School of Data Science
香港城市大學
City University of Hong Kong

Hong Kong Institute for Data Science
香港城市大學
City University of Hong Kong

DATA SCIENCE MAGAZINE 2023

Data Science

Magazine for Data Science @ CityU

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PRESIDENT'S MESSAGE

I am delighted to write for the *Data Science Magazine 2023*, published by the School of Data Science (SDSC) at City University of Hong Kong (CityU). This is my first time contributing to this publication, and I would like to express my congratulations to the School on its 5th anniversary.

Over the course of my academic career in higher education, the following terms have been unmissable: data science, artificial intelligence, biomedical revolution, sustainability, and social problem-solving. While I read through the magazine, learning about SDSC's achievements and steps, I am happy to see accomplishments in the key themes that universities should focus on over the next decade.

Today, technology makes learning a lot more powerful than teachers can teach. From my experience, I believe that the ultimate mode of learning will be experiential. Thus, I am excited to see that the School is attracting more and more sizable and reputable enterprises and companies to offer internships to students, connecting them with industry and the real world.

I was honoured to witness the Data Science and AI Forum on my arrival at CityU. As the 4th in a series co-organised by the Hong Kong Institute for Data Science (HKIDS) and SDSC, I was delighted to see that the scope and scale have been expanded by collaborating with counterparts at Lingnan University. The forum has continuously evolved with world-renowned speakers since its inception in 2020. It is also my prime focus here to gather talents on thematic topics beneficial to the future of our students. I am thrilled that the forum is leading the way in the region as the best of its kind. AI is certainly the talk of the town, which has intensified since ChatGPT emerged late last year. CityU is glad to provide the forum as a platform for experts from around the world to discuss such impacts.

My career focus has long been on providing world-class education, research and innovation. With my background in the transformation of both research and innovation culture, I am always interested in what data science is bringing to academia and society. Its education and application are crucial to the future when data becomes the backbone of society as we know it. As we move into the realm of entrepreneurship, young talent needs to be able to manage technology and access markets in order to succeed. I believe SDSC is steering in the right direction under the leadership of the inaugural Dean, Professor S. Joe QIN.

In my new role as President of CityU, I look forward to the continued success of the School and HKIDS. I am confident that we will achieve another milestone as a CityU community together.

Freddy BOEY
President and University Distinguished Professor
May 2023

FOREWORD BY THE DEAN

Data science is surely one of the fastest-growing disciplines in modern history. This has been fueled by artificial intelligence acting as a major catalyst. Just this calendar year, generative pre-trained transformers (GPT) and the release of ChatGPT 4 by OpenAI have caused a sensation across the planet.

This academic year, 2022-23, has likewise been filled with milestones for the School of Data Science (SDSC) and the Hong Kong Institute for Data Science (HKIDS) at CityU, both celebrating their fifth anniversaries. I'm proud to say we are experiencing dynamic growth, success and healthy peer competition in admitting students, recruiting faculty members, gaining international recognitions, extramural research funding, and industrial partnerships.

I am grateful to have been the School's inaugural Dean and HKIDS's inaugural Director, shaping this discipline at CityU during this era of digitalisation. I have witnessed our accomplishments firsthand, seeing us meet all our challenges year after year. The School has led CityU's STEM disciplines in both undergraduate and postgraduate admissions and provided all students with a first-class education. We now have over 600 students, with 380 undergrads and 229 postgrad students. We have graduated the first-ever class of data science bachelor's degree students in Hong Kong.

Our faculty continues to grow in size and diversity. The accomplishments of our colleagues have been outstanding. Many colleagues have rightfully received international recognitions. In 2022, 12 faculty members affiliated with SDSC were ranked in the world's top 2% most-cited scientists published by Stanford University (including Single Year Impact). In November 2022, I became the first scholar in Greater China to receive the 2022 CAST Computing in Chemical Engineering Award from the American Institute of Chemical Engineers. Fellow colleagues were awarded the NSFC Young Scientists Fund 2022, received a national strategic research grant from the Ministry of Science and Technology, and were honoured with the 2022 Amazon Research Award. Another of our female colleague was appointed as an expert – one of just 20 – for the World Economic Forum's Future of Autonomous Mobility group, part of the Forum's Network of Global Future Councils, indicating the engagement of our faculty with the wider world. Another female colleague earned a Gold Medal with Congratulations from the jury at the Geneva International Exhibition of Inventions.

Our student bodies have accomplished plenty as well. A team of four Year 4 students from SDSC won the AI x HK OpenCup 2022 Champion and Best Innovation Award, and a Year 4 student contributed as one of the authors to a paper published in IEEE Transactions. Our graduates are extremely popular among renowned companies both locally and regionally. SDSC's final-year students and interns are highly sought after in the market. Our master's and PhD students have embarked on a variety of highly rewarding careers, including as data scientists, data analysts, AI engineers, professional consultants, managers and more.

HKIDS continues to work hand-in-hand with the School to sponsor internal and external collaborations and projects. This year is the first time that CityU has joined hands with Lingnan University to co-host "The Forum on Data Science and AI (DSAI)" in May 2023. Faced with accelerated development in the fields of data science and AI, the forum provides a platform for Hong Kong institutions to exchange new ideas about the development of technology and its societal impact. Aside from featured keynote speeches by world-renowned scholars from the US, Europe, Mainland China, and Hong Kong, the DSAI forum also provides a space for young faculty members and students to showcase their research findings.

In this annual magazine, we document the accomplishments of SDSC and HKIDS throughout the past academic year. We invite you to bear witness to the School's ambition and efforts in this hot discipline – knowledge of which is in high demand.

As I depart the School as Dean to become President of Lingnan University on July 1, I hope to expand the scope and impact of both institutions by fostering much close collaboration. I remain poised for the future of data science. My commitment to the School remains unwavering. I appreciate all the support I have received from the management of CityU and my colleagues in SDSC and HKIDS over past years and into the future.

S. Joe QIN, Chair Professor of Data Science
Dean, School of Data Science
Director, Hong Kong Institute for Data Science
May 2023

OUR PEOPLE – ADVANCING ACADEMIC EXCELLENCE

The School of Data Science (SDSC) is home to many brilliant minds in the field with our diverse faculty bringing a wealth of knowledge and experience to our innovative research and teaching initiatives. From data analytics and artificial intelligence to machine learning, our faculty are pushing the boundaries of what is possible and constantly initiating new discoveries. As we move towards our fifth anniversary, we will continue to be a source of inspiration and momentum to the data science community.

ACADEMIC EXCELLENCE

SDSC, housed in one of this decade's fastest-growing universities in the world, has the vision to encourage leading-edge education and research. We achieve such goals with the power of people and over the last five years, our faculty has grown to 41 members, including 15 affiliate members and two honorary professors.

FACULTY MEMBERS

Professor S. Joe QIN is our Dean and Chair Professor of Data Science, as well as a Director of the Hong Kong Institute for Data Science (HKIDS) and of the Centre for Systems Informatics Engineering (CSIE). His research interests include data analytics, statistical learning, system data science, latent variable methods, high-dimensional time series latent variable modeling, data-driven control and optimisation.

Dr. Zijun ZHANG, Associate Dean and Associate Professor, has the following research interests: data analytics, computational intelligence, system modeling and optimisation and renewable energy.

Professor Way KUO, Senior Fellow of Hong Kong Institute for Advanced Study, Emeritus President and University Distinguished Professor, conducts research on modeling, evaluating and estimating reliability of modern systems, with emphasis on optimal system design, reliability design for microelectronics and nano products.

Professor Alain BENSOUSSAN is our Chair Professor of Risk and Decision Analysis. His research areas include stochastic control, risk management, inventory control, real options, and more.

Professor Jun WANG, our Chair Professor of Computational Intelligence, explores areas like computational intelligence, neural computation, optimisation methods, data processing and intelligence control.

Professor Jonathan ZHU is our Chair Professor of Computational Social Science. His research revolves around structure, diffusion, use and effect of new media, network analysis of online communications, web mining, e-social science, quantitative research methodology, statistical analysis, and social computing.

Professor Minghua CHEN covers a wide array of research topics, including: online optimisation and algorithms, capitalising the benefit of data-driven prediction in algorithm/system design, machine learning in networked and societal systems, energy systems (such as smart power grids and energy-efficient data centres), intelligent transportation systems and delay-constrained networking.

Dr. Lishuai LI, Associate Professor, has the following research interests: intelligent transportation systems, air transport and operations, data mining and computational intelligence.

Dr. Matthias TAN, Associate Professor, focuses on statistical modeling and inference for engineering, uncertainty quantification in computer simulations, design and analysis of experiments, and statistical quality improvement.

FACULTY MEMBERS

Dr. Qi WU, Associate Professor, conducts research on quantitative finance, financial technology and business analytics.

Dr. Li ZENG, Associate Professor, explores areas like statistical machine learning, quality engineering, data analytics in manufacturing and biomedical engineering.

Dr. Qingpeng ZHANG, Associate Professor, focuses on healthcare data analytics, medical informatics, network science, social computing and artificial intelligence.

Dr. Xiang ZHOU, Associate Professor, is an expert on applied and computational mathematics, rare event, stochastic modeling and simulation, energy landscapes and machine learning.

Dr. Yining DONG, Assistant Professor, researches on process data analytics, multivariate time series modeling, statistical machine learning, smart manufacturing and new material design.

Dr. Clint HO, Assistant Professor, researches on: decision making under uncertainty, robust optimisation, computational optimisation, and operations research.

Dr. Qing KE, Assistant Professor, has conducted research on innovation, entrepreneurship, venture capital, intellectual property, patents, science and technology policy, economic geography, China, network science, social computing, and social media.

Dr. Jizhou LI, Assistant Professor, has research interests such as imaging science, applied machine learning and interdisciplinary research.

Dr. Linyan LI, Assistant Professor, is an expert on spatial analysis, healthcare data analytics, environmental health, smart city, and real world evidence (RWE).

Dr. Xinyue LI, Assistant Professor, has research interests such as wearable device data analysis, statistical genetics, electronic health record analysis, precision medicine, scalable statistical learning and machine learning methods for large data sets.

Dr. Xiao QIAO, Assistant Professor, has research scope on financial economics, asset pricing, financial data analytics and risk management.

Dr. Yi YANG, Assistant Professor, focuses on variable selection in high-dimensional data, statistical methods for analysis of whole-genome sequencing data, knockoff statistics, and Bayesian hierarchical models.

Dr. Yu YANG, Assistant Professor, works mainly on large scale graph mining, data mining and processing, stochastic and combinatorial optimisation, influence/information diffusion in networks, dense subgraph detection and graph representation.

Dr. Xiangyu ZHAO, Assistant Professor, focuses on machine learning and data mining, reinforcement learning/AutoML/multimodal, information retrieval (recommender systems, online advertising, search engine), urban computing and spatio-temporal data analysis, AI for social computing/finance/education/ecosystem/healthcare.

Dr. Zimu ZHOU, Assistant Professor, has conducted research on machine learning for mobile and IoT systems, ubiquitous sensing, urban computing and spatiotemporal data management.

HONORARY PROFESSORS

Professor John E. HOPCROFT is the IBM Professor of Engineering and Applied Mathematics, Cornell University and won the A. M. Turing Award in 1986. His research focuses on theoretical aspects of computing.

Dr. Kai-Fu LEE is Chairman and CEO of Sinovation Ventures and President of Sinovation Ventures Artificial Intelligence Institute. His specialties covers artificial intelligence, machine learning, speech, natural language.

AFFILIATE MEMBERS

Professor Yuguang Michael FANG is a Chair Professor of Internet of Things at the Department of Computer Science. He conducts research on wireless networks; mobile/edge computing; security/privacy/cybersecurity; wireless AI/machine learning/federated learning; Internet of Things, cyber-physical systems; 5G/6G and beyond; connected and autonomous driving; smart and connected health, and smart grid.

