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陽明交大資訊人

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走過疫情 迎向曙光



走過疫情，新學年歡迎新任系所主管加入院系行政團隊。感謝歷屆行政團隊的努力，以及全院師生和廣大系友的支持，本院今年度在各方面的表現，不只延續學院良好學風與優異傳統，也讓學院未來的發展走得更穩健。

本院在資安領域深耕多年，為國內學界翹楚，不僅設有培養高階資訊安全人才的資安碩士學位學程外，今年 9 月本院與警政署更首創以科技犯罪偵查實務為主的「科技犯罪偵查資通訊碩士在職專班」，以培育更多資安專才。

本院擁有豐沛的研發能量，本期介紹李奇育副教授研究團隊的資安弱點檢測與威脅防護技術，用以應對技術更新所產生的資安威脅。彭文志教授研究團隊開發「可剖析顧客行為模式以提供個人化自動服務」之廣告標題生成技術，與 KKDAY 及玉山銀行的合作，驗證該技術之產業應用性。

今年度資工系友回娘家活動意義非凡。4 月 9 日於交大日頒獎傑出系友林順喜學長、王介呈學長、黃維中學長、陳儒寬學長、江孟峰學長與馮彥文學長，也恭喜林榮賜學長榮獲陽明交大一屆傑出校友，他們傑出表現與成就，裨益社會，足為學弟妹的典範。同日進行「台灣電腦資訊發展館」的揭牌開幕儀，由系友發動募款興建，揭示陽明交大資訊學院在台灣資訊科技發展軌跡中

扮演「中流砥柱」的關鍵角色。

本院師生亮眼的表現亦是本期報導焦點。院內年輕教授不但在國際頂尖學術發表多有斬獲，在各項重要獎項也備受肯定。特別恭喜詹力韋教授榮獲學術界年輕學者的最高榮譽—科技部「吳大猷先生紀念獎」。此外，本院一向鼓勵老師們帶領學生參與國際重要競賽，我個人與陳健教授指導謝承穎同學榮獲 ACM MobiCom 2021 Student Research Competition 研究所組第二名，繼去年本院獲得第一名後，為全台第二度於此國際知名競賽締造佳績。

由於許多世界大學排名非常重視大學的聲譽，新校名對於排名可能會有衝擊，然而合校後陽明交大在世界大學排名相較於合校之前排名均有進步。在最新公布的 RUR 世界大學 2022 排名中，本校整體表現取得全球第 89 名佳績，在台灣大專院校中排名第一。雖然大學排名不是絕對，但這是我們努力之一，是我們鞭策自己的出發點。展望 2023 年，衷心期盼全院師生同心協力為國家社會的未來持續努力。

資訊學院院長

陳志威

2022.12

Got Through the Pandemic The Dawn is Coming

After the pandemic, we are pleased to welcome new members to join our administrative team in the new academic year. We are grateful to the former administrative team members for their efforts, as well as to all of our faculty, students, and alumni for their support. This year, our college's achievements in all aspects not only keeps the excellent tradition of the college, but also paves the way for the steady development of the college in the future.

Having been deeply involved in cyber security research for many years, our college is the leader in domestic academic circles. In addition to the degree program of cybersecurity management for cultivating information security talents, we and the National Police Agency have formed the "Degree Program of Information and Communication for Technology Crime Investigation" in September 2022, which focuses on technology crime investigation practice, thereby cultivating more information security professionals.

Due to our abundant research and development capacity, this issue of the CCS Magazine reports the work of Professor Chi-Yu Li and his team, the information security vulnerability detection and threat protection, to defend against information security threats introduced by technology revolution. In addition, Professor Wen-Chih Peng and his team developed advertising headlines generation technology, which analyzes customer behavior patterns to produce customized automated services, and verified the industrial applicability of this technology through the collaboration of KKDAY and E.SUN BANK.

This year's NYCU computer science alumni reunion is of great significance. On April 9, the NYCU alumni day, Rong-Shy Lin, Shun-Shii Lin, Jie-Cheng Wang, Wei-Chung Hwang, Ju-Kau Chen, Mike Jiang, and Yenwen Feng were honored with outstanding alumni awards. Meanwhile, congratulations to Rong-Shy Lin for being awarded the first outstanding alumni award of National Yang Ming Chiao Tung University. Their outstanding achievements not only benefit the society, but also make them be the role models for students. The opening ceremony of the "Taiwan Computer

Information Development Pavilion" was held on the same day. The museum, of which the fundraising campaign was launched by alumni, revealed the key role of the College of Computer Science of National Yang Ming Chiao Tung University played in the development of Taiwan's information technology.

The outstanding performance of our faculty and students would also be one of the themes in this issue. The young professors in our college not only have published many papers in top international conferences, but also received various academic awards. Special congratulations to Professor Liwei Chan for being awarded the highest academic honor for young scholars - the Mr. Wu Ta-You Memorial Award by the Ministry of Science and Technology. In addition, our college has always encouraged faculty to lead students to participate in important international competitions. Advised by Professor Chien Chen and me, Cheng-Ying Hsieh won the second Prize in ACM MobiCom 2021 Student Research Competition. This is the second time that Taiwan's continued success in this internationally renowned competition.

Since many world university rankings place a strong emphasis on reputation, NYCU, the new university name may adversely impact rankings. However, compared with the rankings before the merger, the ranking of National Yang Ming Chiao Tung University after the merger is better. In the latest RUR World University Rankings 2022, NYCU ranked 89th in the world and top 1 in Taiwan. Though not a completely accurate measure, university rankings are one of the goals we strive for, and the starting point for us to spur ourselves. Looking forward to 2023, I sincerely hope that our faculty and students will work together to continue to work hard for the future of the society and our country.

John Chen

Dean of the College of Computer Science

2022.12



陽明交大與警政署首創全台開設科技犯罪偵查在職專班 建立警政資安生態體系

文／秘書處公共關係組

近年新興科技發展迅速，便利全民生活，也導致科技犯罪猖獗，網路攻擊、金融詐騙、虛擬貨幣洗錢等案件層出不窮，衍生警政人員在資通、金流及情資面的偵查困境。國立陽明交通大學與警政署今年 9 月首創全台開設以科技犯罪偵查實務為主的「科技犯罪偵查資通訊碩士在職專班」，提升警政人員的資安素養，掌握資通訊安全尖端技術。

林奇宏校長表示，「科技犯罪偵查資通訊碩士在職專班」將以教育部每年外加 30 名員額提供優秀警務人才在職進修，結合陽明交大在資通訊安全的專業知識與警政署刑事警察局犯罪偵查實務專長，建構系統性的資通訊教育體系，提升警政人員資通訊安全背景知識與技術，防堵未來伴隨高資訊化時代來臨的資安威脅。

陳永昇教務長指出，愈便利的科技、愈安全的隱私，愈增加偵查人員在案件偵辦上的難度。例如加密通訊軟體有不同點對點加密機制，無法透過網路通訊監察解密取得通訊內容；網路匿蹤技術門檻及成本大幅降低，警方只能查到跳板 IP 位址，難以溯源追查；近年犯罪集團利用虛擬貨幣及第三方支付洗錢，也增加金流溯源困難。資安警員需要持續對新興科技有所了解，長期透過實際辦案、熟知各種網路犯罪模式來累積經驗，並利用現有科技尋求調查辦案突破點，解決偵查困境。

陽明交大在資安領域深耕多年，為國內學界

翹楚；8 位資安領域專業教師搭配資訊學院 60 餘位專任師資，研究與產學合作成果傑出，近年更獲科技部支持設立資安特色中心。為掌握資通訊安全的發展趨勢，建立以實務應用為導向的學術研究模式，專班以資訊學院為核心，科技法律學院、醫學院、生物醫學暨工程學院為衛星，建構資通訊安全師資、課程及應用學科知識，規劃程式設計、電腦網路、資料庫系統、機器學習、人工智慧等基礎學科，科技偵查人工智慧、區塊鏈、雲端運算、大數據、教育訓練、金融科技作為核心學科。

人才培育方面，專班將針對犯罪偵查人員進行培訓，結合刑事局專家進行實務課程共授，由警政署專家提供科技犯罪刑偵實務專業課程，共同進行研究指導，以培養學員具有應對政府、社會及企業等資安事件所需技能，建構完整的科技犯罪偵查資通訊安全資源平台。

「科技犯罪偵查資通訊碩士在職專班」強調科技建警不應侷限於犯罪偵查，要跳脫傳統思維窠臼，接受傳統犯罪衍伸至網路世界的現實，推動「科技」成為警察的通識，並依勤、業務區分類別與等級，將科技偵查向下扎根。陽明交大作為台灣資通訊安全領域的先驅，研究成果與知識持續與產官研界共享，建立我國良好的資安環境，期透過專班與實務偵查上所遭遇之困境與時俱進，進行研究並尋找解決方案，滿足國內對資通訊安全專才的高度需求。

A New Degree Program Established by NYCU and National Police Agency to Cultivate Future Police Officer Talents in Technology

The rapid development of technologies in recent years has brought more convenience to modern life. However, it also led to technology crimes, such as cyberattacks, financial fraud, cryptocurrency crimes. Thus, it causes troubles for police officers in detecting information communication, financial flows, and information security. National Yang Ming Chiao Tung University and National Police Agency worked together to establish the Degree Program of Information and Communication for Technology Crime Investigation in September this year. The purpose is to enhance the information security literacy of police officers and to master the advanced technology of information and communication security.

President Chi-Hung Lin indicated that the Degree Program of Information and Communication for Technology Crime Investigation, founded by the Ministry of Education, will provide 30 additional outstanding police officers for on-the-job training. These courses integrate the information and communication security expertise offered by Yang Ming Chiao Tung University with the crime investigation practice expertise shared by police officers from Criminal Investigation Police Office to build a systematic education system. Police officers can enhance the knowledge of information and communication security to prevent future information security threats that come along with the convenience of new technology.

Dr. Yong-Sheng Chen, the dean of academic affairs, pointed out that the more convenient technology and the more secure privacy there are, the more challenging to detect cases for investigators. For example, encrypted communication software has a different point-to-point encryption mechanism, which cannot be monitored to obtain the contents of the communication. Besides, nowadays the technology threshold for network anonymity and the cost are lower. Therefore, during the investigation quite often, only springboard IP addresses could be found, which means it could make tracing sources difficult online. Furthermore, criminal groups in recent years have been using third-party payment for money laundering. Thus, it also increases the difficulty to trace cash flow. Police officers specialized in Information security need to understand the ongoing emerging technologies through accumulating experiences through different cases with various cybercrime patterns, and using existing technologies to find breakthrough points on

investigation.

National Yang Ming Chiao Tung University has been working in the field of information security for many years. With 8 faculty members specializing in information security and other more than 60 full-time faculty members in the College of Computer Science, the university has achieved outstanding results in research and industry-academia cooperation. In addition, a Information Security Center was established in recent years with the support of the National Science and Technology Council. In order to grasp the development trend of information and communication security and to establish an application-orientated academic research model, this master program takes place at the college of Computer Science as the core department, and other qualified professors also offer courses for this program, including NYCU School of Law, Medical School, College of Biomedical Science and Engineering. Students can take courses such as programming, computer networks, database systems, machine learning, artificial intelligence, artificial intelligence detection, blockchain, cloud computing, big data, education and training, and financial technology at this master's program.

In terms of cultivating talents, the program focuses on training crime investigators in which the teachers are the criminal affairs Bureau experts for practical purposes. The purpose is to train students with skills required to deal with security incidents for government, industries, and our society. Eventually, we hope to build a complete technology crime security resources platform with these talents. The Degree Program of Information and Communication for Technology Crime Investigation emphasizes that technology should not be limited to crime investigation, but to accept the fact that crime has been extended to the cyber world in reality. Therefore, promoting general knowledge of technology has become the trend for police officers with different duties. National Yang Ming Chiao Tung University, taking the lead in information security, continues to share research and knowledge with the industry, government, and communities to build a good information security environment in Taiwan. Through attending this program and investigating issues in real investigation, we aim to find more solutions through more research to meet with the high demand for information and communication security professionals in Taiwan.

4G/5G 多媒體系統之資安弱點檢測與威脅防護

文／翁健棋

第四代行動通訊（4G）自技術萌芽之初，發展至今已逾數十載，憑藉著更快的網速與更大的網路頻寬，許多過去在 3G 時代所面臨的技術障礙被一一克服，伴隨 4G 系統的出現，人們的生活也由「固定式」轉為「行動式」，獲得更大程度的便利性。科技發展日新月異，轉眼無線通訊領域也將進入「高速度、低延遲、多連結」的 5G 時代，面對嶄新技術架構一併帶來的未知資安挑戰，本院資訊工程學系李奇育副教授與其團隊，開發出一款適用 4G/5G 多媒體系統之資安弱點檢測模組，用以應對技術更新所產生的資安威脅。

從技術層面切入討論，已支援現有 4G 語音服務 VoLTE 和 VoWiFi 的 IP 多媒體子系統（IMS，IP Multimedia Subsystem）將在未來支援 5G 語音服務 VoNR（Voice over New Radio）和影像服務 ViNR（Video over New Radio），可見 IMS 系統是未來 5G 通訊生態系統提供服務的必要元件。換言之，該系統若存在資安弱點，將對 5G 通訊造成嚴重資安威脅。李奇育副教授與團隊成員利用所開發之檢測模組，檢測出三個存在於 IMS 系統中的重大資安漏洞；同時使用七個廠牌的手機，在台灣和美國共四個電信商網路中進行實驗，証實此三個資安漏洞將造成用戶承受包括：秘密通話拒絕服務攻擊（Denial of Service）、社交工程攻擊之幽靈通話與來電號碼偽裝攻擊等風險。

特別是前述第一項攻擊威脅一旦出現，將造成用戶在未收到警示，毫無防備的情況下，無法撥打或接收任何來電，對於使用者資安影響可見一斑。開發團隊也於檢測過程中發現，此三個資安漏洞主要分別發生於 IMS 系統的通話狀態機、通話管理和號碼驗證，攻擊者可以藉由 VoWiFi 的資安漏洞截取 VoWiFi 應用程式和 IMS 系統之

間的會話連線，偽造對話啟動協定 SIP 封包，對 IMS 系統的三個資安漏洞進行攻擊。為了檢視此資安威脅可能帶來的最大損害，開發團隊設計了具自動調適的拒絕服務攻擊，實驗顯示，此攻擊對受害用戶的有效攻擊時間竟可達 99%，再次凸顯此漏洞急需解決應對之法，否則將產生極大的資安疑慮。

運用 AI 技術，開發團隊還發現現有 4G/5G 電信網路的另一個資安漏洞——通話資訊洩漏，它可被利用來對目標用戶的電話進行遠端偵測。也就是在用戶毫不知情的情況下，攻擊者僅需知道用戶的電話號碼，便可判斷其是否可為攻擊目標。為了應對上述潛在威脅，李奇育副教授與開發團隊除了將檢測結果回報給 GSMA 行動網路協會，同時提出系列解決方案，包含應用層資料來源認證、延遲通話資源綁定技術和通話管理限制分離；並使用開源軟體 OpenIMSCore 證明，該解決方案在不影響系統效能前提下之實踐可行性。一併搭配應用 AI 發展出的「來電號碼偽裝攻擊之防護檢測技術」，檢測來電通話是否為號碼偽裝攻擊，為 4G/5G 技術下新生之資安威脅提供對應參考解方。

隨著 5G 時代來臨，相關技術不僅在全球經濟發展中扮演關鍵角色，其於各行業、領域的應用範圍和規模也將逐步擴大，高速穩定的通訊技術一旦普及，潛在的資安威脅將讓人難以忽視。李奇育副教授與團隊成員所研發之資安弱點檢測與威脅防護技術，將有助於行動通訊技術標準（如 3GPP 和 GSMA）、國內外電信商、設備商和手機製造商，檢測和修補存在於多媒體服務應用程式和系統的資安風險。如此卓越貢獻，也將造福全球行動通訊技術相關產業，期待此項技術未來於運作系統中的實際應用！

4G/5G Multimedia Application Security Vulnerability Detection and Threat Protection

The fourth-generation mobile communication (4G) has been developed for more than decades since the mobile communication technology debuted. With faster network speed and larger bandwidth, many technical obstacles of 3G mobile network have been overcome. Moreover, the emergence of 4G has changed people's lives from "fixed" to "mobile" so that people have gained a higher degree of convenience. With the rapid development of technology in modern life, the wireless communication network is driving towards the 5G era, promising "high speed, low latency and massive connections". Facing the unknown challenges in information security associated with the new technical framework, Associate Professor Chi-Yu Li of the Department of Computer Science and his team have developed an information security vulnerability detection module for 4G/5G multimedia systems to defend against information security threats introduced by technology revolution.

From a technical perspective, the IP Multimedia Subsystem (IMS, IP Multimedia Subsystem), which supports the existing 4G voice services VoLTE and VoWiFi, will support 5G voice service VoNR (Voice over New Radio) and video service ViNR (Video over New Radio) in the future. The IMS system is definitely a key component for the future 5G communication ecosystem. In other words, if some information security weaknesses exist in the IMS system, it will pose a serious threat to 5G communications. Professor Li and his team used the developed detection module to identify three major information security vulnerabilities in the IMS system. In the experiment, they simultaneously used seven brands of mobile phones in four telecom networks both in Taiwan and in the United States. Finally, they have confirmed that these three security vulnerabilities can put a user's plan in jeopardy, such as secret call denial of service attacks (Denial of Service), social engineering attacks (ghost calls), and caller number spoofing attacks.

