



School of Data Science

香港城市大學
City University of Hong Kong

SCHOOL OF DATA SCIENCE

**SCHOOL
MAGAZINE
2021**





The magazine is
available for download

Published by
The School of Data Science
The City University of Hong Kong
www.cityu.edu.hk/sdsc

MESSAGE

- 3. Foreword From the Dean

PEOPLE

- 4. Excellence Through Discipline Diversity

DIALOGUE ON DATA SCIENCE

- 8. President Way KUO: Building Appreciation for Data Science
- 10. Data Science Education with Domain Knowledge and System Principles – Harvard Data Science Review
- 14. A Whole New World with Data Science – Interview by Cornell Director

RESEARCH

- 16. Data Science in Times of COVID-19
- 18. Research Capabilities Empowered by HKIDS and CSIE
- 20. Highlights of Flagship Research Projects with Industry Collaborators
- 22. Linking Up Data Science Elites Through Seminars and Workshops

CITYU PRIDE

- 24. Earning Our Place in the World

STUDENTS

- 26. Awards
- 28. Reflections on Internship Experience
- 30. Our Postgraduates – Embarking on a New Journey as Data Scientists
- 31. Our Undergraduates – Acquiring Diverse Learning Experience



FOREWORD FROM THE DEAN

The School of Data Science at CityU nurtures multidisciplinary education and research with degree programmes at BS, MS and PhD levels. I am honoured to serve as the inaugural Dean of the School and have witnessed its rapid development with two batches of graduates who are pioneering this new field. It is especially exciting to see that the School will be the home of over 500 undergraduate and postgraduate students in the coming academic year.

Although these initial accomplishments give me great pleasure, we have only just begun with this young school. As one of the first data science schools in the Greater Bay Area – as well as the world – we are behind the wheel of this evolving field. We have already witnessed the tremendous power of big data and artificial intelligence as they have outperformed human beings at playing games and have revolutionized many aspects of our daily lives. Both the opportunities and challenges are equally great: How do we ensure big data technology is used for social good and educate the next generation workforce to have powerful data analytic skills and sound ethics? Much more is ahead of us in this young discipline of data science.

This inaugural magazine seeks to represent many aspects of the School including our multidisciplinary curricula designed to nurture and attract talent; the pioneering research areas relevant to theory and practice; and developing application domains in commerce, healthcare, FinTech, smart city, and Industry 4.0. It is a noble effort to document and celebrate these milestones of our school. I hope as readers browse through these pages, you will all share the same excitement as we do about the past, present and future of the School and the discipline of data science.



Professor S. Joe QIN
Dean
School of Data Science
August 2021



OUR PEOPLE – EXCELLENCE THROUGH DISCIPLINE DIVERSITY

The School of Data Science (SDSC) believes that diversity is key to a bright and innovative future, and that it begins with the people. Thus, we pursue the world's greatest scholars from all sorts of backgrounds and experience levels. As SDSC celebrates its third anniversary, we will continue building a community characterized by people with different beliefs, academic disciplines, and scholarly pursuits.

ACADEMIC EXCELLENCE

SDSC's status as one of the top data science education and research institutions in the world is due largely to our faculty's academic prowess. Over the last year and a half, our faculty has grown to 35 members, including 10 Affiliate members.

FACULTY MEMBERS



Professor S. Joe QIN is our Dean and Chair Professor of Data Science, as well as the Directors of the Hong Kong Institute for Data Science (HKIDS) and 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 Optimization.



Professor Jun WANG, our Chair Professor of Computational Intelligence, explores areas like Neural Computation, Optimization Methods, Data Processing and Intelligence Control.



Professor Junhui WANG is specializes in researching Statistical Machine Learning.



Professor Min XIE, our Chair Professor of Industrial Engineering at SDSC, focuses on: Reliability Engineering, Quality Management, Software Reliability and Applied Statistics.



Dr. Matthias TAN, Associate Professor, covers Statistical Modeling and Inference for Engineering, Uncertainty Quantification in Computer Simulations, Design and Analysis of Experiments, and Statistical Quality Improvement.



Professor Ding-Xuan ZHOU, our Associate Dean and Chair Professor has conducted cutting-edge research on Learning Theory, Wavelet Analysis and Approximation Theory.



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.



Dr. Qi WU, Associate Professor, conducts research on: Quantitative Finance, Financial Technology and Business Analytics.



Professor Way KUO, President of CityU as well as University Distinguished Professor has conducted research on Modeling, Evaluating and Estimating Reliability of Modern Systems, with emphasis on Optimal System Design, Reliability Design for Microelectronics and Nano Products.



Professor Minghua CHEN covers a wide array of research topics, including: Online Optimization and Algorithms, Capitalizing 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 centers), Intelligent Transportation Systems and Delay-constrained Networking.



Dr. Qingpeng ZHANG, Associate Professor, focuses on Healthcare Data Analytics, Medical Informatics, Network Science, Social Computing and Artificial Intelligence.



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.



Dr. Zijun ZHANG, Associate Professor, has the following research interests: Data Analytics, Computational Intelligence, System Modeling and Optimization and Renewable Energy.



Dr. Xiang ZHOU, Associate Professor, is an expert on Applied and Computational Mathematics, Rare Event, Stochastic Modelling and Simulation, Energy Landscapes and Machine Learning.



Dr. Lishuai LI, Assistant Professor, has the following research interests: Intelligent Transportation Systems, Air Transport and Operations, Data Mining and Computational Intelligence.



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



Dr. Yining DONG, Assistant Professor, researches Process Data Analytics, Multivariate Time Series Modeling, Statistical Machine Learning, Smart Manufacturing and New Material Design.



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. Qing KE, Assistant Professor, has conducted research on data science, innovation and complex systems.



Dr. Long FENG, Assistant Professor, focuses primarily on Statistical Machine Learning, Image Data Analysis, and Variable Selection.



Dr. Xiao QIAO, Assistant Professor, has research scopes on Financial Economics, Asset Pricing, Financial Data Analytics and Risk Management.



Dr. Ruocheng GUO, Assistant Professor, has the following research interests: causal machine learning and its applications towards interpretable, fair, and generalizable AI, causal inference, and data mining.



Dr. Clint Chin Pang HO, Assistant Professor, researches on: Decision Making under Uncertainty, Robust Optimization, Computational Optimization, and Operations Research.



Dr. Yu YANG, Assistant Professor, works mainly on Large-scale Graph Mining, Data Mining and Processing, Stochastic and Combinatorial Optimization, Influence/Information Diffusion in Networks, Dense Subgraph Detection and Graph Representation.