Professor Ian W. MCKEAGUE is a Chair Professor and Head of the Department of Biostatistics. His research interests cover post-selection inference, functional data analysis, empirical likelihood, non-standard asymptotics, statistical methods for trajectory analysis in life course epidemiology, survival analysis, Bayesian inverse problems in physical oceanography, statistical aspects of quantum physics and relativity, Markov chain Monte Carlo, competing risks models for HIV/AIDS data, inference for stochastic processes, simultaneous inference, efficient estimation for semiparametric models, counting process and martingale methods in survival analysis.

Professor Keng Leng SIAU is a Chair Professor at the Department of Information Systems. His research interests cover digital transformation and digital society, business analytics and data science, technological innovation and entrepreneurship, smart health and fintech, AI, robotics, and machine learning: future of work and future of humanity, human-centered AI, human-AI interaction, and metaverse.

Professor Dapeng Oliver WU is a Yeung Kin Man Chair Professor in Network Science at the Department of Computer Science. His research focuses on AI; data science; signal processing; communication; network science; and biomedical engineering.

Professor Min XIE is a Chair Professor of Industrial Engineering at the Department of Advanced Design and Systems Engineering. His research focuses on reliability engineering, quality management, software reliability and applied statistics.

Professor Chuangyin DANG is a Professor at the Department of Advanced Design and Systems Engineering. His research interests cover game theory and applications, systems modeling and optimisation, computational economics and finance, data analytics and statistical learning.

Professor Xin LI is a Professor at the Department of Information Systems. His research focuses on digital economy, data science/machine learning, social network, and applied econometrics.

Professor Yanzhi David LI is a Professor at the Department of Marketing and Department of Management Sciences. His research focuses on business analytics, supply chain management, OM/marketing interface, and perishable inventory management and pricing.

Professor Tze-Kin Alan WAN is a Professor at the Department of Management Sciences. He conducts research on model averaging and selection,varying-coefficient semi-parametric models, missing and censored data, and quantile regression.

Dr. Siyang GAO is an Associate Professor at the Department of Advanced Design and Systems Engineering. His research mainly focuses on simulation modeling and optimisation, applied probability, discrete event dynamic systems, and healthcare management.

Dr. Guanhao Gavin FENG is an Assistant Professor at the Department of Management Sciences. His research interests cover financial econometrics, empirical asset pricing, machine learning and quantitative finance.

Dr. Jingyu HE is an Assistant Professor at the Department of Management Sciences, works on the following research: machine learning, tree ensembles, Bayesian statistics and empirical asset pricing.

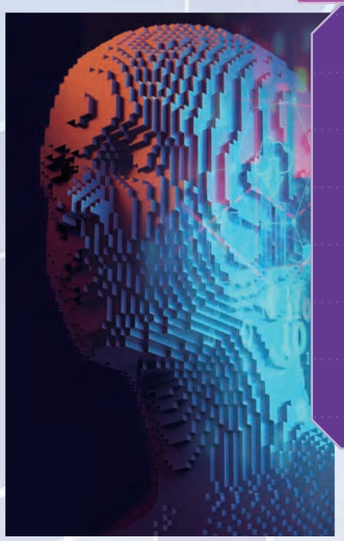
Dr. Jun LI is an Assistant Professor at the Department of Infectious Diseases and Public Health. His research interests include big data mining in biology, predictive modelling, and dynamics and the complex adaptive system in ecology.

Dr. Zhixin ZHOU is an Assistant Professor at the Department of Management Sciences. His research covers network analysis, high-dimensional statistics, information theory, adaptive experimental design, stochastic process and efficient search in recommendation system.

Dr. Inez M. ZWETSLOOT is an Assistant Professor at the Department of Advanced Design and Systems Engineering. She covers the scope of statistical process monitoring, industrial statistics, Lean Six Sigma and operational excellence.

GLOBAL EXPERTISE

SDSC faculty are leading experts in their fields and are drawn from across the world. Most are doctoral graduates of elite universities, including MIT, Oxford University and Imperial College London in the UK; Harvard University, National University of Singapore, Princeton University, Yale University, the University of Chicago, Columbia University, and the University of Pennsylvania in the US; and Tsinghua University and Peking University in China.



WORLD-LEADING SCIENTISTS

Twelve faculty members affiliated with SDSC have been recognised as being in the top 2% of the world's most cited Scholars by Stanford-Elsevier indicators in November 2022. The selection ranked the top 100,000 scientists by citation score (with and without self-citations) or a percentile rank of 2% or above in their specialty field.

These elite global scientists are Dean Professor S. Joe QIN, Associate Dean Dr. Zijun ZHANG, Professor Way KUO, Professor Alan BENSOUSSAN, Professor Jun WANG, Professor Minghua CHEN, Dr. Lishuai LI, Dr. Qing KE, and affiliate members Professor Keng Leng SIAU, Professor Min XIE, Professor Chuangyin DANG and Professor Xin LI. In 2022, more than 170 scientists from CityU made the list of 100,000.

RESEARCH THAT BENEFITS THE WORLD

SDSC faculty are one of the world's leading communities of data scientists. Working across the field, both in-house professionals and affiliated faculty conduct cutting-edge research on data science theory and algorithms. We are committed to applying our research practically to benefit society, as demonstrated by applications ranging all the way from Industry 4.0, smart city development and intelligent transportation to renewable energy, new media, quantitative finance and medical informatics. These are some of our key research areas:

- Data Visualisation
- Data Mining
- Optimisation and Control
- Approximation Theory
- Modeling of Time Series
- System Analytics
- Statistical Learning/Modeling
- Machine Learning
- Reliability Engineering
- Social Computing
- Computational Intelligence
- Computational Mathematics
- Industry 4.0
- Risk Management
- Financial Technology
- Predictive Maintenance

POSTGRADUATES: THE NEXT GENERATION OF DATA SCIENTISTS

In addition to faculty, students are also flocking to SDSC, and we are receiving more and more applications from high-quality candidates. Postgraduate applicants, in particular, are keen to join the School.

As of September 2023, SDSC will have admitted approximately 150 PhD students. These candidates hold undergraduate degrees from prestigious universities such as the University of Texas at Austin; the University of British Columbia; Johns Hopkins University; New York University; the University of California, Davis; Pennsylvania State University; the University of California, San Diego; University College London; the University of Edinburgh; the University of New South Wales; Tsinghua University; Peking University; Zhejiang University; Nanjing University and Xi'an Jiaotong University.

We are also accepting a growing number of master's students. SDSC is currently home to approximately 110 Master of Science in Data Science students and will receive more than 120 new students in September 2023. All of our current and forthcoming master's students graduated from world-class universities (C9 League, Project 985, THE Top 200, ARWU Top 200, Project 211 or QS top 200).

A DIVERSE UNDERGRADUATE BODY

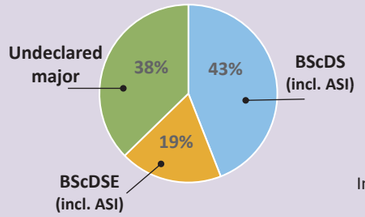
The diversity of SDSC's student body reflects the highly international nature of data science. For the 2022 intake, 39% of our undergraduate students came from non-local, including mainland China, Indonesia, Kyrgyzstan, US and South Korea, etc. More information on our undergraduates' backgrounds can be found below.

Diverse Background for 2022 Intake

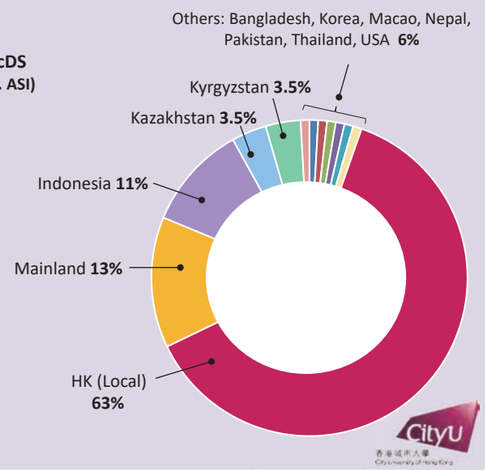
Gender

61% 39%

Programme



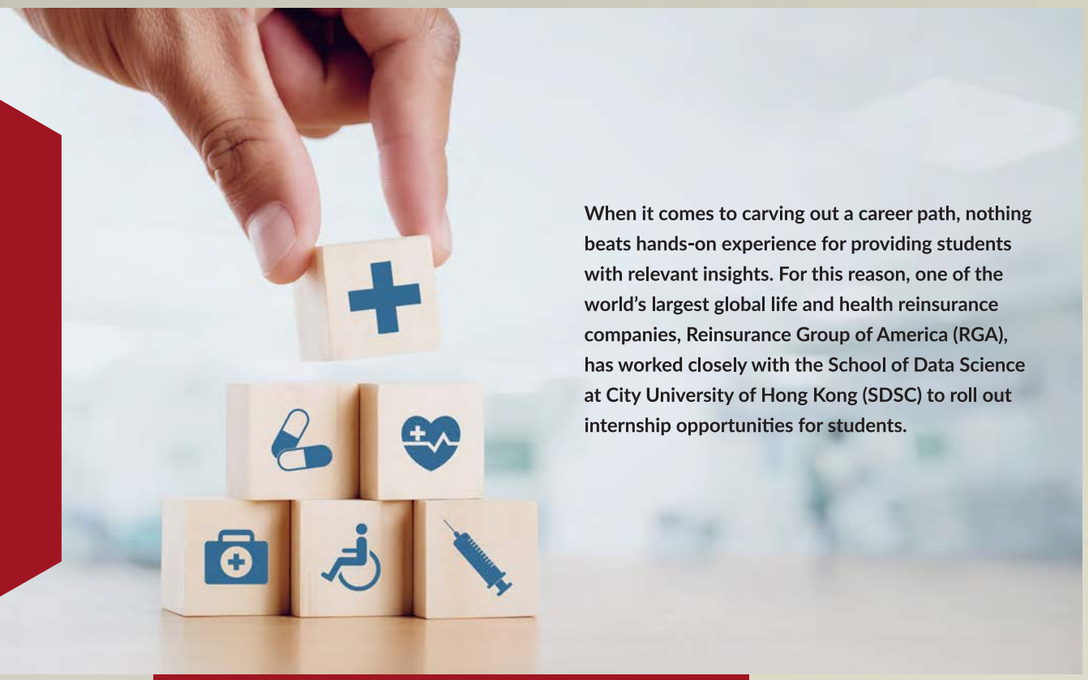
Country / Region



Admission Route

JUPAS (Local)	Non-JUPAS Local	International
41%	19%	40%

CLOSE AND STRATEGIC COLLABORATION NURTURES FUTURE DATA SCIENTISTS



When it comes to carving out a career path, nothing beats hands-on experience for providing students with relevant insights. For this reason, one of the world's largest global life and health reinsurance companies, Reinsurance Group of America (RGA), has worked closely with the School of Data Science at City University of Hong Kong (SDSC) to roll out internship opportunities for students.

"Not only were we keen to get talent from the School, but we also wanted to provide the students with opportunities, such as projects and research ideas, that we can work on together."

Mr. Chester YUE
Regional Head of Internal Audit at RGA

"From the very beginning, our idea was we wanted to build a long-term strategic partnership," says Chester YUE, Regional Head of Internal Audit at RGA, a Fortune 500 company. "Not only were we keen to get talent from the School, but we also wanted to provide the students with opportunities, such as projects and research ideas, that we can work on together."