In particular, once the first attack threat mentioned above occurs, users are unable to make or receive any calls without warnings and precautions, thereby greatly affecting user experience with information security. During the detection process, the team also discovered that these three information security vulnerabilities are mostly found in the call state machine, call management and number verification in the IMS system. Through the security vulnerabilities of VoWiFi, attackers can intercept the connection session between the VoWiFi application and the IMS system, as well as create fake Session Initiation

Protocol (SIP) packets, thereby attacking the three security vulnerabilities of the IMS system. In order to examine the maximal potential damage caused by the information security threat, the team designed a self-adaptive denial-of-service (DOS) attack. Their experiments show that the effective attack time of this attack on victims can reach 99%, which once again highlights that this vulnerability needs to be solved in no time, otherwise it will cause critical security concerns.

Meanwhile, the team uses AI technology to find another information security loophole in the existing 4G/5G telecommunications network: call information leakage, which can be used to remotely identify the target user's phone. In other words, an attacker can target the victim by the phone number without the knowledge or consent of the user. In order to deal with the above potential threat, Professor Li and his team not only reported the results to The Global System for Mobile Communications Association (GSMA), but also proposed a series of solutions, including application layer data source authentication, delayed call resource binding, and call control isolation. In addition, the team used the open-source software OpenIMSCore to demonstrate the practical feasibility of the solution while maintaining system performance. Combining with "Caller Number Masquerade Attack Protection Detection Technology", which checks if the incoming request is a request forgery attack by AI technology, this package provides a corresponding solution for the emerging information security threat under 4G/5G technology.

With the advent of the 5G era, related technologies not only play a key role in the development of the global economy, but also gradually expand the application scope and scale to diverse industries and fields. However, once the stable high-speed communication technology becomes popular, the following potential threat to information security would be too severe to ignore. The information security vulnerability detection and threat protection technology developed by Associate Professor Li and his team will assist mobile communication standards organizations(3GPP and GSMA), domestic and foreign telecom carriers, equipment manufacturers, as well as mobile phone manufacturers to identify and reduce application-level and system-related security risks of multimedia services. Such an outstanding contribution will also benefit the global mobile communication industry. We look forward to the practical applications of this technology in the system in the future.



探勘金融消費資料於客 戶消費行為預測與個人 化電子廣告標題生成

文／翁健棋

隨著網際網路普及與各項資訊技術發展革新，國內外許多產業都乘上了資訊化的浪潮，迎向「數位經濟」新時代。從資訊化的作業流程，到虛擬化的產品服務、數位化的金融交易，以及電子化的商業行為，系列新型態的生產、消費模式轉變，不僅為生活帶來高度的便利性，同時也成為帶動產業創新、優化產業結構的原動力。本院資工系的彭文志教授與其團隊，順應數位經濟發展趨勢，開發出一款「可剖析顧客行為模式以提供個人化自動服務」之廣告標題生成技術，讓商家在精準投放廣告的同時，高效促進顧客消費行為之實踐。

「數位經濟」之具體應用形式之一，即是將大數據與人工智慧技術運用於既有的金融消費模式上，達到預測消費者消費行為之目的。彭文志教授於受訪時提到，早期金融產業如銀行與各商家在選擇行銷手法時，多半只針對具備會員身分的用戶進行廣告投放。但近年來，運用統計與機率的方式，銀行逐步能透過分析報告了解其客群的消費模式；此外，隨著資料的大量累積與演算法不斷地進步，若配合機器學習與深度學習等相關技術，還能做到「對單一消費者進行消費行為分析」這般細膩且精準的操作。如此一來，商家便能針對消費者進行客製化的廣告投放，而個人化 EDM (Electronic Direct Mail) 就是其中一種實踐手法，同時也是彭文志教授與其團隊所開發技術的應用範疇。

EDM 行銷主要藉由發送電子郵件達到通知、促銷、行銷等目的，儘管電子郵件技術問世至今

已逾數十載，該行銷手法仍未被新興的社群媒體所取代，主要可歸功於其技術成熟、成本穩定的特性。彭文志教授團隊所開發之技術內容主要包含「建立顧客行為預測與推薦系統」與「協同吸引力文章標題產生」兩大方向，前者透過消費資料庫為顧客建檔，發掘行為特徵，強化行銷策略與消費行為分析的連結；後者藉由解析顧客的社群點擊紀錄與消費關聯，剖析「顧客一意圖一金融產品」三者錯綜複雜之關係，進而生成個人化標題，作為 EDM 行銷用途。

運用團隊開發技術進行個人化廣告投放，一方面能讓商家針對特定消費族群投其所好，提供最合適之廣告內容；另一方面，消費者也能精準獲得其所需的商品通知，不受多餘資訊打擾，進而提升簽帳比例與消費行為轉換率。此外，於廣告持續投遞過程中，系統會透過檢視消費者與該則廣告的互動情形，作為人工智慧模型調整的依據，透過不斷地循環、學習產製出最精準、客製化的 EDM 內容。

目前彭文志教授團隊已透過與 KKDAY 及玉山銀行的合作，驗證該技術之產業應用性，搭配前述兩者所提供之時空資料庫、金融語意及圖像資料庫、社群網路身分資料庫，統整使用者瀏覽、消費紀錄等數據，分析出客戶喜好、行為模式等特徵，使得精確且個人化的 EDM 內容投放成為可能，同時大幅提升消費行為轉換率，一舉為供需雙方營造雙贏局面。本技術之開發團隊能將商業金融與資訊科技雙領域之學識經驗結合，創造可能並加以應用，實為跨域合作之成功典範！

Predicting Consumer Behavior and Generating Personalized Titles with Data Analytics

With the rapid development of information technology and popularization of the world-wide Internet, many industries, both domestically and abroad, have been riding the wave of informatization and embracing a new era of digital economy. Including information technology workflow, product service virtualization, digital transactions, and electronic business, the transformation of production and consumption pattern not only brings the next level of convenience, but also becomes the driving force of industrial innovation and industrial structure optimization. Following the development trend of the digital economy, Professor Wen-Chih Peng and his team of the Department of Computer Science at NYCU, developed advertising headlines generation technology, which can analyze customer behavior patterns to design and produce customized automated services, to help merchants not only improve the effectiveness of advertising, but also promote consumption efficiently.

One of the forms of work in the Digital Economy is to apply big data and artificial intelligence technology to the existing consumer financial patterns to accurately predict consumer behavior. In the interview, Professor Peng said that financial industries such as banks and merchants in the past only targeted users with membership status for advertising. Nowadays, statistics and probability methods can help banks with analytics to deeply recognize the consumption patterns of their customers. In addition, with the accumulation of large amounts of data and continuous improvement of algorithms, it is possible to achieve precise operation as "analyzing the individual consumer behavior" when we combine technologies such as machine learning and deep learning. In this way, merchants can carry out custom advertising to their target customers. One of the practices is Personalized EDM (Electronic Direct Mail), which is also the application field of the technology developed by Professor Peng and his team.

EDM marketing is a type of marketing that sends email to generate more leads, build relationships, and increase sales. Although being used for over decades, email marketing is not replaced by the emerging

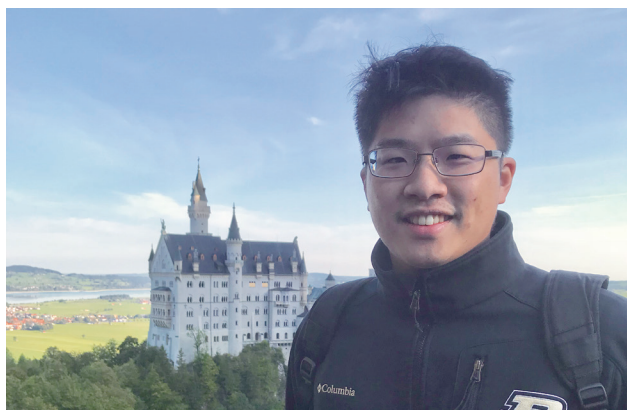
social media due to the mature technology and easy-to-estimate cost. The applications developed by Professor Peng and his team include "A Customer Behavior Prediction and Recommendation System" and "Collaborative Eye-Catching Title Generator". The former builds customer profile database to discover behavioral traits to strengthen the link between marketing strategy and consumer behavior analysis, while the latter analyzes the intricate relationship between customer, intention, and financial product by establishing the relation between customers' ad clicks on social media and their purchase, thereby creating a custom title for EDM Marketing campaign.

While using the technology developed by the team to carry out custom advertising to their target customers, on the one hand, merchants can target their marketing messages to specific individuals; on the other hand, consumers can receive accurate product notification without redundant information to increase consumer conversion rate and spending. In addition, during continuous advertising, the system will keep adjusting the artificial intelligence model according to the interaction between consumers and advertisers, thereby creating the most accurate and customized EDM content.

At present, Professor Peng and his team have verified the industrial applicability of this technology through the collaboration with KKDAY and E.SUN BANK. Combining with spatiotemporal database, financial semantics and image database, as well as social network identity database provided by the above two companies, the team consolidates user browsing and consumption records to analyze customer preferences and behavior patterns and make accurate and customized EDM content accordingly, thereby greatly increasing customer conversion rate and creating win-win situations for both customers and suppliers. Professor Peng and his team integrate the knowledge and experiences of business finance and information technology to innovate with new applications, which successfully builds a model of cross-domain collaboration!

陳奕廷老師： 做自己熱愛且能夠讓世界變得更美好的事

文／翁健棋



本次資訊人有幸邀請到本院資訊工程學系，專精智慧駕駛系統、電腦視覺、人工智慧與機器學習等領域的陳奕廷助理教授，擔任受訪嘉賓。希望能藉由陳奕廷老師豐富多元的出國求學、工作經驗分享，供同為資訊人的資工系同學們做為未來求學規劃、職涯發展參考。從最初求學申請時，對於是否投身研究的迷惘與考量，談到求職時的職場探索經驗與後續任職師資的教學理念，且聽陳老師分享這段學職涯轉換的心路歷程。

迷惘不可避免，摸索別忘把握機會！

於大學四年級時，就讀本校電子工程學系的陳奕廷老師就已開始思考未來的發展規劃。考量到出國求學必要之申請資料、鑑定考試的準備時間，陳老師決定把握住前往伊利諾大學香檳分校的交換機會，以其適應狀態作為未來是否長期出國留學，攻讀碩士學位的選擇依據。憶起出發前往交換前，交大恰巧邀請在伊利諾大學香檳分校從事模式辨識、電腦視覺與人機交互的黃煦濤教授前來演講，演講內容充分激發陳老師的興趣與熱忱，他立刻主動寫信向黃教授詢問是否可以參與研究專案。在獲得肯定答覆後，陳奕廷老師便以新成員的身分加入研究團隊，協助專題計畫進行。

「我覺得這是一個很重要的契機，讓我開始對『研究』這件事情有想法，知道自己在做什麼。」初次的研究經驗累積，與其所帶來之成就感，為陳奕廷老師在探索自我、了解自身未來規劃等面向帶來極大的幫助。該次的專題產製經驗也讓陳老師下定決心，將原先的「出國交換探索、考慮攻讀碩士」等階段性目標延伸規劃，並修訂「申請博士班」為最終目標。儘管摸清了努力方向，後續也順利申請上博士班，陳老師卻面臨了多數國際學生都會遇到的難題——高額消費與學

費所帶來的負擔，在沒有金援的情況下，頂著極大的金錢壓力度過第一個學期。

為何研究？藏不住的熱忱會告訴你

談及「研究動力」與「贊助金援」取捨的兩難，陳奕廷老師回想起在求學第二學期時，雖成功得到獎助學金，但研究主題卻與自身興趣有所出入，在深入探索時總會少了幾分熱忱，這樣的困境直到博士班倒數第二年，修習「電腦視覺」課程之後才有所改善。好不容易找尋到極具探索熱忱之研究領域，但考量到畢業時限在即，面對「等待機會從事相關研究」或「進入職場尋找相關工作」的二選一難題，陳老師選擇了前者，在大學同學牽線下，加入了美國加州大學美西德分校楊明玄教授的電腦視覺研究團隊。憶起當時自己在自薦信中提到「我不管有沒有獎助金，我就是要去！做！」陳老師認為，或許正因毫不掩飾蘄露「真的想做」的熱忱與決心，才有機會打動楊教授，獲得貴人相助，實踐所學，繳出兩項研究計畫成果。

緊接著，在多次研究與實習經驗累積過程中，陳奕廷老師逐步摸索出自身投身研究的理由與目標。在美國本田研究所時，陳老師從先進駕駛系統專案中意識到，車禍事故所引發之社會問題有迫切解決的需求，而自身所學之實踐正是解方之一；「電腦視覺」不單可當作研究興趣，其延伸應用如智慧駕駛系統、輔助機器人等技術更可為交通安全、居家照護等社會議題做出貢獻。「運用所學，為有需要的人提供協助，改變並解決現存之問題，或許正是我一直以來追尋的研究目標與意義。」這是陳老師面對「為何研究」的問題思考，透過親身經歷所得出，簡單卻富含深意的答案。

於訪談末段，陳奕廷老師分享了工作最後一年帶實習生的特別經驗。擔任 mentor 期間，陳老師能充分感受到實習生對研究的迷茫好似當年的自己；他認為，若有人能在此時以過來人的身分，提供引導並給予自信，對於研究新鮮人定有極大助益，這也正是陳老師選擇投身教職的原因之一。結合各項經歷，陳老師以自身體悟勉勵同學們：「主動積極去追尋自己興趣的同時，做自己熱愛且能夠讓世界變得更美好的事！」期待莘莘學子們能充分探索自我，投注熱忱於所學，貢獻並造福社會！

An Interview with Dr. Yi-Ting Chen: Pursuing Your Passion and Make This World a Better Place

We are very honored to invite Dr. Yi-Ting Chen, an assistant professor of the College of Computer Science who specializes in intelligent driving systems, computer vision, artificial intelligence, and machine learning in this interview. We hope to share Dr. Chen's diversified study and career experiences to students of our college for career planning as a great reference. From having doubts to think about whether to pursue a research career, to the experience of job application and his teaching philosophy, Dr. Yi-Ting Chen shared his ups and downs in this journey.

It is normal to feel confused, but don't forget to seize your opportunity

When majoring in Electrical Engineering in his senior year of NCTU, Dr. Chen had already started thinking about his future. Considering the time taken to prepare for application documents and examinations to study abroad, he decided to apply for a short-term exchange program at the University of Illinois at Urbana-Champaign. Through this opportunity, he wanted to see if he was able to fit in and can further pursue master's and doctoral degrees abroad in the future. Just before he left for his exchange program, he recalled that coincidentally Prof. Thomas S. Huang, a professor at Illinois at Urbana Champaign was invited to give a lecture at NCTU. Dr. Huang was one of the leading figures in pattern recognition, computer vision, and human computer interaction. Dr. Chen was deeply inspired by Dr. Huang's lecture so he immediately wrote to Professor Huang to ask if he could participate in the research project. After receiving a positive answer, Dr. Yi-Ting Chen joined the research team in the project team directed by Dr. Huang. "I think this was a turning point for me to start to think about the meaning of research and what I was doing." Not only gaining a sense of self-achievement from research experiences, conducting research also helped him to explore and plan for his future. This experience gained from the research project also made Dr. Chen determined to extend his plan from a short-term exchange and master's degree to a doctoral program application as his final goal. Although Dr. Chen made up his mind and successfully enrolled in the doctoral program, he soon faced a challenge that most international students encountered-the burden of high living costs and expensive tuition fees. He had a rough first semester under enormous pressure without financial support in his doctoral study.

What is the purpose of research? Your passion will answer you

When it comes to the dilemma of choosing between the passion to conduct research or receiving an assistantship, Dr. Chen shared his memory during his second semester of doctoral study. Although he did

successfully receive an assistantship, he was not very motivated in the research topic he was conducting. This situation did not improve until the second last year of his doctoral study when taking the course, Computer Vision, in which he found a passion for research. Just not long after he discovered his passion, Dr. Chen soon faced another challenge, which was that it was about time for him to graduate from doctoral study. He needed to decide whether to keep waiting for an opportunity to do research that he was very interested in or enter the job market in a related field. In the end, he chose the former option and joined Prof. Ming-Hsuan Yang's computer vision research team at the University of California at Merced. In his cover letter to apply for a position at Dr. Yang's lab, he wrote "I don't care if I have an assistantship or not, I just want to do it!". Perhaps the reason why he was recruited by Dr. Yang and earned this opportunity was because of his strong determination. With this firm and positive attitude, Dr. Chen was able to publish two papers while working in Dr. Yang's research team.