Dr. Xiangyu ZHAO, Assistant Professor, focuses on data mining and machine learning, especially (1) Reinforcement Learning, AutoML, and their applications in Information Retrieval (recommendation, computational advertising and search); (2) Urban Computing and SpatioTemporal Data Analysis; and (3) AI for Social Computing, Finance, Education, Ecosystem, and Healthcare.

AFFILIATE MEMBERS



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 Optimization, Computational Economics and Finance, Data Analytics and Statistical Learning.



Dr. Siyang GAO is an Associate Professor at the Department of Advanced Design and Systems Engineering. His researches mainly focuses on Simulation Modeling and Optimization, Applied Probability, Discrete Event Dynamic Systems, and Healthcare Management.



Dr. Simon TRIMBORN is an Assistant Professor at the Department of Management Sciences. His research covers areas such as Digital Finance, Financial Econometrics, Network Analysis, Machine Learning and Textual Analysis.



Professor Yanzhi David LI is a Professor at the Department of Marketing. His research focuses on Business Analytics, Supply Chain Management, OM/Marketing Interface, and Perishable Inventory Management and Pricing.



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. 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.



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. Jingyu HE is an Assistant Professor at the Department of Management Sciences, words on the following research: Machine Learning, Tree Ensembles, Bayesian Statistics and Empirical Asset Pricing.



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.



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.

WORLD-CLASS QUALIFICATIONS

SDSC has top faculty recruits from all over the world. Our members received PhDs mainly from elite universities such as MIT, Oxford University, Harvard, Imperial College, University of Chicago, National University of Singapore, University of Pennsylvania, Yale University, Tsinghua University, Peking University, Columbia University, and Princeton University.

ELITE GLOBAL SCIENTISTS

Six Chair Professors of SDSC, including the Dean Professor Joe QIN, Associate Dean Professor Ding-Xuan ZHOU, CityU President Professor Way KUO as well as Professor Alain BENSOUSSAN, Professor Jun WANG, and Professor Min XIE, were listed among the top 2 per cent of scientists in the world according to a list compiled by the prestigious Stanford University in February 2021. The rankings are based on six well-known metrics and are scientifically adjusted for several factors, including the number of years spent in a particular research field. Over 140 CityU scientists made the list, and Professors QIN and WANG's rankings were among the top 10 in the university's history.

VARIED RESEARCH INTERESTS

Both our in-house and affiliated faculty members have conducted high-quality research on theory and algorithms across the field of Data Science. Additionally, as one of the leading bodies of data scientists in the world, we also focus on how to practically apply our research in meaningful ways. Our research has been applied to a vast array of important domains including Industry 4.0, Systems Informatics, Smart City, New Media, Quantitative Finance, Medical Informatics, Intelligent Transportation Systems and Renewable Energy.

- Data Visualization
- Data Mining
- Optimization 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 – ELITE DATA SCIENTISTS IN THE MAKING

Just like its faculty, SDSC's student body has experienced rapid growth in terms of both the quantity and quality of applicants. In particular, we have been receiving an increasing number of postgraduate applicants.

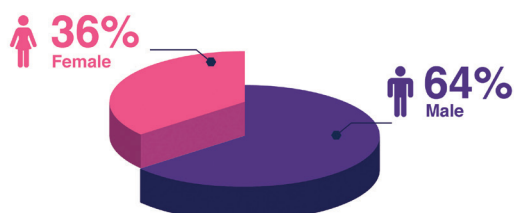
For PhD students, so far our School have admitted around 100 PhDs after finalizing the 2021 intake in September. These candidates graduated from top-ranked universities such as the University of Texas at Austin, University of British Columbia, Johns Hopkins University, New York University, University of California, Davis, Pennsylvania State University, University of California, San Diego, University College London, University of Edinburgh, University of New South Wales, Tsinghua University, Zhejiang University, Xi'an Jiaotong University, Nanjing University, etc.

In addition, we will also be welcoming a growing number of master scholars at the postgraduate level. We are currently home to around 110 Master of Science in Data Science students, and will receive a new cohort of over 100 new students as September 2021 approaches. Among these students, over 90% came from C9 League, Project 985 or QS top 200 universities.

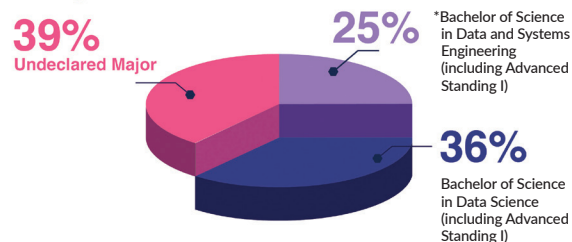
UNDERGRADUATES FROM VARIOUS BACKGROUNDS

For our 2020 intake, 33 per cent of students came from international backgrounds. Both local and international students showed an increased level of interest and confidence in the subject matter due to the high diversity levels. Non-local students came primarily from the Mainland, Indonesia, South Korea and more. More stats about our undergraduates can be found below.

Gender

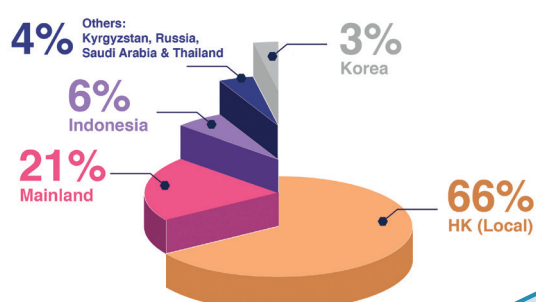


Programme

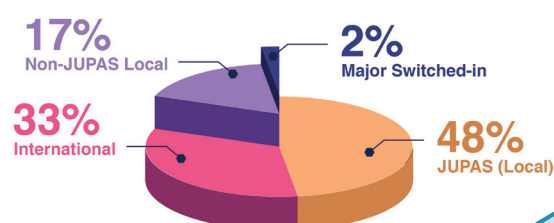


*(Retitled from Bachelor of Engineering in Data and Systems Engineering starting from 2021/22 academic year)

Country / Region



Admission Route



BUILDING APPRECIATION FOR DATA SCIENCE

Professor Way KUO believes that one big lesson of the pandemic is the importance of data science: how data is gathered, how it is presented and how it is analysed.

President and University Distinguished Professor, also faculty member at the School of Data Science (SDSC), Professor Way KUO has been championing the subject of data science ever since joining the University in 2008.

"Data science has been around for a long time, but now we are recognising the value it provides as a knowledge domain," KUO said. "The bottom line is numbers talk, and data talks. But if we don't learn how to use this data correctly we won't get anything out of it."

