國際會議激發專業領域的探索熱情

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2024 年，資訊學院的學生們積極參加了多場國際頂尖學術會議，包括國際機器學習大會 (ICML)、SIGGRAPH 2024 以及國際計算機視覺大會（CVPR）。這些活動為學生提供了展示科學研究成果並與全球頂尖學者交流的寶貴平台，同時也激發了他們在專業領域的探索熱情。

在這些會議中，學生們針對機器學習、強化學習、計算機視覺、虛擬實境等前沿科技議題發表了創新研究，並藉由面對面的深入交流，吸收了來自不同領域的見解和建議。這些參與經歷讓他們不僅在知識層面有所提升，更使他們對學術研究有了更為全面的理解與規劃。以下幾位同學將分享他們在國際會議上的收穫與感想，展示這段成長經歷如何深化他們的研究視野並推動他們持續進步。

發表論文：Accelerated Policy Gradient: On the Convergence Rates of the Nesterov Momentum for Reinforcement Learning

作者：Yen-Ju Chen, Nai-Chieh Huang, Ching-Pei Lee, Ping-Chun Hsieh

指導教授：謝秉均老師

國際會議名稱：International Conference on Machine Learning (ICML 2024)

該會議重要性：International Conference on Machine Learning (ICML) 是人工智慧領域中最具影響力的學術會議之一。ICML 聚集了來自全球的研究人員和專家，展示最新的機器學習理論、技術和應用，其子領域包含深度學習、強化學習、自然語言處理等，並為學界與業界提供了一個交流和合作的平台。ICML 的研究發表往往代表著人工智慧發展的前沿，對推動技術突破、創新應用以及塑造未來發展方向有著深遠影響。ICML 2024 一共審核了 9473 篇人工智慧相關研究，其中 2609 篇被接受，接受率為 27.5%。

黃迺絜同學心得：感謝謝秉均教授的指導，這篇論文我們回答了一個在強化學習中很有趣的理論問題：Nesterov momentum 可否在強化學習中加速 policy gradient (PG) 呢？我們的結果對於這個問題是肯定的。我們發現目標函數在最佳策略的附近時會幾乎是凹的性質，這在最佳化領域中是非常好的性質，使我們能夠證明 Nesterov momentum 是可以顯著地加速 PG 的。很榮幸這份研究能夠被 ICML 接受。參與會議使我受益良多，不只能夠看到各式各樣的頂尖研究，更能面對面與各種領域大佬交流討論，實在非常享受！

發表論文：Enhancing Value Function Estimation through First-Order State-Action Dynamics in Offline Reinforcement Learning

作者：Yun-Hsuan Lien, Ping-Chun Hsieh, Tzu-Mao Li, Yu-Shuen Wang

指導教授：王昱舜老師、謝秉均老師

國際會議名稱：國際機器學習大會 (International Conference on Machine Learning, ICML)

該會議重要性：ICML 係頂級人工智慧會議，ICML 2024 共收到 9653 份投稿，其中 2609 份被接收，接收率約為 27.03%。

連云暄同學心得：本次參加 2024 年 ICML 會議發表之論文係解決了離線強化學習中價值函數估計的關鍵問題，利用 Hamilton-Jacobi-Bellman（HJB）方程和一階一致性來改進值函數估計，創新性地結合了連續時間與離散時間的強化學習方法，顯著提高了模型表現。透過本次研究發表，我們有機會在會議上與許多研究學者討論，會議結束回台，將後延續會議中的討論，著手新的國際合作計畫，持續深耕強化學習研究領域。

發表論文：BoostMVSNeRFs: Boosting MVS-based NeRFs to Generalizable View Synthesis in Large-scale Scenes

作者：Chih-Hai Su, Chih-Yao Hu, Shr-Ruei Tsai, Jie-Ying Lee, Chin-Yang Lin, Yu-Lun Liu

指導教授：劉育綸老師

國際會議名稱：Special Interest Group on Computer Graphics and Interactive Techniques, (SIGGRAPH 2024)

該會議重要性：SIGGRAPH 是計算機圖形學和互動技術領域的國際頂尖會議。研討會涵蓋了計算機圖形學、虛擬現實、動畫、視覺特效、3D 建模等前沿技術領域。作為全球計算機圖形學領域頂尖研究者、藝術家和工程師匯聚的重要平台，通過學術交流、技術展示和創新競賽，推動了圖形學技術的創新與應用，並促進了這些技術在娛樂、設計、醫療和教育等行業的廣泛商業化應用。