Chester explains that this is important because of the explosive growth of the reinsurance industry, which finds RGA constantly on the lookout for students and graduates with the cutting-edge skillset required to help fulfill industry needs. At the same time, students in this relatively new field are searching for the kind of work experience that will show what career paths their degrees can offer.

"Reinsurance is a growing industry, and the projection is around a six per cent growth over the next 10 years, globally, reaching a total size of over $600 Billion USD. It's a big market," says Chester. "Since RGA's purpose is to make financial protection accessible to all, the key to this growth is the ability to innovate."

When it comes to innovation, Chester explains that he means there is a need to find new products to meet customers' needs all of the time. "We have to make it easier and cheaper for people to buy insurance products based on numbers, and all of this is based on big data."

The ability to process data and derive insight efficiently, and apply it to building new products is foundational to what RGA does. And there is a need for people who are schooled in the latest technologies to be able to accomplish these tasks.

The reason for this is simple: those who have the insight as well as the technological know-how will be able to think faster, find more efficient solutions and, in turn, help create products that are more cost effective.

As an example, Chester shares the story of how Yutian CHEN, a Year 4 student from the School, interned at RGA and helped to develop Python code that automated a cumbersome data processing practice.

"She showed us that using some Python code that was about half-a-page short, could replace and beat 15 spreadsheets," Chester enthuses.

According to Chester, this demonstrates that the new talent entering the industry has the ability and know-how to make the impossible possible, finding competencies that will allow companies to refine enormous amounts of data via the latest technology.

"This third generation of interns are really helping us with robotic process automation right now," he says.

Another change in the industry is in the way data is collected. Historically, buying insurance would require customers to complete health checkups and lengthy questionnaires to assess their eligibility and risks. But in a digital world, there are various new data sources that can provide a more accurate view of a person's risk profile.

For example, Chester says that a person's activities, monitored via their phone or smartwatch, can give clues as to how active and healthy a lifestyle a person lives – important factors that contribute to their overall health or risk. These new collection points lead to more correlated data, meaning new and better products can be offered to the customer.

In other words, to keep abreast of industry trends and developments, Chester says, "The bottom line is that we have a fundamental need to be able to get insights out of data or use data more efficiently, and we need that capability."

BUILDING A PIPELINE OF TALENT

The internship partnership between RGA and the School has provided not only a steady pipeline of talent for the company but has allowed RGA to guide new talent and broaden their horizons.

"When you get people in at the internship level and you train them from the beginning to be auditors who have data capabilities too, that's the real game changer."

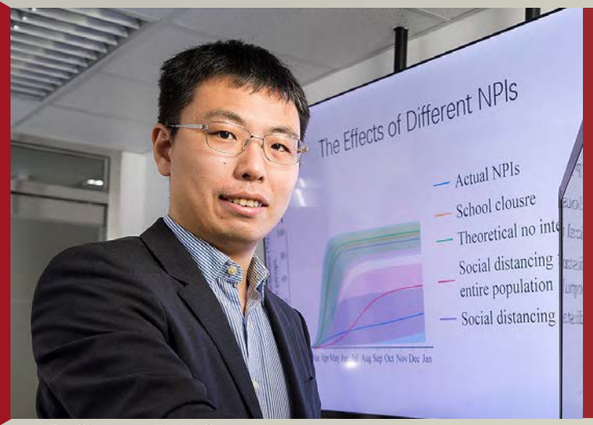
And in fact, this is exactly what the School itself hopes to foster – a generation of graduates who are multifaceted.

"When we first expanded our internship programme for our undergraduate students, we wanted to emphasise that data science is not just computer science and it's not just mathematics," explains Dr. Qingpeng ZHANG, Associate Professor and Internship Coordinator at the School.

"We hope to give our students a chance to be exposed to all different kinds of disciplines, or different potential applications that are related to what they learn at the university."

Looking back, Dr. ZHANG says that when they first approached RGA, they were unsure how their students could contribute to a reinsurance company, so the first batch of students had the opportunity to explore various problems at the company and helped to solve those by applying their learned skill sets. In doing so, their supervisors were surprised to see and learn that the students were able to contribute to the business of the company in immeasurable ways.

"It was a two-way process," says Dr. ZHANG, "because the company's training taught our students what internal auditing was all about and how you can contribute to an established company. But on the other hand, our students were able to educate the company about the latest methodologies that can be useful to enhance their business and programmes."



> **"It was a two-way process because the company's training taught our students what internal auditing was all about and how you can contribute to an established company"**

Dr. Qingpeng ZHANG
Associate Professor and Internship Coordinator

A NEW DISCIPLINE FOR A NEW WORLD

Indeed, the data science programme is a new discipline that involves schooling in heavy computer science programming, using mathematical statistical tools and acquiring domain knowledge. Students are encouraged to take on at least two internship experiences in order to expand their domain knowledge. Students are also advised not to do the same internship twice so they can test themselves in different industries.

"It's really about getting them to apply their skill sets in a real life setting. But the most important thing," adds Dr. ZHANG, "is helping them to gain a better idea of what they want to do once they graduate."

CONTRIBUTING TO INDUSTRY GROWTH AND CAREER INSIGHT

Besides this, an internship is also a key opportunity and mutual learning experience aimed at helping to progress the School's programme, the company's mission and to help progress industries.

For RGA, in particular, this has certainly been the experience.

"The reinsurance industry is undergoing a transition from a traditional practice to a more objective data driven industry," explains Yutian CHEN, following her internship, "and there are a lot of opportunities there for us to apply our data science skills to their auditing tasks."

Stephanie WIJAYA, a Year 3 student who worked as a full-time Internal Audit intern at RGA last summer, says the experience gave her many insights into what she could do with her degree once she graduated. "Currently, I'm still looking for the most suitable role for what I can do, but I wanted to learn as much as I can while I'm studying."

Year 4 student Azamat YELMAGAMBETOV, concurs, saying that the internship opened his eyes to new possibilities and gave him a wealth of experience to help make informed future career choices.

"This was my second internship experience and it really helped me to understand what I want from a future career. You get a better sense of your skills and passion and it's about getting as much experience as possible," he says.

Year 4 student, Qingyang YU couldn't agree more adding that the internship was also valuable in honing her practical skills.

"I learnt to write in Python programs and how to accelerate the speed of the task and use these kinds of skills to work more effectively," she says.

And for a lucky few, the internship opportunity has landed them a full-time job upon graduation, like for Cecilia TANG.

"In my first year I studied engineering but later switched to data science because I liked it and was interested in data-driven industries," she explains. "For my future plans, I don't want to work as a data scientist, rather, I'd like to be a data person on a business team."

And thanks to her internship at RGA, Cecilia was able to find a niche she good at and one which also piqued her interest. "I'm working on an automation project of RGA's auditing system," she continues. "It's basically getting robots to help you to do some work, and the main contribution is to improve efficiency."

PROVIDING A SENSE OF DIRECTION

Ultimately, these internship opportunities should provide direction for students to pursue careers in industries that they love. Regarding this, Dr. ZHANG says that there are often misconceptions about what data scientists can do and what industries they can work in. He says that data science is different to computer science or programming in that students aren't necessarily programmers, but instead apply programming and mathematical skills to contribute to businesses like RGA.

"We also have students who work in fields that require them to have good social skills, visualisation skills and so on," he adds.

AT THE HEART OF RGA

Although there are many benefits to the internship programme, it is crucial that applicants find out more about what exactly RGA is and who it is best suited for.

To help answer this question, Chester says that students need to understand what the company is all about. With its purpose of making financial protection accessible to all, RGA's mission naturally makes it a client-centric, customer-focused business whose bedrock is innovation.

"We're a group of really nice people to work with, we care for each other, we work as a team, and we want to have fun", Chester says. RGA also works closely with the School to help students by giving speeches, hosting seminars, aiding career development and by providing coaching to students on their personal growth.

"We're not just providing an internship, we also have research projects, and I really appreciate what SDSC is doing to help," says Chester. "The students we receive are all terrific, and that says a lot about the quality of the programme."

Given the excellent synergy between RGA and SDSC, former and current interns are quick to praise the opportunity and advise others to apply and give it a go.

"You need to learn by doing real work – you can't do full preparation like this in school," says Yuchen QIU, who interned in the summer of 2021. "In order to apply what we are learning at university to a real-life setting, you must be proactive and not wait for tasks, but go out and ask for those tasks."

For Yuchen, she also felt that it gave her an idea of what kind of company she would like to work for in the future.

"My experience at RGA was amazing and so memorable. It made me feel that I would like my future team and company to be as collaborative as RGA, and it gave me a lot of guidance on my future plans and made me think about whether to work locally in Hong Kong or to work at an overseas company," she adds.

In closing, Chester calls on students to give the company a shot, and to treat the internship as a tremendous opportunity to gain useful experience and to have fun.

"I want to give students an experience so that they can know themselves better," he says. "It's OK that some interns come in and they don't know if they want to carry on in the academic route or join the business side. This is a chance for them to find out. Quoting Socrates: 'know thyself'. That's ultimately what is important."

COMPUTATIONAL MATHEMATICS AND MACHINE LEARNING

by Dr. Xiang ZHOU

Computational Mathematics (CM) is a branch of mathematics that involves the use of mathematical algorithms and computer technology to solve problems in scientific discovery. For example, without well-posed and efficient numerical algorithms for partial differential equations, fluid mechanics and aerodynamics would be limited to abstract theories and expensive experiments.

On a fundamental level, machine learning (ML) uses algorithms to enable computers to process data, find patterns and make predictive outputs based on formulated models. It is worth noting that mathematicians and physicists have implicitly carried out many data mining tasks throughout the history of science discovery. The method of least squares, for example, is a standard approach used in regression analysis today. This method was discovered by the French mathematician Adrien-Marie Legendre, and also credited to Carl Friedrich Gauss who may have previously used it for the motion of planetoids.

With advancements in deep learning and artificial intelligence, traditional scientists now are equipped with modern machine learning and AI techniques to attack challenging problems at much higher levels than the traditional model-based methodology. Computational mathematics is also experiencing disruptive innovation in numerical tools brought by deep neural networks and other AI algorithms. More critically, it is becoming increasingly urgent to understand and demystify the complexity of deep learning and AI technologies by formulating them in terms of new mathematical problems that can benefit from the proven power of applied and computational mathematics. Therefore, the scope of applied and computational mathematics today is evolving toward two emerging strategic directions in research community: ML for CM and CM for ML.

Deep neural networks offer a great practical solution to the long-standing problem in computational mathematics: the curse of dimensionality. Meanwhile, large amounts of data have been generated in scientific fields and the practical tools for efficient and accurate analysis of these data are now publicly available. The capability to work with huge models and the abundance of scientific data together mark the new age of AI: AI for Science, where techniques such as machine learning, deep learning, and natural language processing are being applied to various scientific domains, including biology, chemistry, physics, astronomy, and others. They are helping scientists to make discoveries and develop new technologies at a faster pace than ever before, and it has the potential to revolutionise scientific research and discovery.

In the rest of this commentary, we discuss several specific research topics.

CONTINUOUS VIEWPOINTS OF MACHINE LEARNING

Continuous-time models provide a valuable perspective on machine learning. For example, stochastic gradient descent, the most popular optimisation algorithm in deep learning, can be approximated by a stochastic differential equation that takes into account the effect of noise very clearly. The min-max training of the Generative Adversarial Network can also be formulated by a dynamic system of two variables. This continuous time modelling approach provides a rich set of tools for analysing and tuning ML optimisation algorithms, enabling researchers to develop new models and algorithms.