One of the most respected engineers and scientific researchers in the world, KUO got his bachelor's degree in Nuclear Engineering

in 1972 from National Tsing Hua University in Taiwan and his PhD at Kansas State University in the US in 1980. He has since held prestigious positions in numerous American universities, won dozens of professional awards, written 10 books and more than 200 high impact papers, and delivered countless talks and research presentations around the world on subjects like education, reliability, energy, and research.

DATA DRIVEN

Data science and analytical thinking have been an integral part of KUO's storied career in engineering. But he believes engineers and "hard" scientists are analytical by default. It is people that work in other fields like the social sciences and humanities who stand to benefit the most from data science.

"You could argue that engineers and other scientists need to think more philosophically but similarly, I think people in the humanities and social sciences need to be a little bit more data-driven," KUO said. "I spoke to a social scientist at CityU about this and he believes they are already very data driven. I disagreed with him but I was happy to see that professionals in these areas are starting to value data more."

KUO believes that while data science has made progress as a discipline, far too often people make statements based on emotions and opinions rather than facts or data.

Cityu

香港城市大學
City University of Hong Kong

CityU President and University Distinguished Professor, also faculty member at the School of Data Science, Professor Way KUO.



CityU
Anthem

“ But data science is multidisciplinary and gives you fundamental tools that help you go deeper in your own areas. Tools like computer literacy, statistical analysis, and learning about different kinds of data ”

“My favourite example is the question about class sizes in university,” KUO said. “Some think small classes are better. Some think big classes are better. Some people think it’s a combination of two. But can you prove it? Data science in fields like education helps us answer this type of question properly.”

“Having data science as a knowledge domain helps people calm down a little bit and make statements based on facts, and valid interpretations of data,” KUO continued. “It is important for the young generation to be accountable and not make rash statements based on misinformation and lies. You don’t have to be analytical about everything – but data science is a tool to help us handle certain societal issues and help us understand what is going on.”

A MULTIDISCIPLINARY APPROACH

Although many people think of Data Science as a standalone subject, KUO believes it encompasses many fields of knowledge and, therefore, can be used in many different ways.

“Generally speaking, our domain at CityU has been business, engineering, physics, data and sociology,” he explained. “But data science is multidisciplinary and gives you fundamental tools that help you go deeper in your own areas. Tools like computer literacy, statistical analysis, and learning about different kinds of data.”

Ultimately, KUO believes that Data Science is a subject built around questions, answers and evidence. “For example, through data science we learn that not all data is numbers. Data can be parametric or nonparametric. What is the difference in analysing a large body of data versus a small body of data? And how can the same set of data mean different things to different people? When can a data interpretation be used as evidence?”

KUO said that people often undervalue data science’s role in tackling societal issues – including the COVID-19 pandemic.

“When it comes to something like the COVID-19 vaccination, it would have been extremely difficult to implement successfully without data science,” KUO said. “There are many different choices of vaccines from many different companies and countries – how do you judge which ones are better? To reach an accurate conclusion,

you must have certain data criteria that you can analyse. And certainly, we are doing much better today at handling this pandemic than we did previous ones in ancient times, and that’s because we are able to use data more wisely.”

QUESTION EVERYTHING

Having worked in the United States for several decades, KUO is a big fan of the American university system and their “General Education” course requirements in which students obtain fundamental knowledge in important subjects like psychology, philosophy and literature. He believes that Hong Kong, Taiwan and Mainland universities are lacking in this regard.

“Our universities have General Education courses that are about things like how to enjoy movies, marriage, and other things that are good to know, but they are not something that needs to be taught by a professor at a university,” he said. “General Education should be focused on important fundamental subjects like psychology and literature. Universities like Harvard and Princeton are making data science a General Education subject and I would like CityU to eventually follow suit.”

KUO believes in asking questions – and he has been asking questions that other people have been afraid to ask ever since he took over as CityU president. These questions have led to CityU implementing some of the best aspects of American universities, and have resulted in rapid progress that has helped separate the school from its peers.

“When I first came here I asked ‘do we have a school anthem?’” KUO explained. “The answer was ‘no’ so now we have one. Then I asked ‘why do our graduation commencements take place in November instead of the same month like in American universities?’ There was no answer, so this year, we became the first Hong Kong university to hold our commencement ceremony in May.”

Ultimately, the willingness of KUO and faculty members at the SDSC to ask important questions is why the SDSC has become one of the best data science institutions in Asia in just three years, and why it will continue to experience rapid growth in the future. ●

DATA SCIENCE EDUCATION WITH DOMAIN KNOWLEDGE AND SYSTEM PRINCIPLES

Professor Joe QIN explains what exactly data science is and whether or not it will replace existing engineering and science principles.



This article is adapted from a commentary article Professor QIN published in Harvard Data Science Review along with Deans/Directors from Harvard, Berkeley, MIT, Purdue, Columbia, and UC Irvine.

The world's attention to data science, big data, and machine learning has been triggered by successful applications in recommender systems; business analytics; natural language processing; computer vision; image processing; autonomous systems and processes; social media and network; and so on. A revolutionary impact on science discoveries, data science adds a new pillar to the three existing categories of scientific research – that is, theory, experiment, and computing, especially where first principles are not well established.

For example, it is not straightforward to design new material or molecules with desired functional properties from chemistry principles. Massive experimental data could be analyzed to reveal the mapping from molecular structures to

properties. Another example is to reveal causal relations among research findings to accelerate scientific discoveries (Gates et al., 2019). On the other hand, industries are seeing the next revolution (i.e., Industry 4.0) that will unleash values in massive data from real-time operations, production processes, services, and municipal operations (QIN & Chiang, 2019). Data literacy for the next generation workforce is a necessity, something best achieved via education.

The institutional approach adopted at City University of Hong Kong (CityU) was to establish the first standalone School of Data Science in Asia in mid-2018. Concurrently, the Hong Kong Institute for Data Science (HKIDS) was established to oversee transdisciplinary research activities and to reach out for societal impact. The curricular approach is to adopt the framework of data science plus a domain at the undergraduate level. In the meantime, general education and minor options are available for all college students. Two bachelor's programs were created, with one focusing on data science and another one on data and

systems engineering. The master's-level curriculum follows the same philosophy, where the domain knowledge integration is highlighted by a term project. The Ph.D.-level education is similar to those of many institutions, with data science training via core courses and domain specialization led by their advisors.