蘇智海同學心得：感謝劉育綸老師的悉心指導與其他同學的共同努力，以及女朋友在我專心研究期間的諒解。我很榮幸在大學期間能夠投稿並參加 SIGGRAPH。我們研究了 Neural Radiance Fields (NeRFs) 的立體場景重建，改進現有方法，並幸運地被會議接受為口頭發表。這次研究與會議經歷使我受益於豐富的學術資源和實驗室設備，並結識了來自世界各地的學者，拓展了人際網絡。我希望以此為起點，未來能再次登上國際舞台，為學術界作出更多貢獻。

發表論文：MCPNet: An Interpretable Classifier via Multi-Level Concept Prototypes

作者： Bor-Shiun Wang, Chien-Yi Wang, Wei-Chen Chiu

指導教授：邱維辰老師、王建詒老師

國際會議名稱：IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR), 2024

該會議重要性：CVPR(Computer Vision and Pattern Recognition) 是計算機視覺領域最具影響力的國際會議之一，因其在學術界和工業界的高度認可而具有重要性。它不僅是頂尖研究人員展示最新研究成果的平台，還推動了許多關鍵技術的發展，如圖像分類、物體檢測、深度學習等。

今年 CVPR 收到了 11532 篇投稿 , 並最後接受了 2719 篇 , 僅有 23.6% 的接受率 , 為電腦視覺領域中最頂尖的會議之一。

王柏勛同學心得：我十分榮幸能夠讓我的研究被 CVPR 接受，這對我的學術旅程來說是一個重要的里程碑。首先，我想表達對邱維辰老師和王建詒老師的深深感謝，正是他們的悉心指導與支持，才讓我有機會站上這樣的國際舞台。在會議中，我有幸接觸到來自不同領域的前沿研究，無論是主題演講還是專題研討，都是一次次激發思維的寶貴學習機會。最令人滿足的是，我能夠順利展示我的研究成果，並與參觀的學者進行深入交流，從中獲得了許多具有啟發性的建議和反饋。

International Conference Ignites Passion for Exploration in Professional Fields

In 2024, students from the College of Computer Science actively engaged in several prestigious international conferences, such as the International Conference on Machine Learning (ICML), SIGGRAPH 2024, and the Computer Vision and Pattern Recognition Conference (CVPR). These events offered students invaluable opportunities to present their research, connect with top scholars globally, and fuel their enthusiasm for exploration in their professional fields.

At these conferences, students showcased groundbreaking research on advanced topics such as machine learning, reinforcement learning, computer vision, and virtual reality. Engaging in face-to-face, in-depth discussions with leading experts, they gained valuable insights and constructive feedback from diverse academic fields. These experiences deepened their knowledge and enriched their understanding of research, helping them develop a more strategic and holistic perspective. The students below share their key takeaways and reflections from these international conferences, illustrating how this transformative experience has expanded their research horizons and fueled their future academic growth.

Title: Accelerated Policy Gradient: On the Convergence Rates of the Nesterov Momentum for Reinforcement Learning

Authors: Yen-Ju Chen, Nai-Chieh Huang, Ching-Pei Lee, Ping-Chun Hsieh

Advisor: Professor Ping-Chun Hsieh

International Conference: International Conference on Machine Learning (ICML 2024)

The Significance of the Conference: The International Conference on Machine Learning (ICML) is one of the most influential academic conferences in the field of artificial intelligence. ICML brings together researchers and experts from around the world to showcase the latest theories, techniques, and applications in machine learning, covering subfields such as deep learning, reinforcement learning, and natural language processing. It provides a platform for collaboration and exchange between academia and industry. Research presented at ICML often represents the forefront of AI development, playing a crucial role in driving technological breakthroughs, innovative applications, and shaping the future direction of the field. Following a meticulous review process, 2,609 papers were deemed worthy of acceptance, resulting in an overall acceptance rate of 27.5%.

The Experience of Nai-Chieh Huang: I want to express my sincere gratitude to Professor Ping-Chun Hsieh for his invaluable guidance. This paper tackles an intriguing theoretical question in reinforcement learning: Can Nesterov momentum accelerate policy gradient (PG)? Our results provide a definitive affirmative answer. We found that the objective function exhibits near-convexity around the optimal policy, a highly desirable property in optimization. This insight enabled us to demonstrate that Nesterov momentum can significantly accelerate PG. We are honored that ICML accepted our work. Participating in the conference was a great and rewarding experience—it allowed me to explore a wide range of cutting-edge research and provide opportunities to engage in meaningful, face-to-face discussions with leading experts across various fields. It was truly a highly enriching experience!