The continuous modelling is surely not only restricted to optimisation algorithms only, but is also directly influential to neural networks in deep learning, in the limit of infinite width and infinite depth. The two-layer neural network with infinite width takes the form $f(x)=E_{(c,w,b)\sim\rho}\,[c\sigma(w\bullet x+b)]$. Then a loss function in machine learning can be interpreted as free energy in physics - a functional of the probability distribution ρ instead of individual neurons (c_j, w_j, b_j). The gradient descent training now becomes a gradient flow in the probability space.

Residual Neural Networks (ResNets) are popular as they alleviate the so-called "vanishing gradient problem". By reinterpreting the layers in deep ResNets as the (discrete) march of time, the discrete compositions of simple functions naturally lead to the flow-based model. This reformulation points out more far-reaching observations: the role of weights and bias parameters at each layer is the control and the training problem is in fact a (mean-field) control problem.

DEEP LEARNING FOR SOLVING DIFFERENTIAL EQUATIONS

Many researchers are using deep learning to solve various partial differential Equations (PDE) in science and engineering, with several distinct approaches and the following common features. First, deep neural networks are used to represent the high dimensional solution functions (so the curse of dimensionality is alleviated), and automatic differentiation computation libraries (Tensorflow and Pytorch) are relied upon. Second, the ultimate computational task is to optimise an objective function, making stochastic gradient descent applicable.

There are two different discretisation approaches in general: the Eulerian Viewpoint and the Lagrangian Viewpoint. The Eulerian viewpoint is to treat the problem as a static problem and the training is based on the information on the grids or sampled training points following a certain distribution. This is analogous to traffic cameras attached to poles on the streets. In contrast, the Lagrangian viewpoint is like cameras on top of self-driving cars.

SUMMARY

Overall, as machine learning and artificial intelligence continue to transform all kinds of fields, not only are they providing innovative numerical tools, but they are also inspiring research topics for computational mathematics. The interactions between machine learning and computational mathematics are fast, broad, and deep today. We are confident that applied and computational mathematics can play a crucial role in bridging the gaps between machine learning and scientific discovery. As we continue to explore the possibilities, we are optimistic that we can make great strides in advancing the scientific understanding of AI.

Harnessing the Power of Data Science for Population Health and Wellbeing

By Dr. Linyan LI

How do doctors determine which patients to treat with priority when resource is limited? How is your medical insurance premium calculated? How many deaths could have been prevented if air pollutants are reduced by 1%? Health-related research has become increasingly quantitative, with the availability of large and complex datasets and new data science techniques. The use of these techniques allows researchers to efficiently analyse and interpret these datasets, enabling them to identify disease trends and risk factors, and develop targeted prevention and intervention strategies. Data science also offers the potential for the integration of data from multiple sources, including electronic health records, clinical trials, patient-generated data and environmental data. This provides new perspectives and methods for tackling long-standing healthcare challenges. The application of data science tools in health-related research can lead to the development of more accurate diagnostic tools and personalised treatment plans, and a deeper understanding of complex diseases and environmental health issues. Ultimately, this has the potential to significantly improve population health and wellbeing.

Enhancing Healthcare Performance and Efficiency through Accurate Risk Stratification and Machine Learning

Risk stratification is critical in medical services and insurance markets. With accurate modeling of patients' health risks, healthcare providers can effectively determine the appropriate level of care and services for specific patient subgroups and avoid under- or over-utilisation of healthcare services. Additionally, payers such as insurance providers have a vested interest in comparing hospital performance to identify facilities that provide the most cost-effective care. Similarly, patients are keen to determine which hospitals offer the best outcomes.

However, patient populations differ significantly in their baseline risk, and hospitals perform procedures differently. Therefore, fair comparisons require precise risk stratification to ensure accurate analysis and interpretation of hospital performance data. Traditional risk stratification methods, such as the Charlson Comorbidity Index and Hierarchical Condition Category, are largely based on heuristics and experience and do not capture the subtlety of individual differences.

Dr. LI's team leverages the power of machine learning models to analyse large sets of patients' data, such as medical claims data and electronic medical records, to build accurate predictive models of patients' health risks and healthcare costs. These models and results show great promise for improving the effectiveness and reducing the costs of healthcare systems.

Improving Patient Outcomes with Precision Medicine and Big Data Analytics

Precision medicine is an approach to healthcare that involves tailoring medical treatment to individual patients based on their unique characteristics, such as their genetic makeup, lifestyle, and environment. One way that large healthcare databases can facilitate precision medicine is by providing researchers and healthcare providers with access to vast amounts of patient data. By analysing this data, patterns and associations can be identified that could inform more personalised and effective treatment plans.

However, personal characteristics and behavior styles can interact in highly complex ways to affect healthcare demand, and real-world patient datasets can be enormous and highly noisy. Dr. LI's team works on developing and applying advanced statistical methods, such as Bayesian Networks, to sample large numbers of possible dependency structures between different factors. They construct interpretable models to predict and explain the differences in patients' health outcomes and related treatments.

Data Science in Analysing the Built Environment's Impact on Health

Rapid urbanization has brought increasing attention to the close relationship between the built environment and health. When thoughtfully designed, the built environment can promote health, enhance social interactions and foster environmental sustainability. However, the built environment is a composite factor that involves many interacting individual elements, making it challenging to analyse. Self-reported surveys or crude surrogates are traditionally used to collect data on the built environment, but these methods can be biased, inaccurate or insufficient to capture enough details.

Machine learning has been shown to be powerful in self-learning important features from sophisticated information. Combining machine learning techniques, such as convolutional neural networks (CNN) and satellite images, provides new opportunities to process built environment information more objectively and accurately. Dr. LI's team specialises in segmenting built environment images to extract specific infrastructure, such as highways, green spaces and buildings. They develop tools to process satellite images for better assessment of the built environment and use them to analyse the relationship between the built environment and multiple health outcomes, including behavior (exercise), respiratory symptoms and obesity. The team also works on generalising their analysis to cover as many cities as possible. Their research findings shed light on the associations between the built environment and health, contributing to urban planning decision-making aimed at maximising the health benefits of the residents.

Data Science and Health Impact Assessment

Health Impact Assessment (HIA) is an approach used to evaluate the potential health effects of policies, programmes or projects. Data science can significantly support the HIA process by providing tools and methods for analysing and interpreting large datasets to identify the potential health impacts of various interventions.

Dr. LI's research on the HIA of green roofs provides a good example. Green roofs have the potential to reduce urban heat island effects, improve air quality and promote mental health by providing green spaces in Hong Kong and the Greater Bay Area. However, there is still a lack of quantitative evidence and analysis. To address this, Dr. LI collaborates with other scientists in building, energy, and environmental engineering, using various machine learning techniques to accurately assess the relationship between green roof coverage, air quality and population health. This information can help develop decision support tools for policymakers and public health officials, enabling them to make informed decisions about the potential health impacts of green roofs.

A DIVERSE RESEARCH HUB OF CITYU: HONG KONG INSTITUTE FOR DATA SCIENCE

The Hong Kong Institute for Data Science (HKIDS) works closely with the School of Data Science (SDSC) to develop cutting-edge research and knowledge in this field. It serves as a research and educational hub to integrate data science strengths across the campus. We are helping to train the next generation of data scientists and offer research opportunities to PhD students and support interdisciplinary research projects.

Under HKIDS, we have three research centres and joint laboratories to facilitate high quality and influential research in the area of data science:

- Centre for Systems Informatics Engineering
- City University of Hong Kong – JD (Jingdong) Digital Joint Laboratory in Finance Technology and Engineering
- City University of Hong Kong – DataStory Joint Laboratory in Artificial Intelligence

GRANTS RECEIVED

Innovation and Technology Fund – Aerospace System Prognostics and Health Management Model and Telemetry Task Optimisation

A research team led by Professor S. Joe QIN, Dean and Chair Professor of SDSC and Director of HKIDS, and co-investigated by Dr. Lishuai LI, Associate Professor and Dr. Yining DONG, Assistant Professor from the School, has been awarded a grant of around HK$2.2 million from the Innovation and Technology Fund (ITF) in 2021-2022. The research team is strengthened with the joining of three female postdoctoral fellows, Dr. Yanfang MO, Dr. Boyang SHANG and Dr. Xinting ZHU, and several PhD students. The project is cosponsored and collaborated with New World Telecommunications Limited, Hong Kong.

The objectives of this project are developing prognostic and health monitoring systems for spacecraft systems and ground stations to diagnose and predict faults based on multivariate sensor data. Aims also include reducing maintenance costs and improving system safety and reliability. In addition, task planning algorithms will be developed for spacecraft control mission to optimise matching with ground stations and multiple types of satellites, towards a better efficiency and lower cost.

Natural Science Foundation of China (NFSC) - On-orbit Electromechanical Performance Degradation Trend Prediction Algorithm Based on Compressive Sensing

A research team led by Professor S. Joe QIN, Dean and Chair Professor of SDSC and Director of HKIDS, and co-investigated by Dr. Yining DONG, Assistant Professor of SDSC, has been awarded a grant amounting to HK$2.16 million from Natural Science Foundation of China (NFSC) under the National Key R&D Programme of the Ministry of Science and Technology of the People's Republic of China (MOST) in August 2022.

Innovation and Technology Fund – Development of an AI-Powered Software System for Forecasting the Full Sequence of Day-ahead Wind Power

Dr. Zijun ZHANG, Associate Dean and Associate Professor of SDSC, has successfully secured a funding from the Midstream Research Programme for Universities (MRP) under the Innovation and Technology Fund (ITF) in February 2023.

The primary objective of this project is to develop an AI-powered day-ahead wind power full sequence forecasting software system with the following unique features:

1) A high-dimensional tensorlike input for integrating data from multiple sources;
2) A deep feature engineering mechanism for extracting latent data features;
3) A deep learning based method for effectively mapping latent features to future wind power;
4) A transfer learning based process for rapidly deploying complicated deep models; and
5) A privacy-preserving computing framework for addressing data access regulations.

To successfully develop the proposed software, four interrelated R&D tasks are planned. The first task will develop a program for preparing high-dimensional tensors input and engineering latent data features. The second task will develop a program for building deep models of forecasting day-ahead wind power sequences. The third task will develop a program for implementing the transfer and privacy-preserving based computing process to facilitate the forecasting model deployment. The last task will integrate all program modules and design visualisation interfaces to produce a software package. Such software will serve as a new generation of wind power forecasting tool, facilitate a larger scale wind power integration, and better shape Hong Kong's statue on leading the R&D in AI-powered green engineering technologies.

Historically, CityU has secured fewer than five projects annually from the ITF scheme, making Professor QIN and Dr. ZHANG's achievements significant accomplishments for the Institution.

HKIDS FUNDED PROJECTS

HKIDS Early Career Research Grants (ECRG)

The HKIDS ECRG aims to encourage young faculty members to conduct project-based collaborative research to solve data-science challenges that will be highly likely to lead to extramural grants.

Five impactful research projects were funded under the scheme in November 2022, they were:

Project	Principal Investigator (PI)	Co-Principal Investigator (Co-PI)
1. Nonparametric Option Pricing: Theory and Empirics	Dr. Xiao QIAO	Dr. Qi WU (School of Data Science)
2. Practical Dynamic Assortment Optimisation	Dr. Yu YANG	Professor Yanzhi LI (Department of Management Science)
3. Fault Diagnosis of Rolling Bearings under Small Sample	Dr. Yining DONG	Dr. Lishuai LI (School of Data Science)
4. Unraveling the Innovation Ecosystem of Artificial Intelligence	Dr. Qing KE	Dr. Qingpeng ZHANG (School of Data Science)
5. Unified Multi-modal Multi-task Learning Paradigm for Smart Cities	Dr. Xiangyu ZHAO	Dr. Zijun ZHANG (School of Data Science)

CONSULTANCY PROJECT

Silver Award of 2022 Special Edition of the Geneva International Exhibition of Inventions

A consultancy project coordinated by HKIDS for Electrical and Mechanical Services Department on the topic "Semantic AI for Predictive Maintenance in Permanent Way of Railway System" won a silver award at the 2022 International Exhibition of Inventions of Geneva.