Dr. Yi-Ting Chen gradually found the reasons and goals for his devotion to research from many research and internship experiences. When working at the Honda Research Institute USA, Dr. Chen realized he could put his expertise into solving real problems. For instance, he found that there was an urgent need to solve problems caused by car accidents when exploring advanced driver assist system projects. "Computer Vision" could be more than a research interest, moreover, it can be applied in intelligent driving systems, and assistive robots to contribute to traffic safety and home-care services. "Using what I learned and providing assistance to people in need to solve existing problems is my goal behind my passion in research. This is a simple yet meaningful answer to the question of "what is the purpose of research", and Dr. Chen conveyed the messages through his personal experiences.

At the end of the interview, Dr. Chen shared his experience when leading interns in the final year in Honda Research Institute USA. When guiding interns as a mentor, he felt that those interns' circumstances were very similar to him back then, such as feeling confused about their future and research. He believes that if someone could provide guidance based on their perspective as an experienced researcher, it would be very helpful for younger generations. It was also the reason why he devoted himself to teaching at the Department of Computer Science at NYCU. Now He often encourages his students to "actively pursue their passion and do what they love to make the world a better place." He hopes that students can explore and devote themselves fully to their studies and give what they have to this society.

交大日歡慶回娘家

文／翁健棋

今年四月上旬，搭上陽明交大合校後首個「交大日」歡慶氛圍，本院資工系亦於盛會舉辦期間推出「Beyond Computing 系列活動」，一併進行「台灣電腦資訊發展館」的揭牌開幕儀式，同時頒發傑出系友獎項，廣邀各界資工系友回娘家，共襄盛舉。系列活動不僅獲得「資工人」的熱烈迴響，亦吸引媒體朋友、對相關領域有興趣之莘莘學子出席參與。

傑出系友頒獎典禮中，於各領域執牛耳的受獎學長們「返回主場」，踴躍出席本次盛會，為的就是與學弟妹們分享寶貴的學涯、職涯經驗，希望透過回娘家傳統，實踐「交大人幫交大人」精神，將自身經歷轉化為學弟妹們茁壯成長養分。獲頒傑出系友的 70 級林順喜學長憶起因緣際會到學校任教的過程，喜歡棋牌等益智遊戲的他，將對自身興趣的熱忱轉移至研究領域，結合所學，與學生們開發出棋力、牌力名列世界前茅的程式，其演算能力可達每秒展開上億個牌面，各程式應用領域橫跨中西，從麻將、橋牌到黑白棋皆有相對應技術得以運用，令人驚嘆。林順喜學長以自身喜好為動力，持續思考如何於 AI 技術領域求新求變，如此崇實篤行精神實為各學子之表率。

而 80 級的黃維中學長也在分享中提到，自身於開發軟體過程中的獨到觀察：「在這一波比較新的資訊科技浪潮下，要靠各領域的大家通力合作；換句話說，單一個專長的團隊絕對沒有辦法產出理想成品。不管是在資訊領域、人文社會科學領域，或是醫療領域，多面向相互合作、各展所長，才有可能把成品做得更好。」黃維中學長也期許在座的未來新星們，能多累積跨域合作經驗，與各專長人才共築合作生態系，帶領資訊科技產業向前衝！相信傑出系友們的經驗分享皆讓與會師生獲益良多，也再次恭喜本次獲獎的林榮賜學長、林順喜學長、王介呈學長、黃維中學長、陳儒寬學長、江孟峰學長與馮彥文學長。

除去傑出系友頒獎典禮，本次盛會另一大重頭戲便是由聯發科技資深處長梁伯嵩博士、台積電 IT 企業系統整合處林均彥處長主講的 Beyond

Computing 講座。梁伯嵩博士自三階段 Computing Platform 的轉換切入，透過技術發展歷程，依照時序、由淺入深引導聽眾進入「未來運算趨勢：從積體電路到人工智慧與虛實宇宙」主題。談及現代人普遍對「AI 是否會超越人類大腦」問題所生的擔憂，梁博士應用具體舉例與圖解，點出「目前人工智慧的運算效能，對比人類大腦還差得遠。」同時勉勵在場師生，目前技術的不足、運算效能的瓶頸，正是學界與業界研究突破的動機與目標，儘管現階段好比「觀察鳥兒，欲學習飛行的人類」般，進展有限；但在科技發展日新月異的當代，假以時日，在座的各位都有可能是「高效飛行原理」的開發者。屆時，人工智慧應用的深度與廣度將超出我們目前所能認知的範疇。

講座下半場，任職台積電，81 級的林均彥學長自產業現況切入，提出如何用更低的耗能，做到更強運算的問題思考，與梁博士的演講內容相呼應。談及企業皆須面臨的數位轉型難題，林均彥學長道出「業務價值思考、軟體轉產品的思維建構、清楚的藍圖與願景」三大成功關鍵，搭配上相關業務單位的支持，才會是真正有效益的「好的轉型」。「沒有人能確定目前在做的是否正確，但我可以肯定方向是明確的，我們也會繼續努力。」林均彥學長以樂觀態度面對轉型挑戰，順勢為講座收尾。再次感謝梁伯嵩博士、林均彥學長豐富精彩的分享，和與會貴賓的熱情響應，讓本次活動圓滿結束，期待明年再會！



資工系「系友回娘家」活動圓滿成功，除了三間教室座無虛席，線上亦有逾 400 人觀看直播。

NYCU Alumni Day

In early April this year, with the festive atmosphere of the first "NYCU Alumni Day" after Yang Ming Chiao Tung University was merged, the Department of Computer Science launched the "Beyond Computing Series Activities" during the event, and jointly unveiled the "Taiwan Computer Information Development Center". At the same time, the Outstanding Alumni Award were awarded. All friends and alumni were invited to join the great feast. The activities not only received enthusiastic response from "Computer Science guy", but also attracted both media friends and students who are interested in related fields to attend.

In the Alumni awards ceremony, the seniors who are outstanding in various fields "came back home" and proactively participated in this event to share their precious academic and career experience with young students. Following the tradition of "back home", they hope to practice the "NYCU guys support each other" Spirit and transform their experiences into nutrients for the growth of young students. Shun-Shii Lin ('70), who was awarded the Outstanding Alumni award, recalled the process of embracing teaching as a career. Since he is passionate about puzzle games such as chess and cards, he integrated his enthusiasm with the research. Applying what he has learned, he and his students have developed a program which is ranked among the best in the world in chess and card games. The calculation efficiency can handle hundreds of millions of game states per second. The applications of core technology amazingly span from East to West games, such as Mahjong, bridge, and Othello. Lin, driven by his own passions, keeps on seeking further innovations and changes in AI fields. Such spirit is truly a role model for all students.

Wei-Chung Hwang ('80) also shared his unique observation while developing software: "Under this new trend of information technology, it is necessary for everyone in various fields to collaborate with each other; in other words, it is impossible to develop a perfect product by a team with single expertise. No matter whether it is in the information field, the humanities and social sciences field, or the medical field, cooperating with each other in various fields and exerting their strengths is mandatory to create better products." Huang hoped that the future talents will accumulate more experience in cross-domain cooperation, build a cooperation ecosystem with talents of various expertise, and bring forward the information technology industry. We believe that the experience sharing of outstanding alumni will benefit the faculty and students a lot. Congratulations again to the winners of this award,

Rong-Shy Lin, Shun-Shii Lin, Jie-Cheng Wang, Wei-Chung Hwang, Ju-Kau Chen, Mike Jiang, and Yenwen Feng.

Apart from the Outstanding Alumni Award Ceremony, another main focus event is the Beyond Computing speech given by Dr. Liang Bor-Sung, Senior Director of MediaTek, and Frank Lin ('81), Director of TSMC IT Enterprise System Integration Department. Dr. Liang started from three paradigm shifts of Computing Platform. Through the technological development process in chronological order, he guided the audience, from the shallower to the deeper, to the theme of "Future Computing Trend: From Integrated Circuits to Artificial Intelligence as well as the Metaverse". Responding to people's concerns about "whether AI will surpass the human brain", Dr. Liang took specific examples and diagrams to point out that "the current capability of artificial intelligence is far worse than that of the human brain." He also encouraged the faculty and students: The existing primitive level of technology and the bottleneck of computing performance may become the target of research breakthroughs and motivation in academia and industry. We are currently in a stage as if "while observing birds, human beings want to learn to fly" and the progress in the fields advances sluggishly; however, in an era of rapid technological development, some of you may be the developers of "the principle of efficient flight" in the near future. At that time, the depth and breadth of artificial intelligence applications will exceed the scope of our current knowledge.

In the second half of the speech, Frank Lin, a director at TSMC, cut into the current state of the industry and raised a question for everyone: how to achieve stronger computing with lower energy consumption. This statement echoes Dr. Liang's speech. Referring to the digital transformation challenges all enterprises face, Lin pointed out "business value thinking, mindset of product associated with software, and clear blueprint and vision" are the three key factors to success. Combining with the support of relevant business units, it will be an effective "good transition". "No one can assure whether we are doing the right things; however, I am sure that we are on the right track and will continue our best endeavors." Lin ended the speech with an optimistic attitude towards the challenges of transformation. Once again, we thank Dr. Liang Bor-Sung and Mr. Frank Lin for such wonderful sharing, as well as the distinguished guests for their enthusiastic response, which brought this event to a perfect conclusion. Looking forward to seeing you again next year!

傑出校友 林榮賜學長：利他共好

文／翁健棋



本校合校後，首屆傑出校友名單於去年年末出爐，極具邁向「偉大大學」里程碑代表性，意義重大的獲獎名單中，除去防疫第一線，守護國人健康的醫療公衛領域佼佼者外，亦不乏多位奠定台灣現有通訊建設基礎，放眼未來，布局全球的資通訊領域中堅人才。其中也包含了本文的主角，民國 76 年畢業於本校計算機工程學系，深耕資通訊領域三十載，打造台灣行動 5G 與寬頻服務不遺餘力，任職中華電信執行副總經理（技術長）的林榮賜先生。

具備本校資訊工程研究所博士學位，身為交大資訊人一脈的林榮賜學長，曾擔任中華電信數據通訊分公司總經理、中華電信研究院院長等要職，專門執掌網路與數據技術的應用開發與建置，是位學識與業界經歷兼具的技術領航先鋒。在 5G 技術萌芽之初，林榮賜學長便利用透徹的產業觀察，搭配上多年累積的學識、技術經驗，提前為「萬物皆可聯網」的智慧聯網時代佈局。在認知到電信業者於新商業模式下的定位後，林榮賜學長判斷其所具備的「中介性質」特性，最有機會將使用者與應用服務這兩端串聯在一起，目標既已確立，一系列包括智慧交通、智慧安防、智慧能源等領域的大型專案便開始運作。

除了發揮自身專業，督導行動 5G 建設，打造行動寬頻智慧世代，帶動活躍網路社會之貢獻外，林榮賜學長亦善盡社會責任，長期致力於推動公共安全及災害防護救助緊急通訊之建置。另一方面，林榮賜學長也不忘飲水思源，積極提供資源與協助，支持母校透過產學合作提升「交大出品」人才的國際競爭力。自民國 102 年起步之「產學大聯盟計畫」觀察便可發現，林榮賜學長於與中華電信的產學合作洽談中，扮演極為關鍵的重要推手；此外，其多次協助本校建置前瞻電信研究網路，於強化無線寬頻、free5GC（世界第一個符合 3GPP R15 版本服務化架構標準的開源核心網路）等技術領域研究產生極大助益。

歡慶交大日當週，林榮賜學長以傑出校友、系友雙重身分返校受獎，同時藉此機會與與會師生分享自身領導團隊，統籌事務的管理經驗。憶起初入職場時所受到的衝擊，林榮賜學長點出「利他共好」概念建立的重要性，相較求學時對於學業表現的自我追求，職場上與他人合作共事乃不可避免之常態，此時大家身處同一團隊，利他即為利己，如何踐行利他行為，產生正向循環推進力，是團隊合作達成高效多產的重要秘訣。不單如此，成員的「異質性」也是組建團隊須考量的關鍵要素，如多元的意見與觀點、人格特質互補的相性調適，皆為高異質性所帶來的正面效益。

於分享末段，林榮賜學長以一句「隨時搞懂你需要的是 Do Right Things，還是 Do Things Right。」勉勵眾學子，同時提醒宏觀的格局是協助判斷的關鍵，發現對的問題，同時解決對的問題，是專案成功的不二法門。對比佈局任職公司轉型成長所須的關鍵技術與服務、帶領團隊建立產品研發敏捷化流程，即時滿足市場需求等實績，傑出校友林榮賜學長將職場歷練濃縮，傾囊相授，在經驗傳承的同時，落實了「交大人幫交大人」的精神典範。

品」人才的國際競爭力。自民國 102 年起步之「產學大聯盟計畫」觀察便可發現，林榮賜學長於與中華電信的產學合作洽談中，扮演極為關鍵的重要推手；此外，其多次協助本校建置前瞻電信研究網路，於強化無線寬頻、free5GC（世界第一個符合 3GPP R15 版本服務化架構標準的開源核心網路）等技術領域研究產生極大助益。

Rong-Shy Lin, an Outstanding Alumnus: Altruism and Mutual Advantage

The first list of outstanding alumni after the merger was announced at the end of last year, which marks a milestone towards creating a great university. In addition to the leaders in the medical and public health field, who protect our health at the forefront of epidemic prevention, the list included many talents in the field of information and telecommunications, who have laid the foundation of Taiwan's existing telecommunication infrastructure and established a global presence in the future. Among them, Dr. Rong-Shy Lin, Senior Executive Vice President (Chief Technology Officer) of Chunghwa Telecom, graduated from the Department of Computer Science at NCTU in 1976. He has been deeply involved in the field of information and telecommunications over the past 30 years and spared no effort in creating mobile 5G and broadband services in Taiwan.

Dr. Lin received his doctorate in computer science at NCTU. Specializing in application development and network and data communication deployment, he has held important positions including general manager of Chunghwa Telecom Data Communication and president of Chunghwa Telecom Laboratories. He is also a technology pioneer with knowledge and industry experience. In the early days of 5G technology, Dr. Lin combined his thorough industry observation with the knowledge and experience accumulated over the years to advance the strategic arrangement for the era of intelligent networking where "everything can be connected to the Internet." While realizing the positioning of the telecommunications industry in the new business paradigm, Dr. Lin identified its characteristic of "intermediary," which has the greatest opportunity to link both users and application services. Once the goal was confirmed, a series of large-scale projects, such as smart transportation, smart security, and smart energy, immediately kicked off.

Besides exerting the expertise in the workplace, supervising the construction of mobile 5G infrastructure, creating a mobile broadband smart generation, and driving the flourishing activity of the Internet society, Dr. Lin fulfills his social responsibilities, which he has long been promoting the establishment of public safety and emergency communications for disaster management and risk reduction. On the other hand, Dr. Lin kept the spirit of "drinking water while thinking of the source" to actively provide resources and assistance to NYCU in order to enhance the

international competitiveness of NYCU talents through industry-academic collaboration. In the "Industry-University Alliance Project," which was formed in 2013, Dr. Lin played a vital role in the industry-academia cooperation with Chunghwa Telecom. In addition, he has assisted NYCU in building the testbed of a leading-edge telecommunication network, which significantly benefits the research in the fields such as advanced wireless broadband and free5GC (the world's first open-source 5G core network implementation complying with the 3GPP R15).

Over the University Day celebration week, as an extraordinary alumnus of NYCU and an alumnus of the Department of Computer Science, Dr. Lin attended the ceremony on campus for the outstanding alumni award. At the same time, he took this opportunity to share his experience in team management and affairs coordination with faculty and students. Recalling the impact of the first job experience, Dr. Lin pointed out the importance of establishing the concept of "altruism and mutual advantage." Compared with the personal academic achievement people pursue in school, cooperation in the workplace is unavoidable. In other words, altruism is literally equivalent to self-interest when people are on the same team. And the key factor of efficient and productive teamwork is boosting altruistic behavior to generate positive momentum. And not only that, but the "heterogeneity" of members would also be a main factor of consideration while forming a team. For example, diverse opinions/viewpoints and compatibility adjustment with complementary personalities are both benefits of high heterogeneity.

At the end of the sharing session, Dr. Lin encouraged the students, "Keep aware of your real need: doing right things or doing things right." He remarked that macroscopic patterns would be the key to making better decisions. The success of a project heavily relies on finding the right problem and fixing it. In addition to laying out the key technologies and services for his company's transformation and growth, as well as leading his team to establish an agile product development process so as to promptly satisfy market requirements, our outstanding alumnus Lin distilled his career experience and shared with the students without reserve, which indeed fulfilled the spiritual model of "NYCU guys support each other."