The article "Data Science and Computing at UC Berkeley" by Professor Jennifer Chayes, in the *Harvard Data Science Review*, addresses many critical aspects in data science education and research that are encountered by institutions globally. I would say that every point addressed in the article is worth considering when establishing or revising a data science curriculum. The article is also concise in illustrating the critical aspects, so there is no need to summarize here.

In this discussion, I would like to offer some complementary views to the already rich set of answers in the article. It is convenient to point out that both Berkeley's Division of Data Science and Information and CityU's School of Data

Science (SDSC) were announced in 2018, with inaugural Deans Professor Chayes and myself taking office in January 2020 at the respective institutions. Both Berkeley and CityU are located next to the innovation hubs at the San Francisco Bay Area and the Guangdong-Hong Kong-Macao Greater Bay Area respectively. Both bay areas have witnessed tremendous growth of large companies in big data, e-commerce, and artificial intelligence (AI). The demands for well-trained next-generation talents in data science are strong in both areas.

WHAT IS DATA SCIENCE?

Simply put, data science provides virtual instruments to analyze data for scientific discoveries and engineering problem solving. As data becomes massive, heterogeneous, and high-dimensional, simple curve fitting will not get the job done. Data science provides scientific ways to analyze, visualize, interpret, predict, infer, and even make decisions or take actions on the system under study. These purposes are well elucidated in Chayes's article within various domains.

Instruments in a narrow sense can be Galileo's telescope, which helped him see what others could not. In automation and control, instruments include actuators and controllers that manipulate the system. Reinforcement learning, for example, works as a controller or decision maker to actively learn from data to optimize an objective.

I fully agree with Chayes's view that data science innovations should be human centered. As well as this, they should be instrumental for human beings to achieve their goals with meaningful and ethical purposes. A great utility of data science is its ability to assist humans to acquire knowledge from massive data. Therefore, human beings must be in the loop to interpret, understand, and acquire such knowledge. Interpretability of data analytic outcomes is a necessity. Another utility of machine learning and data science is to develop autonomous systems, but one should resist the temptation to bypass the human prematurely to avoid mishaps like the Boeing 737 Max airplanes with the MCAS software.

The 'Age of Interaction' points to an opportunity to enhance the data science

discipline with domain knowledge. In control and cyber-physical systems, it is obvious that one needs to understand the external system in order to predict, change, and manipulate it. While statistics and computing are two pillars of data science, I argue that system principles, which could be domain specific, should be another pillar of data science, since most data is generated from a system, be it natural or engineering systems. Wiener's *Cybernetics: Or Control and Communication in the Animal and the Machine* (1948) was for this purpose, although control, decision-making, and interactions represent different levels of interventions to the system.

DATA SCIENCE VS. FIRST PRINCIPLES

One frequent question in applying data science to various domains is whether data science and machine learning would replace existing engineering and science principles. The answer is no. Rather, data-driven machine learning complements first principles where they are lacking or unknown.

Take airplane flying as an example, which is shown in the left panel of Figure 1. The airplane (i.e., system) is designed with engineering and science principles and made with every part known. However, when flying the airplane, the ambience it flies through is unknown and time-varying. It is through real-time sensor data and the pilot's judgment that the ambient condition is learned. The coexistence of knowns and unknowns in real-world systems is always there, which is illustrated with the Yin-and-Yang symbol in the right panel of Figure 1. The dark side represents the unknowns and the white side the knowns. Data science helps interpret data and assess the ambient condition in a timely manner to assist the human operator, although the airplane

system was designed with known principles. It would be unwise to forget the principles and rely purely on data, or vice versa. Data scientists should be trained with basic engineering and science principles so that they are more effective. There is no need to reinvent the wheel.

Note that the airplane system can change over time with drifting, aging, and even malfunctioning. The notion of the time variedness of machines and systems is well illustrated in Jordan (2019). There will be constant transfers at the boundary between the knowns and the unknowns. Machine intelligence from data analytics will make airplane flying more autonomous, although a proper balance and a fallback option are always necessary.

A DATA SCIENCE CURRICULAR APPROACH: DS + X

How should data science curricula reflect the need for domain knowledge and first principles? Technological advances in data science and AI are transforming traditional industries, manufacturing, and business operations. The immersion of data science education into science and engineering curricula is just at its beginning and fast developing from graduate to undergraduate programs. New schools, departments, minors, concentrations, and modules of data science have been established worldwide in the last few years.

However, due to the diverse disciplines of engineering and science and the diverse analytical tools in data science, a critical challenge is how to create a curriculum that will equip the student with the highly needed data science skills and a domain specialization. This approach of data science plus a domain, that is, DS + X, where X = a domain, was adopted at CityU's School of Data Science. Our core courses such as



Figure 1. Flying an airplane through a turbulent ambience (left panel) and the coexistence of knowns and unknowns in a system via the Yin-Yang symbol (right panel).



Credit: A.J. Gates, Qing Ke, O. Varol & A.-L. Barabási, Nature, 06 Nov. 2019.

Systems Dynamics and Control, Systems Modelling and Simulation, and Quality Technologies, are nontraditional statistics or computing courses. Detailed curricular information at CityU can be found on the SDSC website.

The composite education approach of 'DS plus a domain' is like the two sides of a coin. Two undergraduate degree programs were established at CityU, with one focusing on data science and another one on data and systems engineering.

The curriculum design embraces many engineering and science domains, including energy; environment; smart manufacturing; smart cities; social media; FinTech; and health analytics. Conversely, students from other schools can take data science courses or a minor in data science.

The master's-level curriculum follows the same philosophy, with the domain education highlighted by a semester-long project. The PhD-level education is analogous to that of many global

institutions, with data science training via core courses and domain specialization by the advisors. It is anticipated that data scientists with a domain specialization will be in high demand.

The last question is also the first one: What exactly is data science? Is it a discipline? Data science being an applied science is convincingly illustrated in Jordan (2019). At this stage it is probably healthy to keep an open mind and state what it is not, as was done in Meng (2019). The CityU's composite talent education with DS + X encourages cross fertilization and in-depth collaboration. The institutional approach at CityU's School of Data Science is not to build internal divisions in the foreseeable future. Faculty colleagues understand that heterogeneity and gaps between theorists and domain specialists are healthy at the current stage of the discipline. Fundamental theory and rigorous development will be an eternal goal, but historically, domain applications often precede theory development. The steam engine was put into wide use after James Watt created the governor for steam engines in 1776, which brought about the first Industrial Revolution. If one had to wait for the rigorous theory of J.C. Maxwell's famous paper "On Governors" in 1868, the Industrial Revolution would have been delayed by nearly a century. ●

Acknowledgments

I would like to thank Professors Zijun Zhang and Xiang Zhou, Program Leaders at CityU's School of Data Science for their input and discussions.