Title: Enhancing Value Function Estimation through First-Order State-Action Dynamics in Offline Reinforcement Learning

Authors: Yun-Hsuan Lien, Ping-Chun Hsieh, Tzu-Mao Li, Yu-Shuen Wang

Advisor: Professor Yu-Shuen Wang and Professor Ping-Chun Hsieh

International Conference: International Conference on Machine Learning, ICML

The Significance of the Conference: ICML is a top-tier artificial intelligence conference. For ICML 2024, a total of 9653 submissions were received, of which 2609 were accepted, yielding an acceptance rate of approximately 27.03%.

The Experience of Yun-Hsuan Lien: The paper presented at the 2024 ICML conference addressed a critical issue in offline reinforcement learning: the estimation of the value function. It innovatively integrated continuous-time and discrete-time reinforcement learning methods using the Hamilton-Jacobi-Bellman (HJB) equation and first-order consistency to enhance value function estimation, significantly improving model performance. Through this research presentation, we had the opportunity to discuss with many researchers at the conference. After returning to Taiwan, we will continue the discussions from the conference and initiate new international collaboration projects, further advancing our research in the field of reinforcement learning.

Title: BoostMVSNeRFs: Boosting MVS-based NeRFs to Generalizable View Synthesis in Large-scale Scenes

Authors: Chih-Hai Su, Chih-Yao Hu, Shr-Ruei Tsai, Jie-Ying Lee, Chin-Yang Lin, Yu-Lun Liu

Advisor: Professor Yu-Lun Liu

International Conference: Special Interest Group on Computer Graphics and Interactive Techniques, (SIGGRAPH 2024)

The Significance of the Conference: SIGGRAPH is a premier international conference in computer graphics and interactive techniques. It explores cutting-edge topics such as computer graphics, virtual reality, animation, visual effects, and 3D modeling. As a crucial platform for bringing together leading researchers, artists, and engineers from around the globe, SIGGRAPH drives innovation in graphics technologies through academic exchanges, technical demonstrations, and creative competitions. Additionally, it plays a pivotal role in advancing the commercialization of these technologies across diverse industries, including entertainment, design, healthcare, and education.

The Experience of Chih-Hai Su: I want to thank Professor Yu-Lun Liu for his insightful guidance, my classmates for their collaborative efforts, and my girlfriend for her understanding and support during my intensive research period. It is a great honor to have had the opportunity to submit and present at SIGGRAPH during my time at university. Our research focused on improving 3D scene reconstruction using Neural Radiance Fields (NeRFs), and we were fortunate to have our work accepted for an oral presentation at the conference. This experience has granted me access to valuable academic resources, the latest laboratory facilities, and opportunities to connect with scholars from around the globe, thus broadening my professional network. I hope this presentation marks the beginning of my journey, and I look forward to returning to the international stage to make further contributions to the academic community.

Title: MCPNet: An Interpretable Classifier via Multi-Level Concept Prototypes

Authors: Bor-Shiun Wang, Chien-Yi Wang, Wei-Chen Chiu

Advisors: Professors Wei-Chen Chiu and Chien-Yi Wang

International Conference: IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR), 2024

The Significance of the Conference: CVPR (Computer Vision and Pattern Recognition) is one of the most influential international conferences in the field of computer vision, highly regarded by both academia and industry. It serves as a key platform for top researchers to showcase their latest findings, while also driving the development of critical technologies such as image classification, object detection, and deep learning. This year, CVPR received 11,532 submissions and accepted only 2,719 papers, resulting in an acceptance rate of just 23.6%, making it one of the most prestigious conferences in the computer vision domain.

The Experience of Bor-Shiun Wang: I am truly honored that my research has been accepted by CVPR, marking a significant milestone in my academic journey. First and foremost, I want to express my deep gratitude to Professor Wei-Chen Chiu and co-advisor Chien-Yi Wang, whose dedicated guidance and support have given me the opportunity to present on such an international stage. During the conference, I had the privilege of engaging with cutting-edge research from various fields, and both the keynote speeches and specialized workshops provided invaluable opportunities for intellectual stimulation. What brought me the most satisfaction was successfully presenting my research and engaging in in-depth discussions with scholars, receiving many insightful suggestions and feedback.