數位分身的前世：傳真機

文／林一平 講座教授

最近我到高雄市的國立科學工藝博物館演講，順便參觀其珍貴館藏，無意間看到中華電信的骨董傳真機 TYPE LDI-3 FACSIMILE，頗有親切感。科工館的解說：「傳真機為結合光學、電子、精密機械及通訊等多項技術的事務機器。由於國際網路通訊盛行，傳真機市場逐步衰退，且單一功能傳真機已不符需求，故廠商推出結合傳真、掃描、影印及列印等多功能傳真機來因應市場變化。」今日傳真機被當成不符需求的事務機器，其實它可是 1940 年代的劃時代創新。

數位分身是今日的熱門話題，而傳真機應該是最早期的遠距數位分身產生器。傳真機的前世可歸功於倫傑 (Richard Ranger) 發明的無線傳真 (wireless photoradiogram 或 transoceanic radio facsimile)。這部無線傳真機由紐約傳送第一張照片到倫敦，照片是時任美國總統柯立芝 (John Coolidge) 的玉照。

倫傑於 1930 年成立 Rangertone 公司，位於紐澤西州的紐瓦克 (Newark)，這家公司在三號公路附近，我曾拜訪過。倫傑一生多采多姿，有許多發明，還得過奧斯卡金像獎。直到今日，無線傳真仍然用於傳送氣象圖及資訊。1924 年，AT&T 的艾維斯 (Herbert Ives) 完成第一張彩色傳真。艾維斯是個特異獨行俠，多次公開表示反對愛因斯坦的相對論。



早期傳真機。林一平攝



林一平手繪之柯立芝 (John Coolidge)。

1925 年貝爾實驗室採用真空管技術和光電管技術研製出了實用型的傳真機。1947 年慕維廉 (Alexander Muirhead) 發明現代的傳真機；1960 年代，美國陸軍首次以衛星傳送照片到波多黎各 (Puerto Rico)。早期的傳真機採用阿摩尼亞水來作顯影液，到後期才出現用特別熱感紙的傳真機。

中華電信總公司陳列一部早期的傳真機，這部日本 Toho Denki 製造的傳真機於 1968 年出品，將客戶手寫之電報稿，原樣地發送或接收。1970 年代中期，因傳真機成本大幅下降，遂普遍被採用，尤其是數位傳真機在日本率先流行，很快取代電傳打字機 (teletypewriter)。其主因是，在那個年代，以打字機敲打日文很不方便，遠不如傳真機的掃描快速。傳真電報稿不必先譯成電碼再傳送，而可直接送真跡到對方客戶端。

1980 年後，傳真機已遍佈全世界。1985 年，麥格努斯基 (Hank Magnuski) 製作第一張電腦傳真擴充卡 GammaFax，完成第一部電腦傳真機。現在的傳真機大多數都依此原理，採用噴墨或雷射列印。今日傳真的服務已漸漸被網路上的服務取代，不過傳真仍有優點，例如它不像網路產品那樣容易被入侵或中毒。因此一些機密文件，仍然依賴傳真機的傳送。



早期電傳打字機。林一平攝

The Forerunner of Digital Cloning: Fax Machine

Recently I gave a speech at the National Science and Technology Museum in Kaohsiung City, and stopped by to enjoy the precious collection. It was quite familiar to me when I saw Chunghwa Telecom's antique fax machine, TYPE LDI-3 FACSIMILE, by accident. The National Science and Technology Museum explanatory text described, "Fax machines are business machines that integrate optics, electronic, precision machinery, and communications. The fax machine market declines gradually due to the prevalence of internet use. At the same time, single-function fax machines cannot meet the end users' expectation so that vendors promote multi-function fax machines, which offer faxing, scanning, photocopying and printing in one box, in response to market changes." Although fax machine today is regarded as a business machine that does not meet the requirements, it was in fact an epoch-making innovation in the 1940s.

While digital clones are a hot topic today, fax machines should be the earliest remote digital clone generator. The forerunner of current fax machines was wireless photoradiogram or transoceanic radio facsimile invented by Richard Ranger. The wireless fax machine sent the first photo, which was a photograph of President John Calvin Coolidge, from New York to London.

Ranger formed a company, Rangertone, Inc., in Newark, New Jersey in 1930. I have visited that company near Highway 3. Ranger lives a colorful life. He has many inventions, and won an Academy Award. Until today, wireless faxing is still used to transmit weather maps and information. In 1924, Herbert Ives of AT&T developed the first color facsimile. Ives is a loner and he has publicly spoken out against Einstein's theory of relativity on several occasions.

In 1925, Bell Labs developed a practical fax machine using vacuum tubes and photocells. In 1947, Alexander Muirhead invented the modern fax machine; in the 1960s, the US Army first sent images to Puerto Rico by satellite. The early fax machines utilized ammonia solution as a developer, and in the later period, fax machines using special thermal paper became available.

Chunghwa Telecom Corporation exhibits an early fax machine. This facsimile machine Toho Denki, manufactured in Japan in 1968, sends or receives the customer's handwritten telegram as it is. In the mid-1970s, the cost of fax machines reduced sharply, so they were widely accepted. In particular, digital fax machines became popular in Japan and soon replaced teletypewriters. In those days, typing Japanese with a typewriter was inconvenient, which was far less efficient than scanning hand-written documents with a fax machine. Fax telegram drafts did not need to be translated into codes before transmission, but were directly sent to the peer.

After 1980, fax machines were used around the world. In 1985, Hank Magnuski produced the first computer fax add-on card, called GammaFax, and invented the first computer fax machine. Most of today's fax machines follow Magnuski's design concept, either using inkjet or laser printing. Today's fax service has been gradually substituted by the service on the Internet; however, fax still possesses some advantages since it is not as easy to be hacked or poisoned as Internet products. Therefore, some confidential documents still rely on the transmission of fax machines.

坦克通訊與 MOS 指標

文／林一平 講座教授

俄烏戰爭中，坦克車大量被摧毀，其中原因包括重度依賴智慧型手機等「不安全通訊裝置」，容易成為攻擊目標。今日戰車指揮主要靠無線電通訊，須避免受到天候、地形等影響。軍方便宜行事，鼓勵車長自購民用無線電設備，通訊效果當然不佳。幾年前台灣 CM-11「勇虎」坦克墜入河道事故，是前方車長沒有收到後方車長的無線電警告。

自從邱吉爾 (Winston Churchill) 在第一次世界大戰發展出馬克坦克車後，在實戰下進行了一系列通訊設施的改良。馬克一號車內有四位成員，由於空間限制，彼此只能有極少的通訊互動。車長一般以敲打駕駛員左右肩膀的方式，指揮行進方向，對外界則靠手語及旗語。必要時則跳下車去對方的坦克車說話。若要向總部報告，則由坦克車的視窗裂縫放出通信鴿。

1930~1950 年間，坦克車的通訊方式開始大幅度改進，終於有內部通話的對講機裝置，並且有無線電可對外和步兵連繫。坦克車不需有放鴿子的洞口要歸功於美國通訊部隊少校阿姆斯壯 (Edwin Armstrong)。1930 年代初期，阿姆斯壯研發出 FM(Frequency Modulated) 無線電技術，很有效地濾掉無線傳輸的噪音。阿姆斯壯將這項價值數十億美元技術的專利免費讓美國陸軍使用於第二次世界大戰。阿姆斯壯對美國政府很慷慨，但一直和美國無線電公司 (RCA) 打專利官司，最後跳樓自殺。

坦克車大致會配備二到三套無線通訊管道，為了提升通話品質，坦克車內的通話過程嚴格遵循「無線通話程序」。軍事行動通話，不是一般電話點對點的方式，而是許多人可以同時參與的對講機 (Push-to-Talk；PTT) 模式。PTT 通訊有協調通話的必要，因此無線通話程序有如下的規則：講話前先聽（不要搶話）、講話時要慢且清晰（戰況火燒屁股時可能慢不下來）、長話要短說，常出現以下無線電對話用詞：Over(我講完啦，等你回話)、Out(會談結束，你不必回話)、Roger(我聽懂你剛剛在講啥)、Wilco(聽懂且遵命)、Read back(請複誦)、Radio Check(告訴我訊號清晰度，以 1 到 5 區分)。

為了不誤認英文字母的發音，會以「字」代替「字母」，例如 Alfa 代表 A、Bravo 代表 B

等。關於 PTT 通訊，可以採分散式的自動化協調。我曾做過相關研究，發表於國際期刊《IEEE Transactions on Intelligent Transport Systems》。

戰爭緊急狀況，通訊品質往往無法控制，必須再三確認對方聽得見。當對方要求 Radio Check 時，你會憑主觀感覺聲音清晰度，回覆說：「Receiving you strength 2」（表示通訊品質不佳）。

其實，聯合國電信組織已訂定電話語音的品質的指標 Mean Opinion Score(MOS)，該指標考慮設備及損傷 (Impairment) 參數，能由人耳感知，主觀的量化語音傳輸的品質。MOS 的數值共有五級，1 代表最差 (unacceptably bad)、2 代表貧乏 (poor)、3 代表尚可 (fair)、4 代表極佳 (good)、5 代表優異 (excellent)。MOS 值可經由演算法來模擬人耳的聽覺，自動算出語音線路的通話品質。測試時，MOS 值要達到 3.5 才算合格（其實就電信等級而言，這個標準並不高）。我也曾以 MOS 值量測並評估加密過後無線通訊的語音品質，發表於《IEEE Internet Computing》。



林一平手繪之阿姆斯壯 (Edwin Armstrong)。

林一平
國立陽明交通大學資工系終身講座教授暨華邦電子講座

現為國立陽明交通大學資工系終身講座 教授暨華邦電子講座，曾任科技部次長，為 ACM Fellow、IEEE Fellow、AAAS Fellow 及 IET Fellow。研究興趣為物聯網、行動計算及系統模擬，發展出一套物聯網系統 IoTtalk，廣泛應用於智慧農業、智慧教育、智慧校園等領域 / 場域。興趣多元，喜好藝術、繪畫、寫作，遨遊於科技與人文間自得其樂，著有 < 閃文集 >、< 大橋驟雨 >。

Tank Communication and MOS

During the Russian-Ukrainian war, a large number of tanks were destroyed. One of the major causes is the heavy reliance on "insecure communication devices" such as smartphones, which makes tanks easily targeted by enemies. Nowadays tank command mainly relies on radio communication and therefore it is necessary to reduce interference by weather, terrain, etc. However, the military took a shortcut with encouraging the commanders to purchase civilian radio equipment. The quality of communication is obviously far below the expectation. Several years ago, a Taiwanese CM-11 "Yonghu" tank crashed into the river just because the front commander did not receive a radio warning from the rear commander.

Since Winston Churchill developed the Mark I during World War I, a series of improvements on communication facilities proceeded according to the battlefield. The Churchill Mark I had a crew of four. Due to space constraints, communication between crew members is limited. The commander generally instructs the driver the direction of movement by tapping his left or right shoulders, and uses sign language and semaphore to communicate with the outside world. Whenever necessary, the commander will jump out of the tank to speak to allies. To report to headquarters, carrier pigeons are launched from hatches on the tank's sponsons.

Between 1930 and 1950, the techniques of tank communication began to advance greatly. Finally, tanks are equipped with walkie-talkie devices for intercom, and radio stations to communicate with the infantry outside. Thanks to Major Edwin Armstrong of the United States Army Signal Corps, tanks don't need hatches for pigeons anymore. In the early 1930s, Armstrong developed FM (Frequency Modulated) radio technology, which effectively filtered out the noise of wireless transmission. Armstrong granted the US military free use of his multibillion-dollar technology patents during World War II. While Armstrong was very generous to the US government, he had filed lawsuits in the United States District Court against the Radio Corporation of America (RCA), and finally committed suicide by jumping from a building.

Tanks are generally equipped with two to three sets of wireless communication channels. In order to improve call quality, the call process in tanks strictly follows the "wireless call procedure". Instead of using a point-to-point connection as a regular telephone system, Military radio is a walkie-talkie (Push-to-Talk; PTT) mode in which many people can participate at the same time. Therefore, due to the necessity of coordinating calls in PTT communication, the following rules are regulated in the wireless calling procedure: Listen before speaking (don't rush to talk), speak slowly and clearly (you may not be able to slow down when the battle is getting fierce), and keep long stories short. The following radio conversation words often

show up: Over (I'm done talking, waiting for you to talk back), Out (the conversation ends and you don't have to talk back), Roger (I understand what you just said), Wilco (understand and obey), Read back (please recite), Radio Check (request signal strength on a scale of 1 to 5).

In order to avoid any misunderstanding of pronunciation in English letters, a set of "words" are used to substitute "letters", such as Alfa for A, Bravo for B, etc. With regard to PTT communication, decentralized automated coordination can be adopted. I have done related studies and published the result in the international journal "IEEE Transactions on Intelligent Transport Systems".

When the battle is getting fierce, the quality of communication is often out of control. It is necessary to double-check if the peer can hear the voice. When the peer asks for Radio Check, you can subjectively measure the clarity of the sound and reply: "Receiving you strength 2" (indicating poor communication quality).

In fact, the United Nations Telecommunications Organization has established the Mean Opinion Score (MOS), an indicator of the quality of telephone voice. Considering equipment and impairment parameters, MOS measures the quality of voice transmission that can be subjectively perceived by the human ear. MOS rates the quality of a voice transmission on a scale from 1 to 5. 1 is "bad," 2 is "poor," 3 is "fair," 4 is "good," and 5 is "excellent." The analytics algorithm can simulate human hearing, and automatically calculate the MOS score to reflect voice quality over phone calls. The MOS score around 3.5 is considered acceptable (in fact, in terms of telecom level, this standard is not high) during tests. I have also measured and evaluated the voice quality of encrypted wireless communication with MOS score, published in "IEEE Internet Computing".

Dr. Jason Yi-Bing Lin

Lifetime Chair Professor of the Department of Computer Science at National Yang Ming Chiao Tung University and Winbond Chair Professor

Dr. Lin is currently a lifetime chair professor of the Department of Computer Science at National Yang Ming Chiao Tung University and Winbond chair professor. He is an ACM Fellow, IEEE Fellow, AAAS Fellow and IET Fellow. His research interests include Internet of Things, mobile computing, and system simulation. He has developed an Internet of Things system called IoTtalk, which is widely used in smart agriculture, smart education, smart campus, and other fields. He has a variety of interests, such as art, painting, and writing, as well as voyaging through science, technology, and humanities.

德州農工大學 P. R. Kumar 教授演講： From Adaptive Control to Reinforcement Learning

文／洪鈺恆 資科工博士生

強化學習可視為機器學習的一個子領域，不同於監督式學習 (Supervised learning) 和非監督式學習 (Unsupervised learning)，強化學習重點在控制探索未知領域 (Exploration) 和利用現有對環境的認識 (Exploitation) 的平衡。可以認為機器學習的目的是要學習資料 (data) 和標籤 (label) 之間的關係，亦可稱之為回歸 (Regression)，而強化學習則是要一步步的跟環境互動來產生學習需要的資料，而學習的過程中也要最大化從環境中得到的獎勵，為了達到此目的就需要一個好的策略來控制要 " 探索未知 " 還是 " 選取當下最好的動作 " 的比例。

強化學習可視為機器學習的一個子領域，不同於監督式學習 (Supervised learning) 和非監督式學習 (Unsupervised learning)，強化學習重點在控制探索未知領域 (Exploration) 和利用現有對環境的認識 (Exploitation) 的平衡。可以認為機器學習的目的是要學習資料 (data) 和標籤 (label) 之間的關係，亦可稱之為回歸 (Regression)，而強化學習則是要一步步的跟環境互動來產生學習需要的資料，而學習的過程中也要最大化從環境中得到的獎勵，為了達到此目的就需要一個好的策略來控制要 " 探索未知 " 還是 " 選取當下最好的動作 " 的比例。比較著名的應用為遊戲的人工智慧，像是 AlphaGo 的圍棋 AI，機器人控制以及推薦系統的演算法。而控制領域被認為是強化學習的前身，主要是在研究一個動態系統的行為，傳統是透過工程數學的方法來設計可以讓動態系統穩定的控制器。用這謝教授的話來概括強化學習就是學習式的控制系統 (Learning-based control)。

這次的演講主要分為兩個段落，第一個段落 Kumar 介紹了控制系統中的核心 - 自調諧調節器 (self-tuning regulators) 以及他的四個主要理

論性質，分別為 stability，self-optimality，self-tuning 和 strong consistency，相關的理論證明持續了將近 30 年，直到西元 1980 年代才被解決，Kumar 只用短短的兩小時就能讓我們了解這 30 年這些理論的發展過程以及細節。在這個段落的最後 Kumar 則介紹了控制領域中更廣泛討論的情況 - adaptive controllers for armax systems。

介紹完控制領域的背景以及理論後，第二段的主題則是這次演講的題目 - 從自適應控制到強化學習，Kumar 從最簡單的強化學習的範例開始 - 多臂老虎機問題 (multi-armed bandit problem)，介紹最簡單的強化學習演算法的同時也連結了強化學習和控制領域的架構，這些簡單的例子使我們更容易以理論的角度來討論這兩個領域。最後，Kumar 也提到了在控制領域中一個很經典的問題是 "Closed-loop identification"，大意是說在 Maximum likelihood estimation (MLE) 的學習方式下會因為缺乏探索而無法學到真正的系統參數，而 Reward-biased maximum likelihood estimation (RBMLE)" 則是用來解這問題的一個很經典的演算法，可以想成是在 MLE 上加上一些擾動來達到探索的目的，講者也分享了 RBMLE 近年來被用來解強化學習問題的幾篇論文。這些研究使我們瞭更加了解如何把強化學習聯想成是控制領域的問題來解決。

演講結束後，這次演講的主辦人 - 謝秉均教授也與 Kumar 討論了幾個和 RBMLE 有關的問題，像是如果 likelihood 本身沒有凹 (convex) 的性質以及用梯度下降的方式來解 RBMLE 的情況，這些問題都使我們更了解 RBMLE 這個演算法的概念。此外，謝教授也請 Kumar 提供了幾個建議給剛踏進強化學習領域的人如何開始研究與學習。這次的演講以及這些建議都讓我們收穫許多。

P. R. Kumar's Speech, "from Adaptive Control to Reinforcement Learning"

P. R. Kumar is currently a distinguished professor at Texas A & M University. His research interests include game theory, adaptive control, machine learning, power systems, automated transportation, unmanned aerial traffic management, millimeter wave, and cyber-physical systems. In this UI NYCU AI lab event, he gave a talk on investigating the relationship between reinforcement learning and control theory.