References

- Chayes, J. (2021). Data Science and Computing at UC Berkeley. *Harvard Data Science Review*, Issue 3.2, Spring 2021. <https://hdrs.mitpress.mit.edu/spring-2021>.
- Gates, A. J., Ke, Q., Varol, O., & Barabási, A. L. (2019). Nature's reach: Narrow work has broad impact. *Nature*, 575(7781), 32–34.
- Jordan, M. I. (2019). Artificial intelligence—The revolution hasn't happened yet. *Harvard Data Science Review*, 1(1). <https://doi.org/10.1162/99608f92.f06c6e61>.
- Meng, X.-L. (2019). Data science: An artificial ecosystem. *Harvard Data Science Review*, 1(1). <https://doi.org/10.1162/99608f92.ba20f892>
- QIN, S. J., & Chiang, L. H. (2019). Advances and opportunities in machine learning for process data analytics. *Computers and Chemical Engineering*, 126, 465–473.
- Wiener, N. (1948). *Cybernetics: Or control and Communication in the Animal and the Machine*. Hermann & Cie & MIT Press.



A WHOLE NEW WORLD WITH DATA SCIENCE

The School of Data Science's Dean Professor Joe QIN looks back at his illustrious career and discusses the future of data science with Cornell's Systems Engineering Program Director, Professor H. Oliver GAO

Dean Professor Joe QIN

When people think of “science,” they often think of familiar school subjects like biology, chemistry, or physics. With the onset of the Internet and newer digital technologies, a new scientific discipline has emerged over the last couple of decades – a “science” that enables powerful solutions and discoveries using data.

To Dean Professor S. Joe QIN, data science not only promises crowd-pleasing applications, such as suggesting your next Netflix show, it also comprises various building blocks across multiple disciplines including computing, statistics, and systems engineering. Students who have good command of data analytics and a domain specialisation are poised to become among the most valued data scientists.

Professor QIN shared his views on this fast-developing subject in a recent interview with Professor GAO, the Systems Engineering Program Director at Cornell University. His research focuses on transportation, environment, energy, and sustainable development. Twelve time zones apart, the two professors virtually conversed about things they share, including their alma mater and the wise pursuit of data science.

SOLVING PROBLEMS SINCE DAY ONE

“It has been almost seven years since I visited Cornell. Time does fly,” Professor

QIN remarked at the beginning of the interview. Looking further back in time, he talked about his early education in the systems domain – what he believes today to be an important foundation of data science.

Professor QIN recalled his entrance in 1979 into the Department of Automation of Tsinghua University, the same university where Professor GAO received his undergraduate degrees. “It’s frightening to mention that I’ve been either studying or working in the systems and control area for over 40 years,” Professor QIN chuckled.

He went on to explain how his undergraduate course opened him to the world of systems. “Systems is central to automation, and as early as four decades ago I began to learn about linear systems, transfer functions, optimisation, and even system identification – a term for using data to reverse-engineer system models.”

This head start equipped Professor QIN to tackle data-related issues which remain relevant in current data science applications.

“I worked on neural networks for my PhD at the University of Maryland from 1989. The drawbacks I encountered back then, particularly with data collinearity and generalisation issues, are still machine learning concerns today. My dissertation was aimed at avoiding those potential drawbacks,” he shared.

SYSTEMS AND DATA SCIENCE

After graduation, Professor QIN spent three years at Emerson developing products using machine learning. Eager to share his industrial experience, he began his academic career at the University of Texas at Austin in 1995, before moving to the University of Southern California in 2007.

“My heart was always in academia,” he revealed. “My research and teaching focus has been either on predictive control or some data-driven approaches.”

From tackling chemical engineering to semiconductor manufacturing and energy areas, Professor QIN saw the distinct role of his systems education across all his work. “All the problems I’ve been dealing with are really systems problems,” he said. Professor GAO similarly noticed how data science cut through all of Professor QIN’s work at different periods of his life.

Not surprisingly, the Dean brought this focus on systems to data science education at CityU. According to him, nearly all data analytic problems that we deal with come from different systems. “When we analyse data from those systems, we need to understand the systems,” Professor QIN said. “There’s the domain knowledge one has to possess; otherwise, you could arrive at arbitrary conclusions. It will be even harder to interpret anything you get.”

DATA SCIENCE AS MULTI-DISCIPLINARY

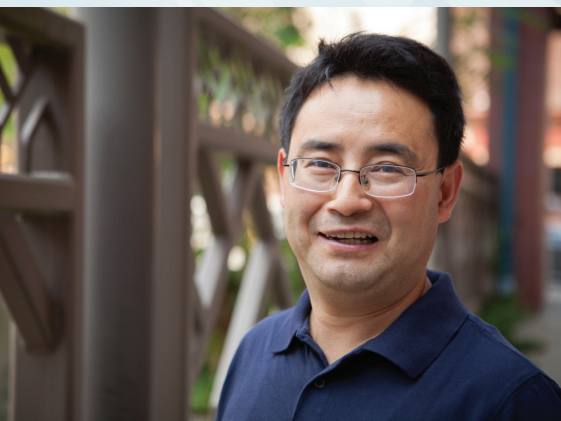
Prior to accepting the deanship at CityU, Professor QIN found himself searching for an answer to the ultimate question of what data science really is. “I visited quite a few US universities like MIT and Harvard to have a good, personal understanding of what the future of data science should look like.”

Professor GAO commended this mission-critical “search.” Citing Professor QIN’s published works in acclaimed journals such as the Harvard Data Science Review, he asked the Dean how he defines data science now.

Professor QIN insisted that data science should not be considered a single subject like statistics or computer science. It also cannot be clearly defined at this stage since data science is continuing to evolve and derives its foundations from other disciplines.

“What’s clear to me now is that it’s an applied science. I would argue that it has three foundations: statistics, computing and systems principles,” he shared. “I think it’s healthy to keep this open definition for data science.”

He added, “About 40 to 50 years ago, computer science was also in its early development. It is still developing, but we already know what it is. In the same way, data science still has many years to grow until there are plenty of standard textbooks and a well-defined curriculum on the subject.”



Professor H. Oliver GAO, Cornell’s Systems Engineering Programme Director.

APPLICATIONS PAVED THE WAY

Addressing data science’s accelerated popularity in recent years, the Dean cited the natural evolution of things, sharing that those “pre-history” efforts were mostly academic.

“Thirty years ago, interest in neural networks and human-like learning systems was already high, but things like computation were simply not ready,” he said.