Consultant team members included Professor S. Joe QIN, Dean and Chair Professor of SDSC and Director of HKIDS; Dr. Paul LAM, Associate Professor of Department of Architecture and Civil Engineering; Dr. Lishuai LI, Associate Professor; Dr. Qingpeng ZHANG, Associate Professor; and Dr. Yu YANG, Assistant Professor of SDSC.

ACADEMIC SEMINARS AND FORUM

Centre for Systems Informatics Engineering Postdoc Associates and Students Seminar (CSIE PASS)

The CSIE Postdoc Associates and Students Seminar series (CSIE PASS) aims to showcase and encourage young researchers in system theory, data science and other related fields to deliver seminars on their research. It provides a good platform for postdoc and PhD students to share their recent work, enhancing their presentations skills and facilitate cross-learning and cooperation.

The CSIE PASS is organized online on a weekly pattern. In the 2022-23 academic year, more than 20 PhD students and young researchers presented their recent works in the seminar series.

Other Thematic Seminars (November 2022 – April 2023)

Distinguished seminar series were organized on the following topics:

- A Multi-Scale Energy Systems Engineering Approach Towards Optimal Energy, Mobility, Process & Materials Transition Strategies (Speaker: Professor Stratos PISTIKOPOULOS, Fellow of Royal Academy of Engineering, Texas A&M University) – 23 Nov, 2022
- No Equations, No Variables, No Space, No Time: Data and the Modeling of Complex Systems (Speaker: Professor Yannis G. KEVREKIDIS, member of the US National Academy of Engineering, Johns Hopkins University) – 14 Dec, 2022
- Wide Area Grid Edge Monitoring and Applications (Speaker: Professor Yilu LIU) – 11 Jan, 2023
- Traffic Flow Modeling, Control and Optimisation in a Connected Environment (Speaker: Professor Petros IOANNOU, member of the US National Academy of Engineering, University of Southern California) – 8 Feb, 2023
- Machine Learning-based Lifetime Prediction and Charging Optimisation of Lithium-ion Batteries (Speaker: Professor Richard D. BRAATZ, member of the US National Academy of Engineering, Massachusetts Institute of Technology) – 4 Apr, 2023

Professor Stratos PISTIKOPOULOS


Professor Yannis G. KEVREKIDIS


Professor Yilu LIU


Professor Petros IOANNOU


Professor Richard D. BRAATZ

HK TECH FORUM ON DATA SCIENCE AND AI

HKIDS, SDSC and Hong Kong Institute for Advanced Studies co-organised the HK Tech Forum on Data Science and AI (DSAI) on 26-27 July 2022.

The DSAI Forum was the first in CityU's HK Tech Forum series, in which a host of world-leading scholars were invited to promote collaboration in tackling long-standing scientific puzzles and challenging technology issues.

The two-day forum commenced with the opening address by Professor Way KUO, President and University Distinguished Professor. This was followed by an overview on the SDSC and HKIDS' development progress by Professor S. Joe QIN, Dean and Chair Professor of SDSC, and Director of HKIDS.

The first day of the forum featured a plenary talk by Turing Award winner, Professor John HOPCROFT, IBM Professor of Engineering and Applied Mathematics in Computer Science at Cornell University, US, on the topic "Math for the Big Data Revolution". The second day of the forum featured another plenary speech by famed AI entrepreneur, Dr. Kai-Fu LEE, Chairman and CEO of Sinovation Ventures, on the topic "How AI will Transform Our World". World-renowned academic and industry leaders were invited to deliver keynote speeches at the Forum to address pressing issues and challenges, including Professor Yi MA, University of California, Berkeley, US; Professor Dacheng TAO, JD Explore Academy; Professor Nick SAHINIDIS, Georgia Institute of Technology, US; and Professor Qiang YANG, Hong Kong University of Science and Technology.

Professor Way Kuo


Dr. Kai-Fu LEE


Professor John HOPCROFT


Professor John HOPCROFT delivered a keynote speech virtually.

The HK Tech Forum opened at 26 July 2022 gathered world-renowned scholars in data science and AI to exchange new ideas and spark technological development.

RESEARCH

Lightning Talks by SDSC young faculties and panel discussion

Six SDSC young faculties presented their recent research work at the conclusion of the forum's first day. The topics were:

- "Robust Dynamic Decision-Making under Uncertainty" by Dr. Clint HO, Assistant Professor
- "Sensor Device and its Novel Application in Digital Health" by Dr. Xinyue LI, Assistant Professor
- "Urbanisation and Health – Using Deep Learning to Study the Built Environment and its Health Ompacts" by Dr. Linyan LI, Assistant Professor
- "Generative Choice Models for Subset Selection" by Dr. Yu YANG, Assistant Professor
- "Portfolio Choice for Online Loans" by Dr. Xiao QIAO, Assistant Professor
- "Adaptive and Automated Recommender Systems" by Dr. Xiangyu ZHAO, Assistant Professor

The second day of the forum climaxed with an exciting panel discussion session featuring five renowned data science scholars: Professor S. Joe QIN; Professor Qiang YANG; Professor Xiaohua JIA, Professor Hong YAN, and Professor Houmin YAN.

Technical presentations showcase HKIDS' cutting-edge research progress.

INSIGHTS AND IMPACT: RECOGNISING OUR ACHIEVEMENTS

As data science becomes one of the most important fields in the 21st century, our legacies are becoming increasingly critical for academics and society as a whole. The following achievements are not only the product of the talents of individual faculty and students — the experienced and young — but also of the nurturing and supportive environment of the School. We present here our awards, achievements, and grants — these accolades will continue to serve as a driving force for future achievements and breakthroughs.

PROFESSOR S. JOE QIN AS THE FIRST SCHOLAR IN GREATER CHINA TO RECEIVE THE 2022 IEEE CSS TRANSITION TO PRACTICE AWARD

Announced in November 2022, Professor S. Joe QIN, Dean and Chair Professor of the School of Data Science and Director of the Hong Kong Institute for Data Science, has become the first scholar in Greater China to receive the 2022 IEEE CSS Transition to Practice Award for his distinguished contributions to the field of data-driven control engineering.

The IEEE CSS Transition to Practice Award, which is presented by the IEEE Control Systems Society, recognises outstanding collaborative scientific interactions between industry and/or research laboratories and the academic community that convert basic controls and system theory to practical systems for the benefit of society.

Professor QIN was awarded for his distinguished contributions to the field of data-driven control engineering, particularly for methodological advances and knowledge transfer in model predictive control, systems safety and health monitoring, and diagnosis, which is applicable to a number of industries. He has rich experience in working with industry and a good understanding of industry needs. After receiving a PhD from the University of Maryland in 1992, he spent three years working in industry before starting his academic career.

"Some of my research breakthroughs are related to industrial needs," Professor QIN said. One of his achievements is related to industrial model predictive control (MPC). When industrial MPC technologies were implemented in various industries 30 years ago, academics knew very little about them. Professor QIN, along with his co-author Dr. Thomas BADGWELL, published a conference paper in 1996 and later a journal paper in 2003 that unified the theories and implementations among them. The paper was highly influential with both academics and industry.

Professor QIN is also a world leader on data-driven fault diagnosis. He has developed a patent and applied the method to improve production in the semiconductor industry. During the 1990s, there was a need for semiconductor companies to detect defects at the early stage of production, but they did not have sufficient data to do so. Professor QIN invented several process monitoring systems to help identify potential defects, thus saving a tremendous amount of time and cost in dealing with problems after they were detected. Companies that have benefited from his work include AMD, Intel and Texas Instruments.

DR. QING KE AWARDED NSFC YOUNG SCIENTISTS FUND 2022

Dr. Qing KE, Assistant Professor of SDSC, has been awarded the National Natural Science Foundation of China (NSFC) – Young Scientists Fund 2022. He has received HK$339,000 to conduct his research on "Quantifying Evolution of Science based on Representation Learning and Dynamic Clustering" over a period of three years commencing January 2023. Dr. KE is among the four awardees at CityU in 2022 to have received the NSFC Young Scientists Fund.

In 2022, the NSFC Young Scientists Fund started accepting applications from Hong Kong researchers. Its goal was to support young researchers to freely choose their research topics within the funding scope of the NSFC. The fund aims to foster the ability of young scientists to independently undertake research projects and do creative research and train upcoming talent in basic research.

SDSC'S FACULTIES AWARDED A RESEARCH GRANT FROM MOST

Professor S. Joe QIN, Dean and Chair Professor of the School of Data Science (SDSC), also Director of Hong Kong Institute for Data Science of City University (CityU), and Dr. Yining DONG of SDSC received a research grant amounting to HK$2.16 million from the Natural Science Foundation of China (NSFC) under the National Key R&D Programme of the Ministry of Science and Technology of the People's Republic of China (MOST) in August 2022.

CityU has achieved outstanding results in the NSFC research grants applications during the academic year 2021-22, being awarded with 97 mainland China project grants with total approved funding of RMB119 million. Among the universities from Hong Kong, CityU is ranked No.1 in terms of the total funding amount for NSFC grants, and No.1 in terms of the number and total funding amount for Shenzhen-Hong Kong-Macau Science & Technology Project (Category C).

Our faculties have demonstrated high-quality research and has been awarded quite a few research grants in 2022, including HK$4.26 million for six research projects under the 2022/23 General Research Fund (GRF) and Early Career Scheme (ECS), and HK$2.2 million from the Innovation and Technology Fund (ITF) 2021/22.

DR. XIAO QIAO RECEIVED THE 2022 AMAZON RESEARCH AWARD

Dr. Xiao QIAO, Assistant Professor in SDSC, received the 2022 Amazon Research Award in the research area of Applied Machine Learning with his research proposal titled "Predicting Successful Scientific Collaborations".

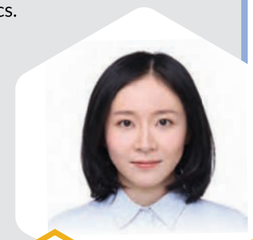
Founded in 2015, the Amazon Research Awards offer unrestricted funds to support academic researchers around the world in various disciplines. Dr. QIAO was the only recipient from an Asian university among the 26 awardees from 24 universities in seven countries or regions in the 2022 spring cycle, which in turn got the award in February 2023.

"I am grateful for and encouraged by recognition from one of the largest and most productive enterprises in the world, Amazon," Dr. QIAO said. "I am excited about the opportunity to work more closely with experts at Amazon, and I look forward to discussing our findings with colleagues." The award-winning research proposal seeks to identify and quantify factors that impact scientific success, aiming to build a machine learning network-based prediction model that helps to predict a team's future success based on the history of the individual and collaborative success of team members involved.

DR. XINYUE LI SNATCHED THE GOLD MEDAL WITH CONGRATULATIONS OF THE JURY AT GENEVA INVENTIONS 2023

A consultant team consisting of three CityU scholars, including Dr. Xinyue LI, Assistant Professor of the School of Data Science; Dr. Condon LAU, Associate Professor of Department of Physics; and Dr. Fraser HILL, Director of CityU Veterinary Diagnostic Laboratory, received the Gold Medal with Congratulations of the Jury at the 48th International Exhibition of Inventions Geneva 2023 – a leading annual event devoted exclusively to inventions globally.

The winning project – "AIstain: Virtual Immunostaining for Veterinary Pathology" presented by ITsci Company Limited, is a start-up under HK Tech 300, a CityU's large-scale flagship innovation and entrepreneurship programme. AIstain is a generative AI tool for virtual tissue staining that is much faster, cheaper and easier to use than conventional veterinary pathology tools advancing cancer diagnostics.