Reinforcement learning is a sub-domain of machine learning. Different from supervised learning and unsupervised learning, it focuses on controlling the balance between exploration and exploitation of existing knowledge of the environment. It can be said that the purpose of machine learning is to learn the relationship between data and labels, which is also called regression. Reinforcement learning is to interact with the environment step by step to generate the data needed for learning. The learning process also needs to maximize the rewards from the environment. Therefore, to achieve this purpose, it requires a good strategy to control the trade-off of exploring the unknown or choosing the best action of the moment.

The famous AI applications of reinforcement learning are AlphaGo, robot control, and recommender system algorithms. Control theory is seen as the predecessor of reinforcement learning, which is the study of the performance of a dynamic system. Traditionally, stable controllers are designed through engineering mathematical methods. "Reinforcement learning is a kind of learning-based control", quoted from Prof. Hsieh. This lecture mainly focused on two parts. In the first session, Dr. P. R. Kumar introduced the core part of the control system, which are self-tuning regulators, and the four main theories of the dynamic system, including stability, self-optimality, self-tuning, and strong consistency. These theoretical proofs lasted for almost 30 years and were not solved until the 1980s. It was very impressive that Dr. P. R. Kumar only spent

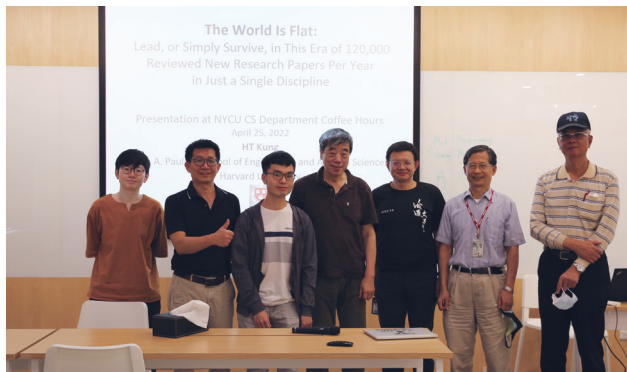
2 hours giving us a comprehensive insight into the development of these theories over the past 30 years. At the end of the session, Dr. P. R. Kumar introduced some more widely discussed cases, which were adaptive controllers for Armax systems.

After introducing the background and theory of adaptive control theory, the second part of the lecture focused on the speech title, From Adaptive Control to Reinforcement Learning. He started from a classical problem, the multi-armed bandit problem to connect with reinforcement learning and adaptive control models. Through these examples, we could understand these two areas from a theoretical perspective. Dr. P. R. Kumar also mentioned another classical question, closed-loop identification in adaptive control theory, which referred to the learning method of Maximum Likelihood Estimation (MLE), which may fail to learn the real system parameters due to lack of exploration. On the other hand, Reward-Biased Maximum Likelihood Estimation (RBMLE) is a classic algorithm for solving this problem. It can be thought of as adding some disturbance to the MLE to achieve the purpose of exploration. The speaker also shared several papers in which RBMLE has been used to solve enhanced learning problems in recent years. These studies gave us a better understanding of how to associate the problems in reinforcement learning with control theory.

After the talk, the host of this event, Prof. Ping-Chun Hsieh, discussed several issues with Dr. P. R. Kumar related to RBMLE, such as the quality of the likelihood itself if it is not concave and the case of solving RBMLE by gradient descent. In addition, Prof. Hsieh asked Dr. P. R. Kumar to provide several suggestions on how to start research and learning for those who are new to reinforcement learning. Overall, we learned a lot from this talk and these suggestions.

哈佛大學孔祥重教授演講： The World Is Flat: Lead, or Survive, in This Era of 120,000 Reviewed New Research Papers Per Year in Just a Single Discipline

文／翁健棋、白文怡



2022 年四月舉辦的資訊學院 Coffee time，特別邀請到全球資訊工程領域極具影響力的學者，同時身兼臺灣人工智慧學校校長、中央研究院院士身分的孔祥重老師蒞臨本校演講。以「The World Is Flat: Lead, or Survive, in This Era of 120,000 Reviewed New Research Papers Per Year in Just a Single Discipline」為題，探討在論文高產出時代，身為研究者，如何從眾多文獻中高效找尋實用內容，吸收並轉化為自身成長養分；也就是說，如何突破重圍，找到合適的研究主題並做出有突破性的貢獻。本次活動採線上線下並行形式進行，共吸引 30 餘位老師與會參與，希望能藉由聆聽孔祥重老師對於資訊領域研究現況的觀察與分享，把握這次討論、交流機會精進自我，以更開闊的視野面臨挑戰，持續於學涯昂首前行。

於講座開場，孔老師憶起自身於 1972 年寫了第一篇研究論文，自此之後經歷了各項資訊技術的革新，包含人工智慧的演進；時至今日，電腦科學早已不再是待開發的新領域，有關人工智慧的研究論文更是如潮水般湧現，從各式機器學習技術（Machine Learning）到雲端（Cloud）、邊緣（Edge）運算技術，各項人工智慧領域相關的研究主題和應用，伴隨著相應技術發展逐漸成熟，好似有著無窮無盡的發想潛力，各式研究成果於學界遍地開花。孔老師提到有兩個趨勢與人工智慧研究論文的高產出現象有關：民主化的出版物以及擴大的工作文獻集（"Working Set"）。前者為任何研究人員都可以從互聯網上學到足夠的知識來撰寫和發表結果；後者意味著由於閱讀了很多論文，研究人員可大大擴展了在相關研究領域上的知識。這兩個趨勢反映了“世界扁平化”和“全球化”，也就是說，為了獲勝，我們需要跑得越來越快。

根據數據統計，單計算 2019 年度，在人工

智慧研究領域就有著將近 120,000 份的同行評審新論文產出。孔祥重老師笑道：「光是要讀完這其中 5% 的論文，每天也要讀 16 篇，那幾乎是不可能的。」例如，CVPR 2022 有 8000 多篇提交和 2000 多篇被接受的論文，同時幾乎每季度都會出現突破性的結果。因此，我們必須努力跟隨領域的進展。在撰寫研究論文之時，以下準備工作是必需的。首先，檢查研究方法，數據集、工具包、評估方法和新技術（例如，自我監督學習）。其次，形成一個包括過去和未來的主題的思維框架。最後，從創意中獲得靈感。孔老師點出閱讀前沿研究（Research Frontiers）的論文是一項具有挑戰性的工作。由於 AI 領域充滿新思想，前沿研究的結果可能還沒有其他人的獨立驗證來證實，因此研究人員在閱讀這些論文時需要使用自己的主觀評估。

如今，鑑於 AI 功能的廣度和深度，提出新穎的 AI 想法和應用的機會很多。同時高效的研究環境也提高了研究工作的生產力。在 AI 領域，有許多成熟的基準數據集（例如 ImageNet 和 COCO），因此研究人員可以在相同的數據上展開競爭。開源也為軟體再利用提供了更好的機會。此外，會議、期刊、線上期刊、arXiv 等多樣且快速的出版場所接受各種研究著作的發表，一些高質量的學術會議並採用雙盲評審制度進行公平競爭。孔老師表示，「就以出版的著作而言，人人機會均等 -- 世界是平坦的。」除此之外，AI 驅動的仿真器可以補充物理的模擬，提供快速近似的模擬，仿真的代理 AI 模型可以將傳統數值模擬加速幾個數量級。這些 Physics-Informed Neural Networks (PINNs) 及 Large Language Models (LLMs) 帶來大量的創新機會和新的合作現象，人工智慧正在促成許多新創領域，這使得更多的研究人員願意做他們感興趣的人工智慧研究。

對於研究人員來說，在頂級學術會議發表論文很重要。在評審大量提交的論文時，獲得足夠多的高質量審稿人是很難的。因此，只有頂級學術會議才有一群頂尖研究人員支持的審稿人。因此，只要論文被頂級會議接受就會在其他論文中脫穎而出。所以，在評估一個學者的研究成果時，我們在過去幾十年中用過以下指標：（1）論文數（2）引用次數（3）H-index 數（4）頂級會議論文數。同時，頂級會議的審稿人評論也非常有用。一旦收到該領域頂級研究人員的評論（通常來自 3-5 名此類審稿人），研究人員將立即知道該研究是否是 state-of-the-art。這是獲得高質量評論的少數方法之一。此外，從這些評論研究人員可以學習其他學科的觀點；譬如說，對於一篇關於機器學習和高性能計算之間的論文，重要的是要理解這兩個學科的觀點和方法。最後，在反駁（rebuttal）期間對文章進行改進。研究人員將闡明新意見，回答審稿人提出的問題，並填補缺失的分析和數據。

對於論文發表的現況，孔老師有以下觀察：觀察 1 -- 論文出版分為兩大陣營：採用高質量評審的 A 組及採用輕度評審的 B 組。對於 A 組而言，儘管開創性論文會有一些，但那些展示優於先前文獻的具體進步的改良型論文可能更容易被接受。因此，當你的優秀論文沒有被接受時，不要太沮喪。另一方面，出現在 B 組的優秀論文可能不會被注意到。但開創性的論文在被 A 組接受之前，可能需要一兩年甚至更長時間才會被接受。觀察 2 -- 多作者論文：在這裡，多作者論文並不是指本質上必須涉及大量參與者的大型項目的論文。一篇論文要被頂級會議接受，需要有實質性的結果和清晰的陳述，準備這些資料和文件需要大量的工作。多作者論文（4 位或更多作者）變得流行的原因，是因為作者們可以分攤工作並互相引用，從而可以撰寫更多論文，而有更高的機會讓他們的論文被頂級會議接受。另外在計算頂級會議論文數時，由於人們通常不會根據共同

作者的數量對論文數量進行打折，因為這樣太麻煩了，所以多作者論文可以藉此取巧得到較好的計量結果。但是多作者論文是有它相對的問題的。多作者的論文可能不利於個人的高度原創作品。世界一流的科學家和思想家通常不會撰寫多作者論文。此外，在一長串的作者名單中通常只有資深作者的名字才會被讀者注意到。即使資深作者是名單上的最後一位作者，情況也是如此。

在信息爆炸的時代，孔老師提供了兩種應對海量文獻的方法。方法一：人脈網路，除了與同事合作分享有趣的論文和從近期文獻中學到的心得，研究人員可參與會議審稿委員會、研究計劃審查和小組討論，了解該領域的新方向，並通過關注領先實驗室和研究人員的方向以了解該領域的熱門工作。方法二：組織。首先，研究人員可通過將個別論文作為研究領域中的點並研究彼此之間的關係來獲得全貌。其次，研究人員需要知道重點和新的機會在哪裡（例如，人工智慧的高性能計算）。第三，研究人員感知具有重要意義的新方法並將它們與自己過去的研究聯繫起來。第四，研究人員通過講課和撰寫概述來組織對某個領域的思考。最後，研究人員利用管理工具來追蹤論文。

在演講的最後，孔老師建議研究人員關注人工智慧的一些關鍵問題，例如克服訓練數據帶來的限制、人工智慧的高效計算系統、以晶片為中心的 AIoT（人工智慧物聯網）以及開發針對產業集群的特定人工智慧軟體平台。孔老師在總結中勉勵大家：「現在是成為 AI 等令人興奮的領域的研究人員的好時機，因為它提供了大量的新機會。然而，面臨著爆炸式增長的文獻，我們需要有一個明確的行程和重點。在評估研究人員時，統計數據很容易獲得，但這些信息可能存在偏差，需要搭配對學界、社會實質貢獻評估加以分析。但是這樣的評估可能是主觀的並且需要大量的努力方能做到。這就是真實世界。我們只能努力做到最好。」

Dr. H.T. Kung's Speech – The World Is Flat: Lead, or Survive, in This Era of 120,000 Reviewed New Research Papers Per Year in Just a Single Discipline

Abstract:

Professor H. T. Kung of Harvard University discussed with NYCU faculty on 25 April 2022 about a recent publication phenomenon of rapidly growing literature in artificial intelligence. He analyzed the cause of this

literature exploration, changes in publication venues and authorship composition, the importance of having research angles, tools, and networking when facing massive publications, and the challenges of evaluating the publication output of a scholar.



林彥宇教授榮獲 科技部傑出研究獎

文／林珮雯

科技部為獎勵研究成果傑出之科學技術人才，長期從事學術或產學研究，提升台灣學術、產學研究水準，增強國家科技實力，特別設立「傑出研究獎」。本院林彥宇教授榮獲科技部 110 年度傑出研究獎。

林彥宇教授的研究領域涵蓋電腦視覺、機器學習、與人工智慧。林教授分析研究議題困難之根源，拓展其潛在之應用，並透過設計與開發深度學習演算法來實現，其研究成果豐碩，是 CVPR、NeurIPS 和 AAAI 等頂尖國際會議的常客。他專攻圖像分割之研究議題，擅長以不同面向角度切入解構複雜的研究難題。他由語義分割類別標註切入處理測試資料，開發出可在測試階段、分割訓練資料中未見過類別物件的深度學習演算法，且不需對該視訊做任何人工標記，大幅降低人工標註訓練資料的成本。除了科技部傑出研究獎肯定外，林教授亦榮獲 2021 年有庠科技論文獎，以及在 2019 年入圍國際頂尖會議 CVPR 的最佳論文獎。

林彥宇教授屢屢在各大頂尖國際會議發表最

前 的研究，並持續推動台灣人工智慧發展，其研究成果對台灣產學界有莫大貢獻，以下是林彥宇教授傑出研究獎得獎感言：

林彥宇教授：長期在有興趣的研究方向上持續深耕

我很榮幸能得到評審委員的青睞，獲得科技部傑出研究獎這項殊榮，這給予我非常大的肯定和激勵。研究是一段長期學識與創新的累積過程，一路走來我要感謝我的研究團隊與合作夥伴，共同努力與相互砥礪，沒有他們，我無法獨自完成研究的工作；對於栽培、鼓勵並提攜我的師長前輩，在我遇到挫折困難時給予寶貴的建議與支持，我由衷地感激；我也要感謝中央研究院、陽明交通大學以及科技部，提供我充足的研究資源與優良的學術環境，讓我能長期在一個有興趣的研究方向上持續深耕，進而作出貢獻；最後我要感謝我的父母親、太太以及一對兒女，因為家人的包容和支持，讓我得以在研究工作上全力以赴。

Professor Yen-Yu Lin Won the Outstanding Research Award of the Ministry of Science and Technology

The “Outstanding Research Award”, instituted by the Ministry of Science and Technology (MOST), honors scientific and technological talents that have outstanding research performance, thereby encouraging them to devote themselves to academic and industry-academic research to improve the quality of Taiwan’s research in the international community, and ultimately boost the country’s technological capacity. Dr. Yen-Yu Lin, professor of the College of Computer Science, received the 2021 Outstanding Research Award from the Ministry of Science and Technology.

Dr. Lin's research covers the areas of computer vision, machine learning, and artificial intelligence. Dr. Lin delves into the core of the research problem, expands its potential applications, and realizes it by designing and developing deep learning algorithms. His prolific research publications are often accepted by top international conferences such as CVPR, NeurIPS and AAAI. Specializing in image segmentation, Dr. Lin is good at deconstructing complex research problems from different perspectives. He leverages the semantic segmentation annotation to process test data to develop a deep learning algorithm which is able to distinguish the unlabeled samples of unseen categories during testing stage. It would greatly reduce data labeling cost. In addition to the recognition of the Outstanding Research Award by the Ministry of Science and Technology, Dr. Lin won the 2021 Y. Z. Hsu Science Paper Award, and his publication was shortlisted for CVPR 2019 Best Paper Award.

Dr Lin has published many papers with the most advanced research in top international conferences, and continued to promote the development of Artificial Intelligence. His achievement has made substantial contributions to the industry-academia partnership in Taiwan. The acceptance speech by Dr. Lin is as follows:

Professor Lin: Long-term and deep cultivation of the research you are interested

I am honored to have been recognized as a recipient of the Outstanding Award by the Ministry of Science and Technology. It is a great affirmation and motivation to me. Research is a long-term accumulation of knowledge and innovation. Along the way, I would like to thank my research team and partners for close collaboration and mutual encouragement. Without them, it would be impossible to complete my research on my own. I am sincerely grateful to my mentors who have encouraged and supported me. They gave me valuable advice and guidance when I encountered setbacks or adversity. In addition, my gratitude goes to Academia Sinica, National Yang Ming Chiao Tung University and the Ministry of Science and Technology for providing ample research resources and a great academic environment to enable me to do long-term cultivation in the research I am interested in so as to make a contribution. And finally, I would like to thank my parents, my wife and children. Because of their understanding and strong support, I have fully applied myself to my research work.