To Professor QIN, the surge in the growth of data science is due to successful applications – especially the rapid evolution of AI and machine learning in the last 20 years. He cites Facebook’s targeted online ads and Google Translate as examples.

“Amazon was making book recommendations 20 years ago. We knew what it was doing but we didn’t have a name for it,” Professor QIN mused. “Turns out, it’s a product of data science. The difference this time is we are already pushed by successful applications of data or data science techniques.”

Reiterating how data science is an applied science, Professor GAO echoed the Dean’s observations, remarking how today’s applications are uncovering more needs for today’s engineers to solve.

ADAPTING WITH THE CHALLENGES

While the influx of applications and research inquiries is fueling the growth of data science, Professor GAO also pointed out that the next generation of engineers and scientists are faced with myriad challenges, including issues surrounding privacy, ethics and equality. Societal challenges also include data sources’ availability and compatibility with data science tools as well as the deployment of internet-based sensors and wireless communications.

As with his definition of data science, Professor QIN advised welcoming new platforms and approaches when tackling these challenges.

“Hopefully we will build more smart technologies around the engineering and societal systems problems. As applications of data science evolve, they will reshape how people install sensors or Internet of Things (IoT), and how data will be communicated over wireless networks,” he said.

Professor QIN also emphasized the importance of appreciating the transitions involved in this process: “Any disruptive advances in data science should be met with an evolutionary approach, building on the existing infrastructure first, before reaching the new one.”


STEERING DATA SCIENCE IN THE RIGHT DIRECTION

“First, choose to do the right thing, then, do it right,” Professor GAO stressed as the interview neared its end. He suggested that apart from training students to do things right, today’s education should prompt them to look at the bigger picture of data science.

Likewise, Professor QIN stressed that developing future-ready solutions requires talent who can address fundamental questions, instead of chasing what is fancy and trendy in data science.

“We should not give up our understanding of the physical systems – what we understand about the basics of engineering, physics, and chemistry. They should be our founding principles,” he said. Elaborating on this data science education component, he added, “By learning how to leverage this systems knowledge with the power of data, we can develop sustainable and timely solutions.”

To illustrate this relationship, Professor QIN suggested systems and data should be treated as two sides of the same coin. “If you look only at one side, you’ll not get the whole picture. First principles tell you what’s certain. Data will always address what’s uncertain,” he said. “The more real-time your data, the more they will help you make the right decisions.”

Picking up on Professor GAO’s comment on doing the right thing, the Dean underscored the ethical requirements expected among data science educators and students alike in this quest for the right solutions. He shared his excitement about leading the School of Data Science at CityU to help realise all these ideas, concluding on a forward-looking note: “We cannot teach the next generation obsolete technologies. We are here to teach them where things are headed. They are the future of data science, after all.” 

DATA SCIENCE IN TIMES OF COVID-19

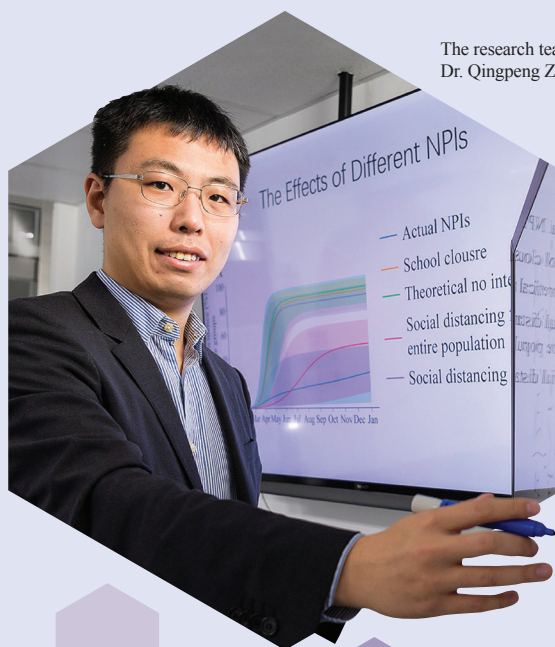
Research remains our priority in bringing light to the Data Science field. We have accomplished substantial major initiatives and milestones. Research is definitely our core focus – its importance is crucial to the world of new science and modern society. We strive for excellence in our research projects within the School, as well as with collaborators in academic, service and business fields. Below are our highlights. *By Dr. Qingpeng ZHANG*

FIGHTING THE PANDEMIC WITH DATA SCIENCE

The research team led by Dr. Qingpeng ZHANG, Associate Professor of our School, has built a series of mathematical models to help fight against the COVID-19 pandemic since the early stage of the pandemic.

Individuals taking adequate measures to fight against the diseases can stop it from spreading. But before the public could develop a self-protection awareness, they have to know about the diseases with correct understanding. However, on the basis of knowing the occurrence of an epidemic, people's subjective perceptions of the severity of the epidemic would be affected by factors including past experience, information spread by the media and opinion leaders, therefore resulting in different preventive behaviours.

The research team observed that in the ongoing COVID-19 pandemic, there are differences in people's risk perceptions which resulted in different behaviours in responses to the outbreak. It has driven the research team to conduct this research. Dr. ZHANG's team proposed a mathematical model to analyse disease transmission, behaviour change and information diffusion. And it is the first study that considered both the subjective risk perception and the public's awareness of diseases.



The research team led by Dr. Qingpeng ZHANG.

Dr. ZHANG explained the relationship between disease, behaviour, and information. "Mass media and opinion leaders would spread the information about the disease, including the transmissibility and severity. People who have access to these information would be aware of the disease, and then they would judge their own risk of being infected. Some people would take action to protect themselves, for example, purchasing protective gears like masks. This would subsequently affect disease transmission by changing the actual infection rate."

Their calculation results showed that if enough number of citizens are

informed of the transmissibility and severity of the disease and willing to adopt personal protection actions, the outbreak could be effectively contained. Dr. ZHANG pointed out that people who are unaware of the disease information usually would not protect themselves as they did not know there is a risk. Individuals who have access to the disease information with a higher subjective risk perception are found to be more actively engaging in self-protection and information sharing.

Dr. ZHANG believed that opinion leaders' views and media coverages on the epidemic would raise the public's awareness and influence them in consideration of taking self-



protection measures. Therefore, both the opinion leaders and media played important roles in the prevention and control of the epidemic. However, Dr. ZHANG elaborated that they should be careful while disseminating epidemic information. "Deliberately downplaying the severity of the epidemic may cause the public to let their guard down and lead to more infections. On the other hand, over-exaggeration of the severity of the epidemic may make the public distrust the public health system," he added.

