圖書股份有限公司

地址：台北市和平東路三段 315 號 7 樓

電話：(02) 27361058

出版年月：中華民國 112 年 10 月