In its 48th session held from 26 to 30 April 2023, the International Exhibition of Inventions Geneva featured 1,000 inventions and new products, 725 exhibitors from 45 countries, and more than 30,000 visitors from all five continents. All exhibited inventions were evaluated by an international jury of specialists.

DR. LISHUAI LI SERVES AS A COMMITTEE MEMBER OF THE WORLD ECONOMIC FORUM'S GLOBAL FUTURE COUNCILS 2023-2024

Dr. Lishu i LI, Associate Professor of SDSC, has been invited to serve as a Committee Member of the World Economic Forum's Global Future Councils on the Future of Autonomous Mobility for the 2023-2024 term. The World Economic Forum's Network of Global Future Councils is the world's premier multi-stakeholder insight network, designed to generate deep understanding of frontier topics as well as established systems and how these issues affect other global, regional or industry-specific challenges. The network gathers around 600 top experts and leaders from business, academia, civil society, and government grouped in 29 expertise-based thematic councils.

"Dr. LI's contribution and engagement are crucial to the mission of the Global Future Councils", remarked Børge BRENDE, President of the World Economic Forum.

The 2023 annual meeting will be convened in Dubai, United Arab Emirates in October 2023. The Council is by invitation-only and members are nominated for a two-year term from March 2023 to December 2024. The council has a total of 20 seats, which are filled by renowned worldwide experts from business, academia and the government sectors in a diversity of gender and nationality.

SDSC STUDENTS WON TWO TOP AWARDS AT AI X HK OPEN CUP 2022

Our future data scientists use their skills learned from classrooms to promote social good. A team of Year 4 undergraduates from SDSC, with a vision to serve the minority, developed a project which won the AI x HK OpenCup 2022 championship! Alex CHAN, Edward LIN, Jason TSOI and Ellen WONG won the "Champion Award" and "Best Innovation Award" in this territory-wide student competition at the finals that took place on 25 November 2022.

Their project "MediMind" is an artificial intelligence tool for distinguishing neurodevelopmental disorders and facilitating follow-up rehabilitation training. Their inspiration came from the lack of social awareness about special educational needs ("SEN") students in Hong Kong and their delayed treatment. Specifically, the project focuses on SEN diagnosis (using video, voice processing and neuroimaging), as well as personalised training.

The fierce competition resulted in nine teams contesting the final round. By dint of their innovative idea and creative solution, the SDSC team beat the other 152 groups, winning two trophies and a cheque for HK$30,000. The OpenCup focused on four United Nations Sustainable Development Goals, namely Good Health and Well-being, Quality Education, Sustainable Cities and Communities, and Climate Action. The judging criteria included relevancy to Hong Kong, solution and technology, potential impact to society and feasibility. By addressing the goals in a creative and practical manner, MediMind stood out in the tertiary category entries.

Our School will continue to provide a supporting and encouraging environment for students to flourish. In addition to nurturing professional talent, it is also our top priority to foster young people with a commitment to contributing to society.

SDSC UNDERGRADUATE-LED RESEARCH TO ADDRESS PUBLIC HEALTH CHALLENGES

SDSC is dedicated to nurturing a research culture, not only for graduate students but also our undergraduate students. Miss Keyang NI, a Year 4 BSDS student, is one of the leading authors of a paper entitled "Model-informed targeted network interventions among MSM social networks in Zhuhai, China", which was published in IEEE Transactions on Computational Social Systems in December 2022.

Led by Dr. Qingpeng ZHANG of SDSC, this study is a collective effort with the University of North Carolina at Chapel Hill, USA and Zhuhai Center for Diseases Control and Prevention, Zhuhai, China. The team saw the urgent need for effective HIV prevention interventions among men who have sex with men (MSM), thus devising such research projects. They proposed a new method, RiskRank, to prioritise individuals in MSM social networks for interventions. Results show that the targeted interventions are effective in large-scale HIV epidemic control.

An increasing number of our undergraduate students are participating in research projects resulting in journal articles or having their work published, displaying their aptitude for research at the apprentice level, common level in top-notch research universities.

COLLEGE / SCHOOL
COMMENCEMENT
CityU

COMMENCEMENT: ADVANCING TO A NEW PAGE

Dean Professor S. Joe QIN presided at the 2023 Commencement.

The School of Data Science (SDSC) held its fourth annual Commencement on 10 May. Undergraduates and postgraduates alike gathered to celebrate their graduation and look towards their future.

With close to 200 graduates of Class 2023, the ceremony marked a significant milestone for the School. This was the very first batch of undergraduate students to graduate from the Data Science programme as well as the first-ever class of data science Bachelor's degree students in Hong Kong.

It was a joyous and momentous occasion for all. "This year is special as we have our first batch of Bachelor's graduates," said Dean Professor S. Joe QIN, during his address speech.

"We are especially proud of you, the pioneers of our data science programs, and we are confident that you will continue to make us proud in your future endeavours." As the graduates move forward and look to their futures, they were reminded of what they have learned and how they are poised to make significant contributions to the world through the new and booming field of data science.

"You now have the skills, knowledge and passion to make positive impact in this rapidly changing world," Professor QIN added. Students were reminded that they are graduating at a time when data science is more important than ever, and the world will continue to face complex and urgent problems that will require data-driven solutions. With the skills gained at SDSC, graduates must take responsibility to keep learning, innovating and creating new value from data.

Speech by Guest of Honour Mr. Jerry LI, CEO of Lenovo PCCW Solutions.

Mr. Alisher BAZARBAY, a graduate representative from BSc in Data Science, said he is excited to face the challenges ahead. Speaking to and on behalf of the graduates, Alisher said that they are thankful for the support and opportunities that CityU and SDSC has provided them. "Graduation is not an end goal in itself; rather, it is a stepping stone towards further achievements and making the world a better place." he said. "We have developed a passion for learning that will stay with us for a lifetime, and I am immensely proud of what we have achieved." In closing, Alisher also reminded his fellow graduates that graduation is not the end, but merely the beginning. "So, we must keep pushing ourselves to learn more, keep up with the latest trends and technologies and stay curious and hungry for knowledge."

Next to address the graduates was Guest of Honour Mr. Jerry LI, CEO of Lenovo PCCW Solutions. Mr. LI encouraged the graduates: "Expectations on you will change from this moment on. You are no longer expected to just learn, but now expected to contribute and earn,". Mr. LI concluded his speech by assuring one more thing to the graduates, that the world has no idea what an exciting future you will create. "In AI and data analytics, ethics will become ever more important. How you behave will shape a generation of accepted level of conduct. The world is counting on you to shape these answers."

Mr. Alisher BAZARBAY delivered a graduate speech during the Commencement.

"The curriculum provided by MSDS brings a comprehensive experience of polishing my workflow of artificial intelligence, from theory to practice as well as from algorithms to engineering, creating a milestone for my future research."

- Mr. Zining QIN, Master

"My data science master's degree was a wild ride of exciting projects and fruitful lessons – a journey that left me with a treasure trove of valuable insights and skills."

- Mr. Jasper LEE, Master

"I am grateful to the faculty and the administration of SDSC for their support. It have built a solid mathematical and computing foundation in the last four years. I plan to build on that foundation to learn more and solve exciting statistical and data science problems."

- Mr. Muhammad DANISH, Bachelor

"As a data science graduate, I have acquired an extensive understanding of machine learning, bridging the gap between theory and practice, and empowering me to embark on future career in data-driven modeling."

- Mr. Simon FUNG, Bachelor

"I have gained valuable knowledge and techniques on data science that enables me to get a foot in the door and initiate future research in the data science field. Also, I am grateful to the School's faculty and staff for their dedication to providing a supportive and challenging environment that has helped me reach my full potential."

- Miss Ellen WONG, Bachelor

"SDSC offers me with a strong foundation in data science techniques, as well as valuable skills in problem-solving, critical thinking, and collaboration. With these knowledge, I am excited to start my journey to solve the real-world data puzzle in the industry and contribute to the data-driven world."

- Miss Cecilia TANG, Bachelor

"Learning Data Science is so much fun and excitement when your AI model is working well. Even it is not going well, collecting more data and fine-tuning model parameters can help. Enjoy the Journey!"

- Mr. Angus AU-YEUNG, Master

"SDSC provides a solid foundation and diverse skills for me to tackle data problems. SDSC offers invaluable internship opportunity, providing practical experience and exposure to industry practices. I am grateful for the opportunities and confident in the skills that I have gained that enables me to make meaningful contributions in Data Science field."

- Mr. Febrian MANUEL, Bachelor

DREAMING OF BEING AN ENTREPRENEUR: FROM IDEA TO STARTUP

In business, being struck by the lightning bolt of inspiration is merely the beginning. Turning an idea into a successful business requires an incredible amount of support. This was one of the key learnings for Andy TONG, a Year 4 undergraduate from the School of Data Science (SDSC) who received a one hundred thousand investment fund from the HK Tech 300 Seed Fund offered by City University of Hong Kong (CityU).

According to Andy, he and his teammates, Paul KAM, a Year 3 student and Ryan KWOK, a Year 4 student from the Department of Computer Science, CityU, stumbled on a business idea when they were working on a group project that required them to build an app for CityU.

"The project was about tackling a market pain point in positioning services, something which is very expensive," explains Andy.

By solving a gap in the market for affordable indoor positioning systems, an idea presented itself and grew into a business opportunity which led to Andy and his teammates building an indoor positioning system under the name Checkpoint. As their desire to expand the idea into a local start-up grew, Andy and his teammates decided to seek funding support, which led them to apply for the HK Tech 300 Seed Fund.

With more than HK$46 million available to distribute to start-ups, the fund aims to enhance the business development of start-ups to boost innovation technology in Hong Kong as well as encourage the practical application of the university's research and technology output.

Thanks to their hard work, strong bond and ingenuity, Andy's team first won a preliminary award from the HK Tech 300 Seed Fund, as well as from the HKSTP (Hong Kong Science & Technology Parks Corporation) Ideation Fund. Beyond that, the team believes that thanks to additional support from the School and CityU, they were able to access the best possible mentorship to help get their business off the ground.

"The Facilities Management Office (FMO) supported us with the trial in CityU, which gave us a chance to do tests on our service," says Andy. "During the proposal with FMO, professionals in the Office gave us insight into our project market value."

Added to that, there was also legal support, assistance, and mentorship amongst a myriad of other support, and Andy says that this was quite unusual which translated to be a great opportunity.

However, as with any startup, Andy and his teammates encountered a number of obstacles during the system's development. From managing time and expectations, to practical and technical development issues, and how to market their product, there were challenges at each turn. But thanks to the support of the School and its professors, the team was able to overcome many of these, and are excited to announce that they have plans to launch their new product in June 2023.

"I'm a university student and I also have part time jobs," says Andy. "When we made our first announcements and started on the project, we didn't expect to encounter so many technical difficulties, and we learned that it takes time to overcome these."

But thanks to the support of their peers, Andy said that they were able to stay motivated.

"We understand that this is a step-by-step process, so our professors inspired us and motivated us to keep going, that was the most important thing," Andy recalls. "Secondly, they pushed us to achieve milestones - because of these smaller milestones we were able to achieve the bigger ones and that led us to be really productive."

On top of this, Andy said that the School and University also provided plenty of support in the form of seminars, networking opportunities and forums. And soon they understood the School's belief that supporting entrepreneurs is about so much more than just handing over a cheque.

"Entrepreneurship is not just about starting a business, it's also about creating something to make the world a better place tomorrow," says Professor Joe QIN, Dean of SDSC.

"The team made use of data analytics, recognising its importance and implemented it in their nearest community. Congratulations to Andy for leading his team to such a meaningful contribution."