Moreover, their mathematical model calculations showed that social influence is also an important factor. People's behaviours would be affected by their friends' behaviours. In social networks, if opinion leaders have taken appropriate anti-epidemic behaviours, the wider public would also be motivated to take anti-epidemic actions, which could significantly reduce the scale of disease outbreaks.

Their findings have been published in the scientific journal *Physical Review E*, titled "Effect of heterogeneous risk perception on information diffusion, behavior change, and disease transmission".

DATA SCIENCE MODEL EMPHASISES THE NEED FOR SOCIAL DISTANCING TO COMBAT COVID-19

The team further utilised a new mathematical model to examine the effectiveness of various non-pharmaceutical interventions (NPIs) in NYC in reducing the total number of infections and deaths among various age groups and locations for the period of January to December 2020. This city-specific model can provide novel insights for other cities, according to their unique age and location mixing patterns.

The NPIs include no intervention, school closures, social distancing for the entire population, social distancing for those aged over 64, and adaptive policies such as full lockdowns.

The results of the experiment show that control policies implemented in NYC reduced the number of infections by 72% and the number of deaths by 76% by the end of 2020.

Among all the NPIs, the results show that social distancing, in the form of reducing contact on public transport, banning public gatherings and the protection of the elderly in

public facilities, is the most effective control measure. It reduces the number of infections by 47% and the number of deaths by 51% across society, and reduces the number of both infections and deaths among the elderly by 47%.

Meanwhile, city-wide school closures may not work as effectively in terms of reducing the number of deaths, resulting in only a 4% reduction in the number of infections compared with the no-intervention policy.

The study implies that NPIs can contain the epidemic with minimal disruption to social contacts in the city, which is particularly important for cities like NYC and Hong Kong, whose economies rely on international trade.

"To confront the COVID-19 pandemic, novel and transparent data science approaches are essential for characterising population demographics, human movement and economic activities," said Dr. ZHANG.

The research was published in *Chaos*, a journal of American Institute of Physics under the title "The impact of non-pharmaceutical interventions on the prevention and control of COVID-19 in New York City".

RESEARCH CAPABILITIES EMPOWERED BY THE HONG KONG INSTITUTE FOR DATA SCIENCE AND THE CENTRE FOR SYSTEMS INFORMATICS ENGINEERING

Hong Kong Institute for Data Science (HKIDS) works closely with the School of Data Science to develop cutting-edge research and knowledge in the field. HKIDS is a University research institute that brings together interdisciplinary faculty members and students who have research interests in data science.

HKIDS is headed by Professor Joe QIN, Dean of School of Data Science, as its inaugural Director. The team is primarily comprised of members including the tenured and tenure track faculty members across CityU, in which 14 of them are from SDSC, including Professor Minghua CHEN, Professor Junhui WANG, Professor Dingxuan ZHOU, Professor Jonathan ZHU, Dr. Yining DONG, Dr. Clint HO, Dr. Lishuai LI, Dr. Xiao QIAO, Dr. Matthias TAN, Dr. Qi WU, Dr. Yu YANG, Dr. Qingpeng ZHANG, Dr. Zijun ZHANG and Dr. Xiang ZHOU. The HKIDS members represent different methodology cores or application-oriented satellite divisions, where some serve as principal investigators or project team leaders in interdisciplinary projects.

HKIDS aspires to be the international focal point for data science research initiatives and translational activities. It aims to be a leading data science platform for both researchers and practitioners to harness the power of big data. It serves as a research and education hub to integrate data science strengths across the campus, and help train next generation of data scientists, we offer research opportunities to PhD students.

HKIDS encourages faculty members to form project-based research teams and solve data-related challenges. The research teams are formed via the joint efforts between the Methodology Core & Application-oriented satellite divisions.



Nearly 500 audience across the academia and industry joined the three modules of the virtual IFAC Workshop Series organised by HKIDS held on 19 March, 21 May and 9 July in 2021.



The XIIIth International Workshop on Intelligent Statistical Quality Control 2019.

Centre for Systems Informatics Engineering (CSIE)

operates under the HKIDS, facilitating high quality and influential research in the area of data science. Celebrating its 10th anniversary, CSIE is committing to creating the best collaborative environment that allows researchers to develop the most updated state-of-the-art modeling methodologies and tools within recent technology breakthrough. Seven faculty members from the School, headed by Professor Joe QIN as its Director, including Professor Min XIE, Dr. Lishuai LI, Dr. Matthias TAN, Dr. Qingpeng ZHANG, Dr. Zijun ZHANG and Dr. Inez ZWETSLOOT are currently serving on the Team.


Health Informatics – Personalized Health Monitoring for Smart Elderly Care

The project aims to develop smart systems that can be effectively utilized for health prediction and analytics that support safe, informed and intelligent healthcare decision-making. This project integrates multi-sources patient data extracted from electronic health records and e-health monitoring platforms. This data can help facilitate individual patient decisions, organization decisions and healthcare policy decisions based on scientific data. The smart personalized health management system also assists professionals to manage an individual's health more effectively with quality service despite limited resources.

Transportation – Safety, Reliability and Disruption Management of High Speed Rail and Metro Systems

This project aims to ensure safety, avoid and manage disruptions, as well as to ensure operational efficiency of the metro system. The research team combines sensor data in order to diagnose important fault modes and degradation rates for the purpose of constructing real-time system operation decision rules. The team is researching how to avert demand spikes and overcrowding, balance supply and demand, and efficient and profitable management of revenues. We aim to make use of quality data to ensure orderly metro and high speed rail passenger flows and crowd control, as well as planning remedial supply and management both in normal operation and in the events of disruptions.

Energy Informatics – Prognostics and Health Management of Rechargeable Batteries

The project aims to develop prognostic and health management of rechargeable batteries consisting of a framework offering comprehensive yet individualized solutions for managing system health, including various techniques for prediction and estimation. The goals involve the studying of the degradation behavior of dischargeable batteries at varied temperatures, as well as developing a robust model for degradation estimation at varied temperatures. CSIE also conducts research in integrating battery based energy storage with renewable energy towards carbon-neutral and sustainability goals. 



Collaborative meeting with APT Satellite Holdings in November 2020.



A joint laboratory in financial technology and engineering has been unveiled by CityU and JD Digits, a leading digital technology company in mainland China, under a strategic collaborative agreement signed by both parties.



HIGHLIGHTS OF FLAGSHIP RESEARCH PROJECTS WITH INDUSTRY COLLABORATORS

JOINT LABORATORY IN FINANCIAL TECHNOLOGY AND ENGINEERING WITH JD DIGITS

Digital finance is transforming how people buy and sell, borrow money, and how financial services are provided. To explore and develop this new field HKIDS in collaboration with SDSC operates a joint laboratory in financial technology and engineering alongside JD Digits, a leading digital technology company in mainland China.

