INTERNATIONAL SUMMER/WINTER PROGRAMMES (i-SP)

IMPORTANT NOTE

Before applying for any summer/winter programme, read the GRO website for important information on:

- General Eligibility Requirements and Application Process
- Module Mapping and Financial Aid
- Visa Application, Travel Advisories and Student Insurance

Peking University: A Glance at Computer Science Research (Online)

(Updated as of June 2022)

Host University Website:	https://cs.pku.edu.cn/info/1383/3451.htm
Programme Location:	Online
Programme Dates:	12 to 14 Jul 2022
Application Deadline:	**30 June 2022**
No. of Placements:	**Unlimited; subject to selection by host**

COVID-19 related updates:

Peking University School of Computer Science is offering a 3-day online summer programme to introduce the research in Computer Science field to interested students in 2022. A selection process and the admission will be on merit basis.

Online summer programme courses taken while physically in Singapore, whilst credit-bearing by the partner universities, are offered to NUS students for enrichment only. Module mapping and financial assistance are not applicable to any electronic summer programmes taken while physically in Singapore. Applications are to be submitted directly to the partner university offering the programme and application on EduRec is not required.

Summer Getaway: A Glance at Computer Science, Peking University

Congratulations on finishing another school year! What's next? How does experiencing a different education system sound to you? While you can just sit back relaxing at home or even at the beach feeling the summer breeze, **10 professors** from the School of Computer Science at Peking University will share their research with you.

Our summer school will last for 3 days, from **July 12-14**. There will be two sessions each day, one morning session from **9:00-11:00 AM (Beijing time)** and one evening session from **8:30-10:30 PM (Beijing time)**.

If you would like to participate and learn more about the School of Computer Science or just Computer Science in general, please join us for the 3-day summer school.

Date	Session	Title/Abstract	Presenter(s)
7/12	AM	**Opening: Introduction of School of Computer Science at Peking University** Through this opening session, you will gain an insight of School of Computer Science, such as its history, disciplines, global impact, etc. This session will also share with you the programs that the School of Computer Science offers for international students. Last but not the least, you will hear from current international students at the School of Computer Science.	Zhenjiang Hu Bin Cui Yao Guo Minghui Zhou
	PM	**Robot Vision and Learning**: The research and development of robotic and unmanned systems, e.g. home robots and autonomous vehicles, is a frontier field in computer science and artificial intelligence leading a way to artificial general intelligence (AGI). In recent years, deep learning based 3D vision systems and reinforcement learning algorithms have achieved a number of breakthroughs, spawning the emerging field -- embodied artificial intelligence, and generating many new directions and topics worthy of in-depth investigation. Therefore, we offer this advanced graduate-level course for students with backgrounds in deep learning and computer vision to further their study in 3D vision and robot learning. The course will cover various tasks and problems ranging from the construction of robot vision systems to vision-based robot control and interaction, and aims to offer deep and broad discussion of this cutting-edge field.	He Wang
	PM	**Towards Machine Learning Generalization in the Open World**: Even though a great deal of existing work has been devoted to the field of machine learning, it still suffers from severe challenges: 1) Domain shift and novel categories of objects often arise dynamically in nature, which fundamentally limits the scalability and applicability of deep learning models to handle this dynamic scenario when labeled examples are not available. 2) Since real-world data usually varies over different environments and has a long-tailed distribution, it is prohibitively expensive to annotate enough data to cover all these variances. However, existing deep learning models usually lack generalization capability and fails to generalize to the out-of-distribution data with limited labels. In this talk, I will introduce my research on how to address these challenges by building machine learning systems that can automatically adapt to new domains, tasks, and dynamic environments with limited training data. Specifically, I will talk about a series of my research on both theoretical study and algorithm design from three	Shanghang Zhang