立足台灣放眼國際 頂尖會議不缺席

文稿整理／翁健棋

一直以來，本校持續以邁向「偉大大學」為目標，期許自身能夠成為積極創新、培養各領域人才，引領產學界發展的指標學府。資訊學院亦遵循此努力方向，鼓勵院內師生參與、投稿頂尖國際會議，透過與全球菁英人才相互切磋砥礪，評鑑、審視自身研究能力與方向，拓展國際視野的同時，即時更新學說理論、洞悉技術發展趨勢，進一步產出更高品質之研究成果，貢獻所學於相關領域。自近期本院碩博士生之研究成果，在 EMSOFT、IJCAI 等國際頂尖學術發表會議的亮眼表現觀察便可發現，陽交大立足台灣、展望國際的願景正在逐步實現，本刊資訊人也特別邀請到同學們簡單分享產製研究的心路歷程：

發表論文：iNVMFS: An Efficient File System for NVRAM-Based Intermittent Computing Devices

作者：Ying-Jan Wu; Ching-Yu Kuo; Li-Pin Chang

指導教授：張立平教授

國際會議：International Conference on Embedded Software (EMSOFT), 2022

該會議重要性：EMSOFT 是權威排名 CSRankings 所認可之嵌入式系統領域頂尖會議，匯集了來自全球學術界、工業界和政府的研究人員，以推進嵌入式軟體開發領域的科學、工程技術。EMSOFT 2022 的接受率約為 23%。

吳瓊燃同學心得分享：碩士研究工作在經過兩輪嚴格審查後，最終被國際 A 級會議 EMSOFT 接受，非常開心！本次研究能獲得如此成就，要感謝張立平教授在過程中的耐心指導、傾囊相授。而實驗室學妹競友也替我分擔了繁重的測試工作，加快整體研究進展，非常感謝。透過這次研究我大量研讀了相關資料，體會到了前人設計的奧妙之處，同時也讓我有機會把過去只在教科書上學的知識實際運用，是個非常難忘又有趣的經驗。

發表論文：Rethinking key-value store for byte-addressable optane persistent memory

作者：Sung-Ming Wu, Li-Pin Chang

指導教授：張立平教授

國際會議：Design Automation Conference (DAC), 2022

該會議重要性：DAC 是系統設計領域中最重要的會議之一，其涵蓋了多元化的主題，如：自動化系統、雲端系統、嵌入式系統與軟體，新型與新興技術以及人工智慧等。在 DAC2022 中約有 970 篇投稿，共 223 篇被接受，接受率約為 23%。

吳崧銘同學心得分享：這是我第一篇被 A 級國際頂尖會議接受的論文，非常感謝老師在論文寫作及研究上的指導與幫忙。這篇論文的投稿過程一開始其實不太順利，最初我們投稿了另一個 B 級國際會議但被拒絕，收到消息的當下非常失落，然而被拒絕可以說是在投稿過程中的必經之路，因此也只能仔細研讀審查委員們給的回饋意見，從中汲取有用的建議並反思哪邊需要修改。經過一番努力，我們改投稿 DAC 並被接受了，這也算是因禍得福。

發表論文：AQT: Adversarial Query Transformers for Domain Adaptive Object Detection

作者：Wei-Jie Huang, Yu-Lin Lu, Shih-Yao Lin, Yusheng Xie and Yen-Yu Lin

指導教授：林彥宇老師

國際會議：International Joint Conference on Artificial Intelligence(IJCAI),2022

該會議重要性：IJCAI 為人工智慧中頂尖的國際會議之一，過去在單數年召開，自 2016 年起每年召開，今年一共有約 4535 篇有效投稿，接受率約為 15%。此會議有多種類型的主题，包含電腦視覺與自然語言處理等。

陸玉霖同學心得分享：這次是我第一次參與國際

會議投稿，在做研究的過程中遇到一些阻礙，雖然也會感到憂心，但最終都將其一一化解；論文審查期間，審查人提出對論文想法與問題，讓我們從不同角度了解該如何更完善這份研究，是個很有趣的經驗。

發表論文：3D-PL: Domain Adaptive Depth Estimation with 3D-aware Pseudo-Labeling

作者：Yu-Ting Yen, Chia-Ni Lu, Wei-Chen Chiu, Yi-Hsuan Tsai

指導教授：邱維辰老師

國際會議：European Conference on Computer Vision(ECCV), 2022

該會議重要性：ECCV 是電腦視覺領域的國際頂尖會議，為國際三大頂尖電腦視覺會議之一，今年共有 5,803 篇論文投稿，其中有 1650 篇論文被接受，接受率約為 28%。

顏妤庭同學心得分享：很榮幸能投稿上這個國際頂尖會議，這對我來說是很大的肯定，代表這段時間的努力都是值得的，也很謝謝我指導教授的教導。在研究的過程中會有很多辛苦的地方，但每當克服不同的難題都能收穫與學習到非常多，也很期待能在十月底去以色列參加會議，介紹我們的成果給大家，同時也期待能和厲害的學者們交流，並且從中可以認識到更多相關領域優秀作品。這也是我第一次參加實體研討會，相信這一定是非常難忘的體驗。

發表論文：An MIL-Derived Transformer for Weakly Supervised Point Cloud Segmentation

作者：Cheng-Kun Yang, Ji-Jia Wu, Kai-Syun Chen, Yung-Yu Chuang, Yen-Yu Lin

指導教授：林彥宇老師

國際會議：Computer Vision and Pattern Recognition Conference(CVPR),2022

該會議重要性：CVPR 為電腦視覺領域中最頂尖的會議。今年一共有 6656 篇有效投稿，其中有 1470 篇被接受，接受率為 22% 左右。近年來深度學習與人工智慧非常熱門，而電腦視覺也被認為是該領域中很重要的發展方向，因此 CVPR 也被公認為是 AI 領域中的頂尖會議之一。

吳季嘉同學心得分享：這是我第一次成功投稿國際會議的論文，無論是在研究的過程中教授給予我們的指導，以及在論文審查時審查人員給予的建議都讓我學到很多事物。很榮幸我們的論文能夠被世界頂級的會議接受，可惜因為疫情無法到現場參加會議，但在線上會議中看各個研究團隊錄製的論文介紹影片依然讓我了解到其他領域的研究課題，在會議中聽各個學者們對彼此的論文提出問題並一同思考也讓我大開眼界。

發表論文：Point MixSwap: Attentional Point Cloud Mixing via Swapping Matched Structural Divisions

作者：Ardian Umam, Cheng-Kun Yang, Yung-Yu Chuang, Jen-Hui Chuang, and Yen-Yu Lin

指導教授：林彥宇老師

國際會議：European Conference on Computer Vision(ECCV),2022

該會議重要性：ECCV 是兩年一次的電腦視覺研究會議，與 CVPR、ICCV 並列電腦視覺領域的三大頂級會議。每年的論文接受率為 25-30% 左右，每次會議在全球範圍會收錄論文 300 篇左右，收錄論文的主要來源來自於歐美等頂級實驗室及研究所。

Ardian Umam 同學心得分享：很高興這篇以我為第一作者的博士論文能被頂尖的 ECCV 會議接受！在這個博士級的會議論文中，我學到最多的是如何提出一個創新的想法，並在考量到可行的前提下，突破現有技術的困境，也就是說設計一個最先進的方法去解決相關問題。本研究提出用 3D data augmentation 來執行 3D point cloud downstream tasks，包含分類、形狀檢索等等，在執行過程中，探討如何降低數據標記的成本及提高模型的概括性。可以很驕傲地說說我們在此研究建立了一個新的技術，並預計在 2022 年的 10 月下旬至特拉維夫發表，我也預計參與此研討會。我很開心能夠有機會接觸到本領域的新趨勢，及認識世界各地優秀的研究人才。雖然距離研討會還有一些時間，但我已經事先在線上認識也將在本年度參與 ECCV 的新朋友，並期待在研討會與他們相遇！

NYCU Students Gaining International Recognition at Top International Conferences

It is our goal that National Yang Ming Chiao Tung University will become “the Great University”, which is an innovative institution to cultivate talents in different domains, and as well to lead the development of the industry and academia. The college of Computer Science, one of the key colleges at NYCU also pursues these goals by encouraging faculty and students to participate in top international conferences. By interacting with the talents across the world, research capacities and directions can be evaluated and reviewed to expand researchers’ horizons in theories. In addition, conference participants can be more aware of the trend of technological development for better research results in the study of Computer Science. Recently, outstanding research results have been shown by our graduate and doctoral students through top academic conferences such as EMOSFT and IJCAI, which suggests that the international recognition and outlook has been realized by NYCU students. The following are the reflections given by those outstanding students after giving presentations at international conferences.

Title: iNVMFS: An Efficient File System for NVRAM-Based Intermittent Computing Devices

Authors: Ying-Jan Wu; Ching-Yu Kuo; Li-Pin Chang

Advisor: Dr. Li-Pin Chang

Conference: International Conference on Embedded Software (EMSOFT), 2022

Background information of EMSOFT:

EMSOFT is a top conference in the field of technology of embedded systems recognized by CSRankings, bringing together researchers from academia, industry and government worldwide to advance science and engineering in the field of embedded software development. It has an acceptance rate of about 23%.

Ying-Jan Wu's Reflection:

After two rounds of rigorous review, our work was finally accepted by EMSOFT, a top international conference, and I was so happy to hear the news. I'd like to thank Prof. Li-Pin Chang for his patient guidance during the research process. I am also grateful to my lab members for handling the testing work for me, which speeded up the overall progress of the research. During this process, I have studied a lot of relevant data and experienced the design and framework proposed by other researchers. At the same time, it was a very interesting experience

to apply the knowledge from what I learned from textbooks

Title: Rethinking key-value store for byte-addressable optane persistent memory

Authors: Sung-Ming Wu, Li-Pin Chang

Advisor: Li-Pin Chang

Conference: Design Automation Conference (DAC), 2022

Background information of DAC:

DAC is one of the most important conferences in the field of system design, which covers a wide range of topics such as: automated systems, cloud systems, embedded systems, and artificial intelligence. There were 223 accepted papers out of around 970 submissions, in which the acceptance rate is about 23%.

Sung-Ming Wu's Reflection:

This is my first paper accepted by a top international conference, and I am very grateful to my professors for his great guidance in research and thesis writing. The submission process did not go very well at the beginning. We initially submitted it to another international conference but it was rejected, and we were very disappointed when we received the news. After a lot of hard work, we were accepted by DAC instead, which was a blessing in disguise.

Title: AQT: Adversarial Query Transformers for Domain Adaptive Object Detection

Authors: Wei-Jie Huang, Yu-Lin Lu, Shih-Yao Lin, Yusheng Xie and Yen-Yu Lin

Advisor: Prof. Yen-Yu Lin

Conference: International Joint Conference on Artificial Intelligence (IJCAI), 2022

Background information of IJCAI:

IJCAI is one of the top international conferences on Artificial Intelligence, which used to be held every two years, but it has been held annually since 2016. The conference has a variety of topics, including computer vision and natural language processing.

Yu-Lin Lu's Reflection:

It was my first time to submit a paper to an international conference. I encountered some obstacles in the process while conducting my

research. Although I felt worried, I eventually solved them gradually. While my paper was being reviewed, the reviewers raised some questions and ideas to help us improve the research from different perspectives, which was an interesting experience.

Title: 3D-PL: Domain Adaptive Depth Estimation with 3D-aware Pseudo-Labeling

Authors: Yu-Ting Yen, Chia-Ni Lu, Wei-Chen Chiu, Yi-Hsuan Tsai

Advisor: Dr. Wei-Chen Chiu

Conference: European Conference on Computer Vision (ECCV), 2022

Background information of ECCV:

ECCV is the top international conference on computer vision, which is also one of the top three international conferences on computer vision. 5,803 papers were submitted this year, of which 1,650 were accepted, with an acceptance rate of about 28%.

Yu-Ting Yen's reflection:

It is a great honor to be accepted to this top international conference, which is a great recognition for me and means that all the efforts are worthwhile. I would like to thank my advisor's great support. Although there were a lot of challenges when conducting my research, I also learned a lot when trying to overcome different tasks. I am also looking forward to attending the conference in Israel at the end of October and presenting our results to everyone. In addition, I am also looking forward to interacting with great scholars and getting to know more excellent works in the field. This is also my first time to attend an offline conference, and I believe it will be a very memorable experience.

Title: An MIL-Derived Transformer for Weakly Supervised Point Cloud Segmentation

Authors: Cheng-Kun Yang, Ji-Jia Wu, Kai-Syun Chen, Yung-Yu Chuang, Yen-Yu Lin

Advisor: Yen-Yu Lin

Conference: Computer Vision and Pattern Recognition Conference (CVPR), 2022

Background information of CVPR:

CVPR is the top conference in the field of computer vision. This year, there were 6656 submissions, of which 1470 were accepted, with an acceptance rate of about 22%. In recent years, deep learning and artificial intelligence are very popular, and computer vision is also an important development in this field, so CVPR is also recognized as one of the top conferences in the AI field.

Ji-Jia Wu's Reflection:

This is the first time I successfully submitted a paper to an international conference. I learned a lot from the guidance provided by my professor and suggestions given by the reviewers during the research process. I was honored that our paper was accepted by the world's top conference. Unfortunately, I was unable to attend the conference due to the pandemic, but watching the online conference video presentation of each research team still helped me to learn about different research topics. In addition, listening to the scholars' questions and reflections on different papers in the conference was also an eye-opening experience.

Title: Point MixSwap: Attentional Point Cloud Mixing via Swapping Matched Structural Divisions

Authors: Ardian Umam, Cheng-Kun Yang, Yung-Yu Chuang, Jen-Hui Chuang, and Yen-Yu Lin

Advisor: Yen-Yu Lin

Conference: European Conference on Computer Vision (ECCV), 2022

Background information of ECCV:

ECCV is a biennial conference on computer vision research, and is one of the top three conferences in the field of computer vision, along with CVPR and ICCV. The acceptance rate of papers is about 25-30% per year, and about 300 papers are accepted worldwide for each conference, with the main sources of accepted papers coming from top laboratories and research institutes in Europe and the United States.

Ardian Umam's Reflection:

I am very glad that our paper is accepted in one of the premier venues in my field, which is ECCV 2022, especially since this is my first PhD work as the first author. The thing that I learned the most from this first PhD work is about how to identify and propose a new idea that is novel enough and at the same time can push the current limit of the existing methods in the targeted task, i.e., set a new state-of-the-art method. Our work aims at reducing the cost of data labelling and improving model generalization on 3D point cloud downstream tasks, which include classification and shape retrieval, by proposing 3D data augmentation. The work leverages the structural information posed in the 3D data, and successfully sets a new state-of-the-art. This work will be presented in Tel Aviv, in late October 2022. I plan to physically attend the conference and am excited to catch up with new trends as well as to meet other researchers around the world. Although the conference has not happened yet, I already know some strangers that also submit papers to the ECCV and plan to have a meet up there!