So far as Andy is concerned, the app still has a way to go before it will be ready for launch, but in the meantime, he's already learned so much about what it means to be an entrepreneur.

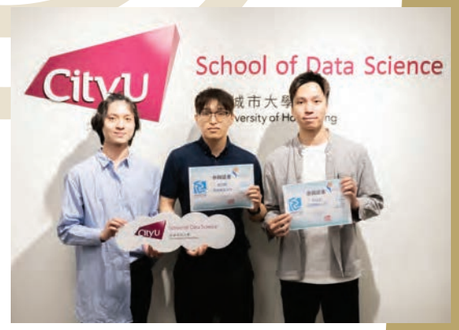
"Execution is so much more important than the idea. At first, we thought that the idea was more important, but when you actually put your hand on it, execution is more important," he said.

Andy and his team believe that it was their presentation, the amount of preparation that they put in and their outright passion that helped them beat the other 200 applicants.

Andy is proud of what his team has achieved so far applauding his teammates for their brilliance in building the design and technique development. And he encourages his fellow student entrepreneurs to consider applying for the same funding.

"This is a great chance given to us through CityU, to get the support from the School," he enthuses. Furthermore, he says the process for applying for the Seed Fund is an incredible learning experience in itself.

"It helps you to really think deeper about your business idea, prepare your business proposal and consider how it will all work," Andy says. "It gets you involved and passionate about what you want to do."



Nurturing Future Data Scientists for a Better World

Internships are one of the many resources the School of Data Science (SDSC) provides to assist students in gaining practical experience in the field. Through hands-on training in real-world settings, the School offers students the opportunity to develop the skills and knowledge necessary to succeed in the workplace. Each year, we pair students with corporations and organisations from a variety of industries. The internship experience is unique to every student, which is also its essence. By the second quarter of 2023, we have offered up to 400 industry placement opportunities to our undergraduates.

We continue to refresh our list of corporate partners, ranging from major players in Hong Kong's finance, technology, healthcare, and entertainment sectors, to big regional corporations. To name a few, they include Active Care Group, Adidas, APSTAR, ASTRI, Bank of Thailand (Thailand), Cathay Pacific, China Telecom, Coca-Cola, DFS, Fleet Management Limited, Hang Seng Bank, the HKSAR Government (Census and Statistics Department, Electrical and Mechanical Services Department, Hospital Authority, Logistics Department), Hong Kong Express Limited, Huawei, InnoHK, Innovation and Technology Commission of the HKSAR Government (STEM Internship Scheme), KG Data, NetEase Games, Nova Credit, Ocean Park, Lenovo PCCW Solutions, PricewaterhouseCoopers, Reinsurance Group of America, Ricoh Hong Kong Limited, SF Express, Skieer, Shangri-La International Hotel Management Limited, Swire Coca-Cola HK, TianYanCha (Beijing), Vandalsoft (South Korea) and Wengegroup, among others.

These industry leaders, supplementing our classroom teachings, let students experience real-world challenges in fast-paced, competitive business environments. The placements do more than merely develop students' technical expertise, they also equip them with communication and teamwork skills that are difficult to acquire on campus.

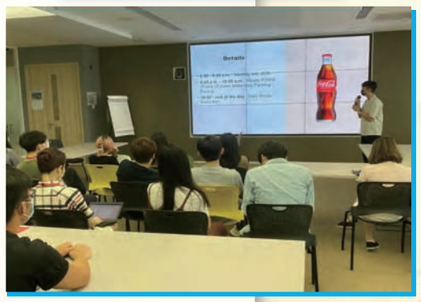
Let's read their reflective internship stories!

Mr. Dingze LI (Year 2)
Swire Coca-Cola HK
Summer Intern - Data Analyst

As a summer data analyst intern at Swire Coca-Cola, I was responsible for developing, analysing and interpreting statistical data. I also supported our sales team in completing market execution by deploying innovative merchandising items.

The biggest challenge I faced was monitoring and evaluating the effectiveness of the promotion offer through data analysis and regular market visits. Although I applied many data analysis skills learnt from school in real life, practical work and theory are two completely different things. For data performance, there are lots of ways to present the data: the focus was on how I could convince others that the data can lead to improvements or can be turned into a business action. Therefore, I needed to improve my skill set, for example, with video editing, filming and animation skills.

In addition, I followed my colleagues on the front line to carry out market execution and understand both the online and offline business operations of Swire Coca-Cola, from receiving orders, promotion, delivery, finance etc. And I also conducted data collection on user pain points and promotion effectiveness in order to improve market execution. It really gave me very intuitive experience in how data analysis is not just back-end.



Training on a marketing execution event

Mr. Akul MALHOTRA (Year 1)
FWD Group Management Holdings Limited (FWD Insurance)
Summer Intern (Group Technology Services)

In the long run, studying only from textbooks without understanding how to use what we learned in the real world is ineffective. I made the decision to participate in an internship in the summer of Year 1 in order to better understand how what I study in university is used in the real world.

I chose to pursue an internship in the field of cloud computing because of its rapid growth in recent years. I was recruited to work as an intern in the Technology Services division of the Cloud Team at FWD Insurance. Before my internship, I was really anxious about what work I would be assigned as an intern and if I would be able to adapt with my skills. However, once my internship got underway, I began to fully understand the work. My managers were really supportive and helpful. I quickly learned to adapt and meet the responsibilities given to me. My tasks included both cloud computing-related and Power BI-based data visualisation. I found some things easier to do thanks to university courses like Data Visualisation.

Along with technical capabilities, my internship taught me a lot of soft skills, such as teamwork. To conclude, the internship was a fantastic learning opportunity that improved both my technical and soft abilities.

Miss Xueyao WANG (Year 4)
Hospital Authority – HK AI Lab
Research Assistant (AI Systems)

As a Research Assistant intern, I work on various AI techniques in the health field, the most prominent of which is deep learning. The work routine is that the manager proposes project topics, and then I spend a few weeks developing them to meet the expectations. A weekly meeting is scheduled to review the previous week's progress on all projects in the team.

Prior to the internship, I hadn't done much knowledge on deep learning, either through course work or through research. While the job requires extensive study and practice in cutting-edge models like computer vision, NLP, and others, I found it difficult to expand on my work because I needed time to clarify fundamentals before actual implementation. But so far, I have improved on the aspect and become more acquainted with the use of GitHub.

Four students, including myself, joined the team at the same time. We are all senior computer science and data science students at local universities. The workplace is not frightening, and co-workers are generally pleasant.

I once decided not to pursue a career in research. But as I become more involved, I think that conducting research in industry is not such a bad idea. Besides, I have noticed that the technology used in industry these days tends to advanced deep learning rather than traditional machine learning.

Mr. Jeffrey NG (Year 3)
Swire Coca-Cola HK
Summer Intern - Data Analyst in Sales and Marketing

It was my honour to become part of Swire Coca-Cola (SCCHK) this summer, which gave me an opportunity to widen my horizons in a big company. I have spent precious time with my colleagues and received useful first-hand experiences during this period.

As a data science student, SCCHK provides me with a chance to get involved in data-related projects, such as doing data preparation and cleansing. One of my leading projects was about address hierarchy and error mix. In this large-scale company, each frontline team has its own district cluster and missing a building block. Therefore, I am responsible for creating a new address filling system and doing validation on the current address master line.

The biggest challenge was that the number of addresses was so large, with nearly 2.5 million to handle. Luckily, my team discovered a website called ArcGIS which handles geographic data, which made it a helpful tool for land planning and region clustering. This task was very challenging, but I had to try my best to complete it, which brought me a sense of satisfaction.

Mr. Calvin PUN (Year 2)
Fleet Management Limited
Data Analyst

I worked as a full-time intern under the data science team of Fleet Management Limited for 12 weeks. Fleet Management is a third-party ship management company with more than 20,000 qualified seafarers and 650 vessels.

During these three months, I worked on a machine learning project about vessel carbon emissions to improve vessel performance. To deal with the challenges I faced in this project, I applied the knowledge learned from my school, including SQL, Python machine learning, and dashboard design.

Apart from using technical skills, I learned how to communicate with colleagues. We usually had team-building lunches and meetings to build up our relationships and improve our morale and confidence. In addition, we were encouraged to join different workshops to learn more about Data Science, which gave me the opportunity to understand the industry.

It was a great experience to work there. Working in Fleet Management provided a valuable opportunity to enhance my knowledge and practice skills. It made me look forward to being a data scientist in the future.

Miss Keyang NI (Year 4)
Compass Health Technology (HK Tech 300)
Research Assistant

I worked as a research assistant on medical knowledge graphs, which involve medical data collection, knowledge graph construction, network simulation and the studying of research paper. Not only did I learn techniques to code and to build the model, I also acquired a clear and profound understanding on how to conduct a research project. What's more, through communication with seniors from medical background, I learned quite a few medical facts that I would never otherwise know.

As this internship requires skills in network science which was beyond the scope of the courses I had taken before, I encouraged myself to learn it fast through work. Fortunately, I found myself getting more and more interested, because it is more challenging and reveals more insights of the world than the simple tabular data.

INTERNSHIP

Miss Patricia VIANNEY (Year 3)
Adidas Sourcing Limited
Sourcing Intern – Supply Base Management

In Semester B of 2022, I had the opportunity to join Adidas as a Sourcing Intern. My role involved a lot of data analysis and most importantly cross-divisional communication. During this internship, I was mainly responsible for checking data discrepancies, data cleaning, creating visualisation dashboards, and helping the team generate evaluation reports on our suppliers' performance. When feasible, I used Python to analyse and clean the data, which helped a lot in terms of efficiency because we dealt with tens of thousands of data rows daily.

Furthermore, I also picked up various soft skills that will undoubtedly help me in my future career. Other than learning how to communicate in a professional field, I also acquired knowledge about business etiquette and influential decision-making. As an intern, I was given the same amount of trust and responsibilities as a full-time employee, and that was what I loved about working here. Of course, I faced a number of challenges during my journey; but thanks to my great team, I was able to handle all of them. I am once again reminded of how important it is to be proactive and supportive as a team player.

Another aspect of my internship that I enjoyed the most was the people. There are plural cultures here in Adidas, but that does not serve as a challenge at all. Everyone is very welcoming, and I gained numerous fruitful insights from experts in the field through networking. I am grateful to be a part of the Adidas family, and I strongly believe this internship experience will be beneficial for my future. Furthermore, I am also thankful for the knowledge I gained from the School of Data Science prior to my internship, as they taught me the skills and knowledge I needed. This was surely a memorable experience for me.

Miss Julia CHUNG (Year 2)
Census and Statistics Department, HKSAR
Summer Internship

This group photo was taken on August 31, the last day of my internship. We are team 3 and 4. These are my lovely colleagues and supervisor. They come from different universities and only I am studying at CityU. We worked together over these three months and solved a lot of difficulties and challenges together. I was so grateful and elated to meet them this summer. Also, we had lunch, played badminton after work and had gatherings many times this summer - I have many great and unforgettable memories of them. Hope all of us will have a good fresh start to studying. All the best!!

Here are the memos and letters I received during work hours. We played a game called Secret Angel. My angel was so sweet - as he knew I am a healthy girl, he bought some fruits and jujube for me instead of snacks. This moved me and give me much more energy to work.

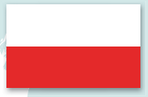
Lastly is my partner from HKUST. With her I did many face-to-face interviews in many different types of companies. We felt amazed and surprised as many companies' environments were so fantastic.