		aspects: 1) Generalize to new domains; 2) Generalize to new categories; 3) Generalized and efficient machine learning for IoT applications, including intelligent transportation and healthcare, which promotes the landing of AI in the real world. Especially, I will discuss the exploration of brain cognition mechanism to develop generalized machine learning that can adapt to new domains and modalities with limited labels.	
7/13	AM	**Multi-Agent Reinforcement Learning**: Multi-agent reinforcement learning (MARL) is a well-abstracted model for many real-world problems. In this talk, I will focus on the MARL algorithms to solve cooperative multi-agent tasks, covering value decomposition, multi-agent actor-critic, and more recent advances in this research field.	Zongqing Lu
	AM	**An Overview to Person Re-Identification**: PERSON Re-Identification (ReID) is a task that retrieves and identifies a query person from non-overlapping camera networks. It is commonly tackled as a fine-grained image retrieval task and faces many challenging issues. For example, lots of persons share similar appearance, and the appearance of each person can be affected by lots of factors like cloth change, viewpoint and illumination variance, occlusions, etc. Moreover, it is very difficult to manually identify the same person across different cameras, making the data annotation very time consuming and expensive. Due to its important applications in surveillance and public security, person ReID has become a popular topic in computer vision and image retrieval community. Many efforts have been made to promote its performance. This talk gives an overview to person ReID, its challenges, as well as recent efforts on supervised, semi-supervised, and fully unsupervised methods for person ReID.	Shiliang Zhang
	PM	**Application mapping on Reconfigurable and Tiled Processors**: Reconfigurable and tiled processors provide an extra trade-off point of programmability and efficiency among CPU, GPU, and ASIC. Coarse-grained reconfigurable architecture (CGRA) is one of the representative computing devices. The CGRA compilation problem is to map an application onto a 3D time-space model of the CGRA. In this lecture, we will give a survey of application mapping problems, as well as an example of optimization modulo theories (OMT) formulation for an efficient solution.	Guojie Luo
	PM	**An Efficient Infrastructure for Distributed Modeling Training**: In Deep Neural Network (DNN), the size of the model and dataset is increasing, and the DNN training tends to be implemented in a distributed architecture. The PS-worker architecture for DNN systems suffers from the traffic incast problem, where many workers exchange traffic with the PS, causing the PS to be the bottleneck. Inspired by the recent progress in programmable switches, we propose	Wenfei Wu

		an Aggregation Transmission Protocol (ATP), which supports multi-tenant and multi-rack in-network aggregation for DNN training. ATP consists of the networking stack on end hosts and the aggregation service on switches. The switch allocates its computation resources to jobs in a decentralized manner. The end host networking stack has a fallback to complement the switch's corner-case incapability(e.g., overflow, packet loss) and congestion control to share network resources. Finally, we made a bunch of engineering optimizations to make ATP saturate the high-bandwidth network (100Gbps). We wrap up ATP as a primitive in the transport layer and integrate it with ML systems, and show that ATP can provide both performance gain and correctness to typical DNN training (e.g., AlexNet, VGG, ResNet).	
	PM	**Improving Quality of Experience for Video Streaming with AI at Network Edge**: Over Internet, video content has consumed more than 80% bandwidth. In many countries like China, the number of users watching long- or short-form videos has exceeded 600 millions. However, the high-speed mobile access network, congested backboned network, and under-construction edge networks cannot fulfill the demands in video streaming from Internet users. Hence, it is still challenging to improve the quality of experience of watching a video online. To address the problem, it is promising to have artificial intelligence (AI) techniques for enhancing the video streaming services, e.g., to predict the popularity of video content in future, to characterize the dynamics of network bandwidth, and to analyze the user behaviors. Key enabling techniques includes video content caching, dynamic bit rate selection, super-resolution, object detection, which support better quality of experience for video content consumers in the era of 5G and beyond.	Kaigui Bian
7/14	AM	**Probabilistic Programming and Its Applications in Software Analyses**: Probabilistic programming has emerged as a new approach to program artificial intelligence systems. On one hand, it is a new programming model/language that has built-in support for random variables. On the other hand, it is a new machine learning model that allows expressing highly-complex probabilistic models using a general-purpose programming language. In this talk, I will use representative probabilistic programming languages as examples to introduce the theories, algorithms, and applications of probabilistic programming. Then, I will talk about how software analyses can leverage probabilistic programming to gain new capabilities. These capabilities enables us building smarter software engineering tools.	Xin Zhang
	PM	**Principle of Least Sensing & Computing: Building an Intelligent System with**	Leye Wang

		<u>Minimum Data</u>: With the worldwide emergence of data protection regulations, how to conduct law-regulated big data analytics becomes a challenging and fundamental problem. This talk introduces the principle of least sensing & computing, a promising paradigm toward law-regulated big data analytics. Under the guidance of this principle, various techniques including sparse sensing, differential privacy, and federated learning can be integrated to build an intelligent system with the minimum data.	
	PM	**<u>Algorithm Design and Analysis: From Classical to Quantum</u>**: Algorithm design and analysis is one of the most fundamental directions in computer science. Classical algorithms have been extensively studied since the start of computer science research, but in the current trend of quantum computing, the design of quantum algorithms is much less understood. In this talk, I will introduce my research that brid ntum computing and theoretical com will briefly introduce some of my recent de or machine learning and optimization, and neral study of computer science.	Tongyang Li

While you are interested, please fill out this form h a3RZSWVwa056 (or scan the QR code) before **June 30**, so that we can send you the link for participa

Should you have any questions, please contact us a