資訊學院陳志成教授團隊 大幅提升核心網路效能

文／秘書處公共關係組



榮登國際頂尖會議 ACM SIGCOMM 2022

本校資訊學院陳志成教授與美國加州大學河濱分校之 K. K. Ramakrishnan 教授共同指導四位陽明交大學生與二名加大河濱分校學生，整合陽明交大開發之 free5GC 與加大河濱分校開發之 openNetVM，2022 年 8 月於國際頂尖會議 ACM SIGCOMM Conference 發表論文：L25GC: a low latency 5G core network based on high-performance NFV platforms，該論文探討如何有效將 5G 核心網路元件虛擬化 (Network Function Virtualization, NFV)，並大幅提升網路效能，且將所有程式碼公開。SIGCOMM 全名為 Special Interest Group on Data Communication，是全球通信網路領域的頂尖會議，SIGCOMM 對論文的品質要求極高，經五位委員雙盲審查 (double-blind peer review)，接受率約 10% - 20%。自 1987 年 SIGCOMM 開辦 36 年以來，陳教授團隊論文為第四篇台灣團隊人員發表至該頂尖國際會議之長篇論文 (full paper)。SIGCOMM 之長篇論文被接受後，大會另組織一委員會檢驗程式碼，經三位匿名審查委員嚴格檢驗後，free5GC 與 L25GC 獲得大會最高三項徽章：可獲得 (Available)、正常運作 (Functional)、結果再現 (Results Reproduced)。在 SIGCOMM 今年 55 篇被接受論文中，僅有 23 篇論文同時獲得三項徽章。由於 SIGCOMM 審查非常嚴謹，錄取的論文大多數都會被廣泛引用，具有非常大的影響力。

陳教授從就讀博士班開始，一直投入電信網路系統之研究，尤其著重通信協定與系統軟體，以「十年磨一劍」之精神，長期深耕於此一領域。陳教授將其過去二十幾年從 3G 至 5G 之研究經驗，

具體打造出全世界第一個符合 5G 國際標準之免費開源軟體 - free5GC。過去由於電信網路之核心網路相當昂貴，動輒十幾億甚至上百億台幣，一般從事此領域之研究者，僅能用數學分析或電腦模擬來驗證提出之想法，無法於真實的電信系統驗證。因為 free5GC 的開源性、完整性、且可與商用基地台與手機互聯，越來越多的研究者使用 free5GC 當作驗證平台發表論文，如美國的普林斯頓大學、約翰霍普金斯大學、Cisco、Nokia 等世界各國的研究者，皆已採用 free5GC 發表論文。free5GC 的出現，改變了此領域的研究方式。此外，free5GC 打破傳統產業的枷鎖，將核心網路的軟體，釋放到任何硬體平台上。因軟、硬體分家，可普及核心網路於行動通訊網路的市場，眾多小型網通廠可以生產白牌機，並使用 free5GC 為軟體，打入高門檻之電信產業，打破核心網路被少數國際大廠獨占的情形，進而產生新的產業鏈。陳教授帶領的團隊，已做出對產業界與學術界真正有實質影響力之研究，於國際舞臺佔有一席之地。

此次發表於 SIGCOMM 論文之陽明交大作者除陳教授外，另有張宏鈺博士後研究員、謝承穎博士生、李家安與朱浩澤碩士生。此外，蔡瀚興與劉又聖碩士生亦參與此研究。陳教授團隊表示，希望這次的研究成果能讓大家將來可享受效能更佳的電信網路系統。陳教授團隊並免費開放所有程式碼於：

L25GC: <https://github.com/nycu-ucr/l25gc>

free5GC: <https://www.free5gc.org/>

The Team of Dr. Jyh-Cheng Chen of the College of Computer Science Greatly Improve the Efficiency and Performance of the Core Network Presented at a Top International Conference – ACM SIGCOMM 2022



Four students, advised by Professor Jyh-Cheng Chen of the College of Computer Science, and two students advised by Professor K. K. Ramakrishnan of the University of California, Riverside, integrated free5GC developed by NYCU and openNetVM developed by UC Riverside, and published the paper, "L25GC: a low latency 5G core network based on high-performance NFV platforms", at the top international conference ACM SIGCOMM in August 2022. This paper explores how to effectively virtualize 5G core network components (Network Function Virtualization, NFV) and greatly improve network performance. Meanwhile, the team also makes the source code publicly available. SIGCOMM, Special Interest Group on Data Communication, is a top conference in the field of communication networks globally. SIGCOMM has extremely high requirements on the quality of accepted papers. After double-blind peer review by five committee members, the acceptance rate is around 10% - 20%. This is the fourth full-length paper with Taiwanese teams that was published at the SIGCOMM conference since its inauguration in 1987. After a full paper was accepted, SIGCOMM organized another committee to examine the source code. Passing rigorous testing by three anonymous reviewers, free5GC and L25GC won the top three badges of the conference: Artifacts Available, Artifacts Evaluated – Functional, and Artifacts Evaluated – Results Reproduced. Only 23 papers were awarded with these three badges among the 55 accepted papers at SIGCOMM this year. Most SIGCOMM papers are widely cited with great influence due to the rigorous review of SIGCOMM.

Since studying for PhD, Dr. Chen has devoted himself to the research on telecommunication network systems, especially focusing on communication

protocols and system software. With the spirit of "Ten years to sharpen a good sword," he has long been deeply involved in the field. Drawing his research experience with 3G, 4G, and 5G networks, Dr. Chen and his team create the world's first free and open-source software complied with the international 5G standards - free5GC. In the past, because the core network of the telecommunications network was quite expensive, which was worth billions or even tens of billions Taiwanese dollars, ideas proposed by researchers in the field can only be verified using mathematical analysis or computer simulations, not real telecommunication systems. Because of free5GC's completeness, openness, and excellent interoperability with many base stations and cellular phones complying with the international standards, more and more researchers from all over the world, such as Princeton University, Johns Hopkins University, Cisco, and Nokia, etc., utilize free5GC as a platform to verify their research ideas. The emergence of free5GC has changed the way of research in the field of the telecommunications network. In addition, free5GC breaks the shackles of traditional industries so as to deploy the core network software to any hardware platform. Released from software's dependence on hardware, the core network can be popularized in the mobile communication network market. Many small manufacturers can build white-box machines with free5GC built-in to penetrate the high-barrier telecommunications industry so as to break the situation that core networks have been dominated by few international manufacturers for years, thereby creating a new industrial chain. The team led by Dr. Chen has made the research with real impact on the industry and academia, and succeeds in the international arena.

The authors of the SIGCOMM paper from NYCU includes Dr. Jyh-Cheng Chen, postdoctoral researcher Hung-Cheng Chang, as well as Hao-Tse Chu, Chia-An Lee, and Cheng-Ying Hsieh. In addition, Han-Sing Tsai and Yu-Sheng Liu also joined the research. The team hopes that the results of this research may enable everyone to enjoy a more efficient telecommunication network system in the future. The source code is open for free at:

L25GC: <https://github.com/nycu-ucr/l25gc>

free5GC: <https://www.free5gc.org/>



一起提升英文和學術力，資訊學院碩博士生踴躍參與系上專屬英文課程

文稿整理／劉美君

本學院在 110 學年度起獲選為教育部雙語計畫重點培育學院。為提升本院學生的英語能力，晉升為國際人才，因此開設專屬於資訊學院的小班制客製化六週的免費英語課程，旨在協助本院碩、博班生增進一般英語與學術英語的聽說讀寫能力，學生可依據學習需求彈性選擇課程，以下為 110 學年下學期學生參與課程的心得。

英文學術能力寫作課程

陳鈺潔 (邱維辰教授實驗室)
參與課程：學術英文寫作邏輯課 level 1

Willy 老師的課程專注於學術文章的邏輯與概念，讓我學習到如何去分析論文的架構，這不只幫助我在快速閱讀論文時更容易抓住重點，更當自己實際在撰寫論文時，學會使用精確的字彙與完整的架構撰寫論文，投稿論文時更容易上手！老師在課程的安排上很用心，會穿插有趣的互動，也會偶爾和大家聊聊天，上課很愉快又能學習東西！

鄭昕宜 (邱維辰教授實驗室)
參與課程：學術英文寫作邏輯課 level 1

過往求學階段的英文課較少涵蓋專業領域的論文寫作，而這項能力在碩班卻相當重要，如何把完成的研究闡述成一篇完整且清楚的論文，是一大挑戰。在【資工領域論文篇章邏輯與概念】這堂課中，Willy 老師針對許多學生撰寫論文常犯的錯誤或是常用的單詞、句型和語法進行剖析和歸納整理，例如資工論文單詞的主詞用法和同義詞、強調重點的句型用法和解釋數據的常用英文等等，幫助學生在撰寫論文時可以有效地把研究的重點通順且強而有力的用英文表達出來。

金則禹 (曾建超教授實驗室)
參與課程：學術英文寫作邏輯課 level 1

修習 Willy 老師的論文篇章邏輯與概念課程讓我受益匪淺，瞭解到了許多在論文寫作時需要注意的關鍵點，例如英文寫作會在第一句話點名

段落或者是全文主旨，論文寫作存在著 GSG 這樣的既定結構需要作者遵循，以及不論在句子或者是段落中主語或者主詞都是文章的核心需要圍繞其來寫作。另一方面老師也分享了一些自己參加學術論文寫作的經驗對我也是大有裨益，這些經驗在普通課程中也是難以接觸到的。而在解釋一些比較難以理解的知識點時老師則會藉助生活中的例子來解釋，讓學生更好的理解，並且穿插一些風趣幽默的片段緩解了課堂學習的緊張感。最後十分感謝資工系開設這個課程讓我有機會學習更專業於資工領域的英語知識。

林欣儒 (黃敬群教授實驗室)
參與課程：學術英文寫作邏輯課 level 1 & 學術英文寫作邏輯課 level 2

在上寫作一、二的課程時，還沒有任何寫論文的經驗，在聽 Willy 老師講解怎麼把論文每一段架構寫出來時總覺得離自己有點遙遠，但是課堂上對論文的架構解析對於閱讀論文反而有很大的幫助，上寫作課前讀論文時只覺得把讀到資訊看懂，上過課後可以清楚知道哪一句是重點哪裡是補充說明，而且發現幾乎所有頂會的論文都遵循寫作課所教的架構方式撰寫。碩二開始寫自己的論文時，一開始真的會不知道怎麼下筆，後來翻出寫作課的教材和筆記，發現上課的內容完全是寫論文的救星！雖然論文論述內容還是需要腦力激盪，但是要強調的部分和編排順序都可以從寫作課程得到解答，比較可惜的是，不是剛好在準備要寫論文的時候上寫作課，在準備論文撰寫的時候更能知道會遇到什麼困難，更能在寫作課學到自己不足的地方，所以更推薦準備寫碩論時上寫作課，一定可以吸收到更多寫作技巧！

江梓豪 (黃敬群教授實驗室)
參與課程：學術英文寫作邏輯課 level 1 & 學術英文寫作邏輯課 level 2

上完 Willy 老師的學術邏輯寫作 level 1 & 2 課程，獲益良多。我學到了很多英文學術寫作的

篇章架構，讓我能夠良好的規劃自己畢業論文的結構，除此之外，我在寫作上常出現「中式英文」的問題也改善了很多，在閱讀別人的文章時，我也能更快速的抓到作者想表達的重點。老師的上課非常的輕鬆有趣，與學生的互動良多，並且內容非常貼近我們的生活、學術議題，每次上課都能感受到老師的用心，希望疫情趕快結束，可以不用在遠端上課。

郭家璋 (黃敬群教授實驗室)
參與課程：學術英文寫作邏輯課 level 1 & 學術英文寫作邏輯課 level 2

我在寫作時常遇到的問題是：看別人的 conference paper 時都覺得很有架構、文字通順，不過自己寫時就像流水帳、重點與細節交錯令人難以閱讀卻不知問題。Willy 老師系統化的整理一篇有章法的文章會在哪部分出現哪種固定形式的 block，只需按自己的研究內容填充，使文章有邏輯組織。上過兩個學期的課後，對學術文章的掌握增加了，也順利的發出的 conference paper。感謝 Willy 與 Selina 老師的付出。

英文口說能力表達課程

李東霖 (曹孝傑教授實驗室)
參與課程：英語口說課 level 1：溝通與表達課程

從小，在國高中時我的英文科目總是比起數學或其他理科來得差。雖然我一直都知道這個問題需要改善，但由於學習英文遲遲沒有帶來像是解開數學題目或是搞懂一個物理現象背後的原理那樣有成就感。使得我對於學習英文一直都感到興趣缺缺，只是維持著最低標準的英文技能，一路來到了碩士讀資訊。非常榮幸的剛好搭上交大資工專屬英語課程的機會，加上教授與實驗室夥伴的大力推薦，因此重新提起熱忱來上課。不得不說，原本我很擔心我的英語程度之低可能會讓老師感到困擾，不過修完之後才發現是當初想太多了。整個修課的氣氛非常輕鬆愉快，更重要的是不用害怕講錯，因為老師都會很有耐心的解釋與替你解除一些知識上的盲點或不足。另外，課程內容也不會讓大家覺得枯燥乏味，反而像是跟實驗室成員一起出來玩一樣，替水深火熱的研究生活增添樂趣同時加強英文能力，真的是一舉兩得。推薦該課程給與我有一樣經歷或苦惱沒有機會練習英語的你，必然是會獲益良多的。

王嘉誠 (陳志成教授實驗室)
參與課程：英語口說課 level 1：溝通與表達課程

口說的 level1 是非常輕鬆有趣的課程。在 Selina 老師準備的日常教材裡，我們可以用非常生活化的方式學習英文口說，並透過英文學習知識。以我在外遊歷的經驗而言，其實口說要好無非是願意開口與他人對話，而這堂課非常輕鬆，沒有過多的作業，也沒有艱深的文法，只要願意開口說，老師都會悉心指導。所以我非常推薦怯

於開口並想精進英文口說的學生修這堂課。

王嘉誠 (陳志成教授實驗室)
英語口說課 level 2: 資工領域學術英文發表課程

口說的 level2 是紮實有用的課程，也是我當初想修口說這門課的原因。在這堂課，發音跟語速變得重要，讓我這自認英文還過得去的深深意識到自己的不足，從而找出問題並精進自己。這堂課教會我長短母音，跟輕重音的正確使用方式，讓我克服過去在聖荷西問路路人卻聽不懂的困難。此外，這堂課也會著重在學術發表，如果需要去國外參加研討會的學生可以認真考慮，輔以老師提供的英語諮詢時間，定能對 oral presentation 大有幫助。

陳鈺潔 (邱維辰教授實驗室)
參與課程：英語口說課 level 2: 資工領域學術英文發表課程

Selina 老師安排非常多的口說練習，讓我察覺到很多平常說英文沒有注意到的事，像是句子的停頓點、講話時的聲調變化，這些都影響自己的口頭報告品質。此外，老師提供報告論文時能參考的例句，還有正式研討會場合可以使用的用語，讓我獲益良多！老師既熱心又認真，願意額外花時間幫我們修改講稿，超級用心，大推！

鄭昕宜 (邱維辰教授實驗室)
參與課程：英語口說課 level 2: 資工領域學術英文發表課程

學生以往在學校較少有機會用英文練習學術發表，而這堂【資工領域學術英文發表課程】快速地幫學生建立英文學術發表時需要注意的事項以及常用的發表方式，包含重點強調、頓點的使用和如何口語解釋實驗的圖表等等。而口說發表十分需要實際練習來精進，這堂課給了學生很多開口練習的機會，也進行論文發表的模擬讓每一位學生練習用英文發表一篇論文，有效地讓學生累積英文學術發表的經驗，將來對於這類活動能有更好的發揮。

金則禹 (曾建超教授實驗室)
參與課程：英語口說課 level 2: 資工領域學術英文發表課程

今年是我第三年參加資工系開設的資工領域課程，基於自身的規劃這學期選擇修習學術英文發表。Selina 老師在這次課程中主要規劃了兩條路綫的學習，一方面是對口語報告發音朗讀的訓練，我學習到了單詞重音，句子重音和劃分 chunk 朗讀的技巧，另一方面老師也教授了學術英文發表時會常用到的用字遣詞，並且隨著課程的進行我也逐漸完成了一份學術英文發表的 ppt 和逐字稿。最後一周的分組報告很好的檢驗了我自己的學習成果，讓我瞭解了學術英文報告的特點和自己目前的不足。希望以後還有機會繼續參加這樣對我英文能力有切實提升的課程。

Enhancing General and Academic English Together at the College of Computer Science

The college of Computer Science was selected as one of the benchmark bilingual colleges by MOE. To enhance the English language ability of CS students and to promote them as international talents, the Department of Computer Science of National Yang Ming Chiao Tung University (NYCU) offers English enhancement courses to improve their general English and academic English abilities. Students can select the courses according to their learning needs for English. The following are students' reflections after joining these courses.

Academic writing course

Mavis Chen (EVA Lab)

Course: The Introduction to English Writing and English Logic 1

Willy's course focuses on the logic and concepts of academic writing. In this course, I learned to analyze the structure of academic papers. This helped me to not only grasp the main points more quickly when reading papers, I was able to write better conference papers after I learned knowledge about precise vocabulary and structure of papers. The course instructor made a great effort with the course content, also the class atmosphere was quite joyful because sometimes we had interesting interactions with each other. Overall, it was a pleasant class to attend to learn academic knowledge.

Jenny Cheng (EVA Lab)

Course: The Introduction to English Writing and English Logic 1

During the past years, thesis writing has been rarely taught in the English courses I attended. However, the ability to write a comprehensive and clear academic English writing plays a crucial role for a master's student. In Willy's course, he analyzed and summarized some common mistakes graduate students often make. In addition, he also introduced some useful vocabulary, sentence patterns, and grammar for academic writing purposes in the Computer Science domain, such as how we could use synonyms or how we explain the data in English. This course helped students to effectively express the main points when we write in English academic papers about our research findings.

Ze-Yu Jin (WIN lab)

Course: The Introduction to English Writing and English Logic 1

I learned a lot of concepts about thesis writing from Willy's course. For example, the thesis statement of a thesis is stated at the beginning of the paragraph. When writing a thesis, it is important to follow a certain structure, like a GSG structure mentioned in the class, and it is important to consider the main subjects we use in writing. In addition, the teacher also shared his experiences in academic writing, which helped me

to gain some insights. When explaining some of the more difficult concepts, the teacher explained them with real-life examples and interesting clips so that we were able to understand them better. Finally, I'd like to show appreciation to our department for providing these English enchantment courses to learn English in the Computer Science domain.

Hsin Ju Lin (ACM Lab)

Course: The Introduction to English Writing and English Logic 1 & 2

I didn't have any experiences in thesis writing before I took writing 1 and writing 2 courses. Therefore, I didn't feel that relevant when I took Willy's courses on how to write a comprehensive and structured academic writing. I accidentally found that these courses helped me better understand when reading academic papers. After taking the courses, I was able to distinguish the main points and supplementary information in the papers. Besides, I found that most of the top conference papers actually followed the structures taught in the class. When I started to write my own thesis from the 2nd year of master's study, I felt struggled. I took out the notes from these two courses and found that they were the lifesaver for writing a thesis in English. Although the content of the thesis statement still required brainstorming, I was able to arrange my contents according to the structures taught in the class. I would recommend that students should probably take these courses when they are already working on their own thesis. In this way, they know what the difficulties are and they may find the solutions in the courses.