STUDENT EXCHANGE: A WORLD OF EDUCATION

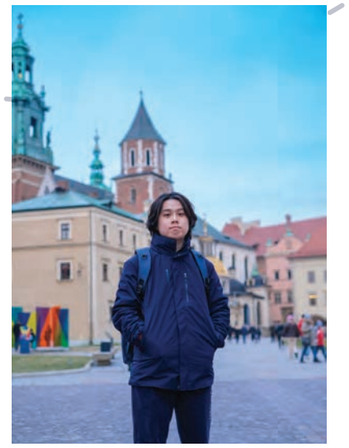
An essential aspect of a universal discipline like data science is global exposure. The School of Data Science (SDSC) believes that each institution around the world has a different perspective to bring to our students. Research into data science is an essential global trend where exchanging information plays a huge role in enriching students' knowledge. In this section, four students are excited to share their study-exchange stories from Semester B, 2022/23 spent at world renowned universities in Poland, Switzerland, the US and Canada. Let's hear at their discoveries and realisations!

Vincent CHAN

SGH Warsaw School of Economics, Poland



It was an honour to take part in the student exchange programme at the SGH Warsaw School of Economics, Poland. To be honest, I did not know a thing about Poland until I set off. Compared to France, Germany and other European countries, Poland is more low-key. At first, when I arrived in Poland, taking the first breath of European air, I did not feel at all excited but nervous about getting lost in a strange city with cold, socialist buildings.



In fact, Poland does not only have a long history and culture, but its economy has also been catching up rapidly in recent years. Its technological development has even reached the point where mobile payments can be made across the country as the principal form of transaction. There are relatively few Chinese speakers. My goal for my exchange program was to get in touch with a new culture, to experience a new way of life and to learn a new language. Poland dismantled the communist system at the end of the 20th century. All in all, I think life is relatively simple here, and luckily there is not too much racial discrimination.

SGH is Poland's highest ranked and oldest economics university and the school is quite international. The semester started off with an orientation week and a cross-culture workshop, helping students prepare for living in a different culture and meeting new friends. SGH not only has a large number of exchange students but also offers many courses taught in English.

I took four courses during my exchange there: decision analytics and risk management, quality technologies, statistical methods and data analysis, and project management and analysis. These four courses follow the major requirements and their credits can be transferred to CityU. The courses are well structured and allow me to communicate with students in different countries, which was an entirely new experience for me. I learnt about a new technology called statistical process control (SPC) and data quality tools which can be used to monitor the performance of a process over time and identify quality issues. By applying SPC to data analysis, analysts can identify trends, patterns and anomalies in data, which can identify opportunities for improvement to help us gain more insights from the data and make better-informed decisions.

In Poland, an increasing number of people have a university degree, so the competition among college students has become keener than ever. It is not a rare sight for students to go directly to work after class, and there are often career recruitment activities in school. Moreover, you can see many people wearing suits around the campus, which is different from the more relaxed attitude of European students I had imagined.

Besides gaining cultural understanding, improving language skills, and developing my sense of independence and confidence, this exchange was also a rewarding opportunity for me to step out of my comfort zone.

Zhengdao DONG

École Polytechnique Fédérale de Lausanne, Switzerland

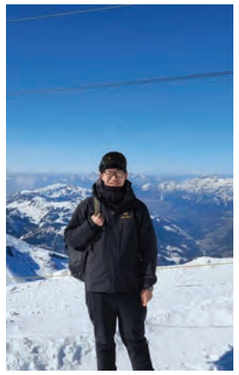
My exchange to École Polytechnique Fédérale de Lausanne has undoubtedly been a life-changing and unforgettable experience for me. When I first came to Lausanne and walked into EPFL for the first time, I was so attracted by beautiful Lake Geneva and the rolling Alps viewed from the campus.

I took many maths courses during my exchange programme, and the workload was really heavy. But it was such a pleasant surprise that one of my teachers in maths was a Fields Medal winner -- Maryna Viazovska. EPFL offers a lot of freedom in course selection, you can add any course as long as you want it, and if you don't wish to continue, you can withdraw anytime before the final exam. The learning and academic environment at EPFL is very different from Asia. I met many excellent students from all over the world.
I travelled to many European countries during my exchange with my friends and we tried many new activities. We went to almost all the big cities in Western Europe with a highlight of trekking in the Alps at high altitudes of 3,000 metres. We also savoured various traditional European cuisines.

During my stay in Switzerland, I also took a French course at the University of Lausanne. Lausanne is in the French-speaking area of the country and I went from being a French beginner to being able to use simple French words to communicate.

Living alone outside of China for the first time was quite a challenging experience. It took me some time to get used to a place where living and eating habits are very different from China. Nevertheless, the exchange program offered me the opportunity to leave my comfort zone and overcome various difficulties.

The exchange component is also an important reason why I chose to study at the City University of Hong Kong. I enjoy exploring new areas - my motto is: "世界這麼大我想去看看," which translates in English as "The world is so immense, and I yearn to experience it firsthand." This exchange program has given me cherished memories for life, and I am very grateful to the school for offering me such a fantastic opportunity.



Calvin PUN

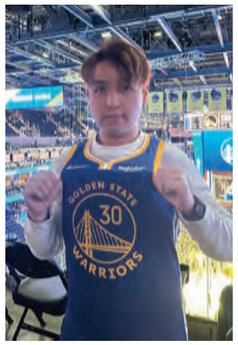
San Jose State University, USA

Being an exchange student in the US is one of the most remarkable memories of my life! San Jose State University is in the capital of Silicon Valley so, it has a vigorous Department of Computer Science and Engineering, which is highly competitive. It offers a lot of data science courses as well as a degree programme. The university was established in 1857 and is the oldest public university on the West Coast. The campus here is quite different from CityU with a mix of historical and modern architecture and several large green spaces. Another cool thing about SJSU is that it allows pets in the residence hall; sometimes I meet cute dogs in the elevator!

Apart from enjoying the great campus, I made friends from different nations including Japan, Germany, South Korea, Italy, etc. We usually hung out together, visiting famous places around the town and state. One unforgettable sight was the night view from Twin Peaks in San Francisco, from where you can see the entire city.

During the exchange programme, traveling alone became my hobby. I loved to fly to another city to discover the local culture and do not need to worry about coordinating with anyone; I can go anywhere I want to visit. It empowers me and makes me a more mature person.

All in all, joining an exchange programme was the best decision of my university life. I want to explore more cultures in foreign countries. If I can join the exchange programme again, I definitely will!



Hamza Bin SHAHID

University of Waterloo, Canada

I had the most engaged and merry few months ever during my exchange at the University of Waterloo in Canada. I chose to go during the winter semester, hoping to catch the harsh winter climate. Waterloo is a small town that is an hour's drive from Toronto, the nearest big city, so this place is relatively quiet. Life there is pretty slow-paced compared to Hong Kong. However, the people in this small town are always enthusiastic and willing to chat, it has that thriving, small-town vibe.

The University of Waterloo has a lovely campus, which is quite spread out and gives you quite the jog to get from class to class sometimes. The winter and the heaps of snow made everything look very scenic, as if out of a noir crime film. There is plenty of flora and fauna in and around campus towards springtime with geese found everywhere, even right outside your window while studying at the library.

I took four courses during my time at the University of Waterloo, including a course on quantum computing and deep learning. Waterloo is a pioneer in quantum computing, with the faculty having shaped a lot of our understanding of the subject. My deep learning course was fascinating as we built up the idea of neural networks from the human brain and neuroscience. Building architecture in our assignments and writing elegant proofs, it was an intellectually rewarding but very challenging process. The collaborative study culture and study groups made my learning experience smooth and productive. The friends I made were very passionate about their work and all the cutting-edge innovation in the immediate area with a thriving start-up culture in generative AI on campus. It gave me renewed enthusiasm to share with my talented peers back at CityU and take some of the harder, more cutting-edge data science courses offered at CityU.

I believe the exchange was a wonderful opportunity for me to reset and re-evaluate. The drastic change can really help you to get out of counterproductive habits, form new ones and become more disciplined. The inspiration from all the passionate people and the thriving culture can really help you to become more ambitious, motivated and ready to take on bigger challenges with a more refined and global vision now under your belt.

A COLLECTION OF CAMPUS CHRONICLES

With campus life building back to normal in recent months, the School of Data Science (SDSC) has hosted a wide spectrum of activities during the current 2022-23 academic year. From career talks to award ceremonies, we have organised occasions for students of all levels. The career-oriented events cater to the needs of our undergraduates and master students while for Dean's List awardees, we hosted two ceremonies to recognise their achievements. In addition, SDSC also participated in CityU's annual signature event – The Information Day - to showcase our multidimensional capabilities. As a campus community, we strive to be a vibrant and inspiring place. Here are highlights below.

To Get Admission Tips and Career Prospects as Data Scientists

City University resumed its on-campus Information Day on 20 October 2022. Along with the other Schools/Colleges, SDSC offered a lively programme covering topics such as the Smart City, Education and Careers, FinTech, as well as undergraduate sharings. The attendance was excellent, with every session having a full house. Faculty members including the Dean, Associate Dean, Programme Leaders and Course Leaders attended to give information and support to potential newcomers. In the full-day programme, our School featured our Bachelor of Science in Data Science (BSc DS) and Bachelor of Science in Data and Systems Engineering (BSc DSE) degrees as promising options for incoming students. We look forward to seeing these attendees again on campus very soon!

For the Future: Career Talks Exclusively for SDSC Students

Our students' future has always been our School's top priority. SDSC is constantly looking for partnerships to secure internship and graduate opportunities for our students. We organise SDSC-privileged career talks featuring prominent guest speakers ranging from managers to senior leadership levels. These experts have come from a variety of organisations and professional bodies, including the Reinsurance Group of America (RGA), Internal Audit Profession, Bank of East Asia, Lenovo PCCW Solutions, Group M and Hong Kong Productivity Council -- covering a broad spectrum of industries. Speakers have spoken on various topics like career training, internship opportunities, and specialised areas like internal auditing. These sessions have been very popular among students, especially with our first batch of final year students.

MSDS Career Forum

The Career Forum for SDSC Master students was held on 18 February 2023. Our hosts, including our Dean Professor S. Joe QIN, Associate Professor Dr. Matthias TAN, Associate Professor Dr. Li ZENG and Associate Professor/Internship Coordinator Dr. Qingpeng ZHANG, were present to welcome the speakers, as well as open a new page for our master students. This career talk featured three guest speakers to share their expertise in job-seeking techniques and advice on how to enter the actuarial industry. These experienced speakers included Ms. Janet ZHANG (CityU Alumna), who is the founder and iMentor of CityU HK Tech 300 Project/Asia Pacific Trainer, Morgan Stanley/Consultant/Project Manager, Hewlett Packard HK SAR; Mr. Terry CHEN, Senior Manager, Actuarial Services, PricewaterhouseCoopers; and Mr. Damian YIP, Executive Director, The Actuarial Society of Hong Kong (ASHK). Students responded readily and benefitted greatly from interacting with these professionals.

Outstanding Students Attended Dean's List Award Ceremonies

The School has organised two Dean's List Award Ceremonies to recognise the academic excellence of its outstanding students. The ceremonies were held on 22 September 2022 for Semester A and on 20 March 2023 for Semester B. To be eligible for the Dean's List, students must have earned at least 12 credit units and achieved an SGPA of 3.7 or higher in a semester. The School is proud to have so many students (35 in Semester A and 37 in Semester B) who have achieved this. At the ceremonies, apart from presenting certificates, our Dean Professor S. Joe QIN also encouraged them and took the initiative to get to know them better. Associate Dean (Dr. Zijun ZHANG), Programme Leaders (Dr. Xiang ZHOU and Dr. Lishuai LI) and Deputy Programme Leaders (Dr. Qingpeng ZHANG, Dr. Clint HO and Dr. Xiao QIAO) also attended the ceremonies and shared the joy and pride of the students. Congratulations to all Dean's List awardees!

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