Tzu-Hao Chiang (ACM Lab)

Course: The Introduction to English Writing and English Logic 1 & 2

After taking Willy's Academic Writing level 1 and level 2 courses, I have learned so much about the structure of academic writing, which helped me to plan the structure of my thesis. Besides, I was able to fix my problem with Chinese style English. When reading other people's writing, I can quickly grasp the main points that the authors want to express. Willy's class was very relaxing and interesting, and the content was very close to our graduate life and academic issues. I hope the pandemic will be over soon and I will not have to take classes remotely.

Chia-Wei Kuo (ACM Lab)

Course: The Introduction to English Writing and English Logic 1 & 2

The problem I often encounter in writing is that when I read other people's conference papers, I find them very structured and well written, but when I write them myself, it is like a dull description of events in my diary. In addition, it's difficult to distinguish the main points and details. However, in the courses, we learned to

organize our content based on the structure and logic introduced by course instructor, Willy. After taking the courses for 2 semesters, I gained more background knowledge about academic papers in the computer science domain. Finally, I was able to publish a top conference paper. I sincerely appreciate Willy and Selina's efforts and help.

General Speaking Course

Tony Lee(Grass Lab)

Course: English for Communication and Delivery

English has always been my less favorite subject at school. Although I always knew that this problem needed to be improved, learning English never brought the same sense of accomplishment as solving a math problem or understanding the principles behind a physics phenomenon. As a person who had always been not interested in English, I just maintained a minimum standard of English skills all the way to my master's study.

I was very fortunate to have the opportunity to take the English enhancement courses at our department recommended by our professor and lab members. At first, I was worried that my low level of English might be a problem for the teachers, but after I finished the course, I realized that I thought too much about it at first. The class was very relaxing and enjoyable. I had a great time with my lab members. More importantly, I didn't have to worry about making mistakes because the teachers were very patient in explaining English concepts to us. It felt like killing two birds with one stone. I was able to relax and learn English at the same time during the busy time of graduate study. I recommend this course to those of you who have the same experience as me or who are worried about not having the opportunity to practice English.

Patrick Wang (Prof. Jyh-Cheng Chen's lab)

Course: English for Communication and Delivery

Speaking level 1 course is a very relaxing and fun course to attend. We are able to learn English conversation in a very practical way with the learning materials prepared by our instructor, Selina. There are a lot of topics to talk about in the class, and we can also learn English through world knowledge in this course. From my travel experiences, the only way to speak well is to be willing to talk to others. Besides, there are not a lot of assignments or difficult grammar to deal with in this course. The teacher would guide you as long as you are willing to speak. I would recommend this class to students who are shy about speaking and want to improve their English speaking.

Academic speaking course

Patrick Wang (Prof. Jyh-Cheng Chen's lab)

Course: English Presentation for Academic Purposes

Speaking level 2 course is a solid and practical course, which is also the reason that I wanted to take the course in the first place. In this course, pronunciation and speech delivery pace became important. I became aware of my mistakes and tried to improve on those areas although I thought my English ability was alright before taking this course. I learned to

distinguish long and short vowel sounds of English, and the way to use stressed sounds in a sentence, which helped me to overcome the challenge when I asked direction to native speakers in San Jose when traveling in America. In addition, this course focuses on developing skills in academic presentation. If you need to present your research abroad, you can consider taking this course. You can also apply the one-on-one consultation provided by the instructor, I believe your oral presentation in English will definitely improve.

Mavis Chen (EVA Lab)

Course: English Presentation for Academic Purposes

Our course instructor, Selina, organized a lot of speaking exercises in the course, which made me become aware of many aspects of English that I never paid attention to before. This can affect the quality of a presentation such as how to pause between sentences and how to change the intonation when speaking in a presentation. In addition, the teacher provided examples of sentences that we could use when presenting in a conference and thesis, which was very useful to me. The teacher was very attentive and enthusiastic in the course, and she also spent extra time outside of class revising our speech scripts. I would highly recommend computer science students at our department to take this course.

Jenny Cheng (EVA Lab)

Course: English Presentation for Academic Purposes

Students often had little chance to use English to conduct presentations at school. This course introduces ways of presenting in English, including how to pause between sentences, how to stress on important points, and how to use figures to explain your research findings. This kind of presentation requires a lot of actual practice, and this course could provide a lot of opportunities for students to practice their oral presentation. For instance, a simulated conference presentation practice was conducted at the end of the course, which helped us to gain some experience that we can apply in the future.

Ze-Yu Jin (WIN lab)

Course: English Presentation for Academic Purposes

This is my third year participating in the English enhancement courses, and the course I decided to take in this semester is English Presentation for Academic Purposes. This course focuses on two aspects of presentation, one is pronunciation training such as stress sounds and chunks, another is introducing words and phrases that are commonly used in academic English presentations. As the course progressed, I also gradually completed an academic presentation with PowerPoint slides and scripts. The final presentation gave me a chance to assess my learning outcome of this course with the feedback provided by the instructor. I hope that I will have the opportunity to continue to attend such courses to improve my English skills.



本刊每學期發刊一期，做為本院師生與系友、家長、院友的溝通橋樑。每期報導本院近期研究現況，內容包括人事動態、國際交流、師生獲獎等。期能經由本刊使讀者掌握資訊學院最新動態，促進彼此互動。

Published twice per year, this periodical, as a bridge between faculty, students, alumni, parents and friends of the college, is dedicated to the latest research updates, including personnel changes, international collaboration, faculty & students honors, etc., in order to assist readers to keep update of the latest developments of the College of Computer Science (CCS) and encourage mutual interaction.

一、人事動態

- ◇ 本院陳永昇教授榮任本校教務長；施仁忠教授榮任本校資訊技術服務中心主任；李奇育教授榮任本校資訊技術服務中心副主任。
- ◇ 本院曾建超教授自 111 年 8 月 1 日起擔任資訊學院副院長兼任跨校區合作推動辦公室主任。
- ◇ 本院黃俊龍教授自 111 年 8 月 1 日起擔任資訊工程學系新任系主任。
- ◇ 本院張立平教授自 111 年 8 月 1 日起為資訊科學與工程研究所新任所長。
- ◇ 本院黃俊穎教授自 111 年 8 月 1 日起為網工所新任所長。
- ◇ 本院林彥宇教授自 111 年 8 月 1 日起為多工所新任所長。
- ◇ 本院彭文孝教授自 111 年 8 月 1 日起為數據所新任所長。

- ◇ 本院嚴力行教授自 111 年 8 月 1 日起為國防資安管理碩士在職專班新任主任。
- ◇ 今年 8 月本院與警政署成立「科技犯罪偵查資通訊碩士在職專班」，由吳育松教授兼任首任班主任。吳育松教授同時續任本院資安學程主任。
- ◇ 資工系彭文志教授、易志偉教授、林靖茹教授、林文杰教授於 111 年 7 月底卸下系主任、所長之行政職務，感謝四位教授對學院之貢獻。

二、國際交流

- ◇ 紐西蘭惠靈頓維多利亞大學 (Victoria University of Wellington) Winston K.G. Seah 教授於 2022 年 5 月 4 日本系演講，講題為：「Machine Learning in Network Anomaly Detection」。
- ◇ 美國明尼蘇達大學 (University of Minnesota) 杜宏章教授於 5 月至 8 月來訪本院進行短期學術交流。

- ◇ 美國華盛頓大學 (University of Washington) 黃正能教授於 6 月至 9 月來訪本院進行短期學術交流。
- ◇ 新加坡新加坡科技設計大學 (Singapore University of Technology & Design) Tony Q.S. Quek 教授於 2022 年 7 月 8 日本系演講，講題為：「Machine Learning in Network Anomaly Detection」。

三、教師榮譽

- ◇ 彭文孝教授、吳毅成教授、陳永昇教授榮獲本校 110 學年度第 2 學期特色課程【創新類】課程傑出獎！
- ◇ 曾新穆教授榮獲中華民國資訊學會 2021 年資訊榮譽獎章！
- ◇ 邱維辰教授榮獲中華民國資訊學會 2021 年李國鼎青年研究獎！
- ◇ 李奇育教授榮獲中華民國資訊學會 2021 年李國鼎磐石獎！
- ◇ 邱維辰教授、高孟駿教授榮獲傑出人才發展基金會第十屆「年輕學者創新獎」！
- ◇ 李奇育教授榮獲第十屆有庠科技發明獎！
- ◇ 詹力韋教授榮獲科技部 111 年度吳大猷先生紀念獎！
- ◇ 吳俊峯教授榮獲教育部 111 年度玉山青年學者！
- ◇ 曾新穆教授、莊仁輝教授、李奇育教授、林一平教授、袁賢銘教授團隊榮獲 2022 未來科技獎！
- ◇ 彭文孝教授、杭學鳴教授、蕭旭峰教授、黃敬群教授、邱維辰教授計畫團隊「基於生成模型的視訊壓縮」榮獲國研院研發服務平台亮點成果獎【優等獎】！
- ◇ 曾建超教授、林彥宇教授榮升特聘教授！

四、學生榮譽

- ◇ 林彥宇教授指導陸玉霖同學榮獲 IPPR 第十五屆碩士論文佳作獎
- ◇ 邱維辰教授指導顏好庭同學榮獲 IPPR 第十五

屆碩士論文佳作獎！

- ◇ 黃敬群教授指導陳作源同學榮獲 IPPR 第十五屆碩士論文佳作獎！
- ◇ 彭文孝教授指導何永涵同學榮獲 IPPR 第十五屆博士論文優等獎！
- ◇ 王才沛教授指導陳逸夫同學參與 AI CUP 2022 尋找花中君子—蘭花種類辨識及分類競賽獲得第二名！
- ◇ 王才沛教授指導陳逸夫同學參與 AI CUP 2022 農地作物現況調查影像辨識競賽【AI 作物影像判釋】獲得競賽第一名！
- ◇ 王才沛教授指導陳逸夫同學參與 Aldea 人工智慧共創平台【人聲語音去噪】獲得競賽第一名！
- ◇ 林靖茹、李奇育教授指導資工系陳昱丞、吳少寶同學榮獲科技部「110 年度大專學生研究計畫研究創作獎」！
- ◇ 張永儒教授指導葉素芳、吳孟欣、陳澤宇、林彥淳、張矽晶、江友軒同學榮獲 ACM CHI 2022 Best Paper Honorable Mention Award!
- ◇ 彭文孝、杭學鳴教授指導何永涵、林志軒、陳鵬宇、陳沐融、張之芃同學榮獲 ISCAS 2022 Grand Challenge on Neural Network-based Video Coding
- ◇ 陳志成教授、陳健教授指導謝承穎同學榮獲 ACM MobiCom 2021 Student Research Competition 研究所組第二名！

1. Personnel Changes

- Dr. Yong-Sheng Chen was named Dean of Academic Affairs at National Yang Ming Chiao Tung University. Dr. Zen-Chung Shih was named director of the information technology service center at NYCU. Dr. Chi-Yu Li was named associate director of information technology service center at NYCU.
- Dr. Chien-Chao Tseng was named associate dean of College of Computer Science and director of CCS Promotional Office for Cross-Campus Collaboration, effective August 1st, 2022.

- Dr. Jiun-Long Huang has been appointed chair of Department of Computer Science, effective August 1st, 2020.
- Dr. Li-Pin Chang has been appointed director of Institute of Computer Science and Engineering, effective August 1st, 2022.
- Dr. Chun-Ying Huang has been appointed director of Institute of Network Engineering, effective August 1st, 2022.
- Dr. Yen-Yu Lin has been appointed director of Institute of Multimedia Engineering, effective August 1st, 2022.
- Dr. Wen-Hsiao Peng has been appointed director of Institute of Data Science and Engineering, effective August 1st, 2022.
- Dr. Li-Hsing Yen has been appointed director of the Degree Program of Cybersecurity Management, effective August 1st, 2022.
- The College of Computer Science and National Police Agency have formed the "Degree Program of Information and Communication for Technology Crime Investigation", and appointed Dr. Yu-Sung Wu, the director of Graduate Degree Program of Cybersecurity, as its first director.
- Dr. Wen-Chih Peng, Dr. Chih-Wei Yi, Dr. Kate Ching-Ju Lin, and Dr. Wen-Chieh Lin formally stepped down from the posts as chair and director at the end of July, 2022. Thank you for your professional services relevant to the college's mission over the past years.

2. International Collaboration

- Dr. Winston K.G. Seah (Victoria University of Wellington) gave a speech at College of Computer Science, NYCU, titled "Machine Learning in Network Anomaly Detection" on May 4th, 2022.
- Dr. David Hung-Chang Du (University of Minnesota) visited the College of Computer Science, NYCU, for academic exchanges from

May to August, 2022.

- Dr. Jenq-Neng Hwang (University of Washington) visited the College of Computer Science, NYCU, for academic exchanges from June to September, 2022.
- Dr. Tony Q.S. Quek (Singapore University of Technology & Design) gave a speech at the Department of Computer Science, NYCU, titled "Machine Learning in Network Anomaly Detection" on July 8th, 2022.

3. Faculty Honors

- Professor Wen-Hsiao Peng, Professor I-Chen Wu, and Professor Yong-Sheng Chen won the NYCU 110 Academic Year Spring Semester Featured Courses (Innovation) Outstanding Award.
- Professor Vincent S. Tseng was awarded the 2021 IICM Medal of Honor.
- Professor Wei-Chen Chiu won the 2021 K. T. Li Young Researcher Award.
- Professor Chi-Yu Li won the 2021 K. T. Li Breakthrough Award.
- Professor Wei-Chen Chiu and Professor Mong-Jen Kao won the 10th FAOS Outstanding Scholar Awards.
- Professor Chi-Yu Li won the 10th Y.Z. Hsu Science Award.
- Professor Liwei Chan won the 2022 Wu Da-Yeu Memorial Award of the Ministry of Science and Technology.

- Dr. Chun-Feng Wu was named the 2022 Yushan Scholar by the Taiwan Ministry of Education.
- The team of Professor Vincent S. Tseng, Professor Jen-Hui Chuang, Professor Chi-Yu Li, Professor Jason Yi-Bing Lin, and Professor Shyan-Ming Yuan was awarded the 2022 Future Tech Award.

- The team of Professor Wen-Hsiao Peng, Professor Hsueh-Ming Hang, Professor Hsu-Feng Hsiao, Professor Ching-Chun Huang, and Professor Wei-Chen Chiu was awarded the R&D Service Platform Highlight Achievement Award (Excellence Award) by Taiwan Instrument Research Institute in "Video compression with generative models".
- Professor Chien-Chao Tseng and Professor Yen-Yu Lin were named Distinguished University Professors.

4. Students Honors

- Yu-Lin Lu, advised by Dr. Yen-Yu Lin, was awarded the 15th IPPR Master's Thesis Award.
- Yu-Ting Yen, advised by Dr. Wei-Chen Chiu, was awarded the 15th IPPR Master's Thesis Award.
- Tso-Yuan Chen, advised by Dr. Ching-Chun Huang, was awarded the 15th IPPR Master's Thesis Award.
- Yung-Han Ho, advised by Dr. Wen-Hsiao Peng, was awarded the 15th IPPR PhD Dissertation Excellence Award.
- Yi-Fu Chen, advised by Dr. Tsaipei Wang, won the second prize in AI cup 2022 - looking for "a gentleman"- Orchid Species Identification and Classification Competition.
- Yi-Fu Chen, advised by Dr. Tsaipei Wang, won the first prize in AI cup 2022 - Image Recognition of Crop Status Survey on Farmland - Autumn Contest.
- Yi-Fu Chen, advised by Dr. Tsaipei Wang, won the first prize in the human voice denoising competition of Aldea Artificial Intelligence Collaboration Platform.
- Yu-Cheng Chen and Shao-Pao Wu, both advised by Professor Kate Ching-Ju Lin and Professor Chi-Yu Li, won the University Student Research Award for 2021.

- Su-Fang Yeh, Meng-Hsin Wu, Tze-Yu Chen, Yen-Chun Lin, XiJing Chang, and You-Hsuan Chiang, advised by Professor Yung-Ju Chang, won the ACM CHI 2022 Best Paper Honorable Mention Award.
- Yung-Han Ho, Chih-Hsuan Lin, Peng-Yu Chen, Mu-Jung Chen, and Chih-Peng Chang, advised by Professor Wen-Hsiao Peng and Professor Hsueh-Ming Hang, won the ISCAS 2022 Grand Challenge on Neural Network-based Video Coding Top Performance Award in the End-to-end Track.
- Cheng-Ying Hsieh, advised by Professor Jyh-Cheng Chen and Professor Chien Chen, won the second place in ACM MobiCom 2021 Student Research Competition.



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我們誠摯邀請學長姊們共襄盛舉, 一同支持本院所發起的募款活動, 協助培育學弟妹們為未來產業之棟樑。

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