Established in early 2019, the joint laboratory was formed between CityU and JD Digits, which was the financial technology arm of JD.com, a global e-commerce platform, offering technology solutions to corporates and other clients to enhance their digital development.

Combining the first-class scientific research capabilities of SDSC and HKIDS and the extensive FinTech industry experience of JD Digits, the partnership has carried out cutting-edge research to create industry-leading solutions, especially in financial risk identification and management. The joint endeavour will help define the way forward for the future of FinTech development in the Greater China region and beyond.

After two years, Dr. Qi WU, Associate Professor of SDSC and coordinator from HKIDS, has stated that the joint laboratory has researched areas including asset pricing, financial risk monitoring and user behaviour.

The two parties have also conducted research on data modelling and analysis, and jointly developed innovative applications for financial engineering technologies as well as big data in risk-based loan pricing. With JD Digits sharing practical experience in the adoption of financial technology, HKIDS has been helping its partner to further enhance its scientific research capability and groom management professionals.

As we move into the era of FinTech 2.0, the market relies increasingly on flexibility. Financial Derivative Instruments and other related trading products demand strong innovativeness. JD Digits, for example, combines machine learning and AI in the application of financial risk management. HKIDS is able to help corporations on reducing the Non-performing Asset Ratio.

To address the problem of classical estimators that overlook the confounding effects between a lender's credit decisions and a borrowers' credit risk – as well as significant biases in risk assessment – the research team put forward a novel approach to construct estimators that have been proven to substantially reduce the estimation error. This will help technology conglomerates to better manage retail credit risks in the online marketplace, which are fundamentally different from the credit card default risks faced by commercial banks.

As seen from the research results, compared to traditional machine learning these new methods predict more accurately. This will be crucial and revolutionary for online marketing.

HKIDS AND DATASTORY LAUNCH JOINT LABORATORY IN AI AND BIG DATA

HKIDS and DataStory – one of the fastest growing unicorn enterprises in artificial intelligence in mainland China – have been collaborating since March 2021. Their joint laboratory specializes in research areas including, but not limited to Key Opinion Leader Sales Model and Intelligence Recommendation. The aim is to establish a collaboration platform between academia and certain industries and catalyze the transformation of research outcomes into use in the business world. Dr. Yu YANG, Assistant Professor of CityU's School of Data Science, is currently coordinating on this project.

The involved parties have been conducting research on data modelling and analysis, and are jointly pushing for the innovative application of big data and AI in online marketing intelligence. The emerging potential of AI and big data has resulted in great changes to business models and operations, thus increasing the needs of “Data x Academic” and “Data x Business” in the worlds of academic research and commerce.

In the era of social media, the advertisement industry is also undergoing tremendous changes. Anyone can share photos on the Internet and inspire marketing sales, thus increasing the importance of Key Opinion Leaders (KOLs). This joint lab can assess the influence of KOLs as well as push data driven recommendations, helping brands reach their target audience more effectively. The lab uses social media platforms to build models, providing precise predictions of KOL influence, as well as balancing the interests between sellers and consumers, thus establishing a client-based AI recommendation model for a healthy business eco-system.

Professor QIN, Director of HKIDS, believes one of the Institute's main roles is to spearhead incubation projects and intellectual properties, and to promote the social impact of new generation intelligent technology together with enterprises. In the future, HKIDS will collaborate with more top enterprises on R&D, or work on direct knowledge transfer.

RESEARCH AND CONFERENCES - LIU BE JU CENTRE FOR MATHEMATICAL SCIENCES

The Research Centre for Mathematical Sciences at City University of Hong Kong was founded by Professor Roderick SC WONG in 1995 and is currently led by its Director Professor Ding Xuan ZHOU, also the Chair Professor and Associate Dean of School of Data Science. Other members from the School of Data Science include Chair Professor Alain BENSOUSSAN, Professor Junhui WANG and Associate Professor Dr. Xiang ZHOU.

Officially named the Liu Bie Ju Centre for Mathematical Sciences (LBJ Centre) in 1997, the Centre has taken great strides since its founding, making substantial contributions to applied mathematical sciences as well as organizing regular international conferences and workshops, high level lectures, a bi-weekly colloquium, and public and internal seminars.

One of the leading research centres of its kind in the Asia-Pacific region, the primary mission of the LBJ Centre is to conduct first-class research in applied mathematics and in computational mathematics.

HKIDS and DataStory, one of the fastest growing unicorn enterprises in AI in mainland China, simultaneously signed a strategic collaborative agreement at a virtual ceremony between the two regions on 31 March 2021.

To this end, the Centre consistently attracts eminent visiting scientists from all over the world; regularly organizes international mathematics conferences and workshops, half-year programmes, and weekly colloquia; it actively seeks mathematical and computational problems arising in industry and financial sectors; and it supports the publication of journal articles, books, preprint series and lecture notes series. It also plays a leading role in attracting outside funding and donations for the purpose of enhancing research in applied mathematical sciences.

The research areas of the Liu Bie Ju Centre of Mathematical Sciences reflect its strength and vitality, including:

- Applied Differential Geometry
- Approximation Theory
- Asymptotics and Perturbation Methods
- Boltzmann's Equation
- Complexity and Computation
- Finite Element Methods, Wavelets
- Hyperbolic Conservation Laws
- Integral Transforms and Operational Calculus
- Learning Theory
- Mathematical Finance
- Mathematical Methods in Fluid Mechanics
- Mathematical Methods in Solid Mechanics
- Modeling and Mathematical Analysis in Elasticity
- Numerical Analysis, Control and Optimization
- Orthogonal Polynomials and Enumerative Combinatorics
- Partial Differential Equations and Calculus of Variations
- Plate and Shell Theory
- Special Functions of Mathematical Physics

SDSC/HKIDS AWARDED AI FOR FINTECH LAB

The Laboratory for AI-Powered Financial Technologies Limited (HKAIFT) was successfully awarded to a collaboration between City University of Hong Kong and Columbia University of the United States led by the late Professor Duan LI. Nine faculty members from the School of Data Science are currently serving on the Lab, which include Professor Minghua CHEN, Professor Yanzhi LI, Professor Joe QIN, Professor Jun WANG, Professor Jonathan ZHU, Dr. Yining DONG, Dr. Xiao QIAO, Dr. Qi WU and Dr. Zijun ZHANG who play various roles for the Lab. Currently Chair Professor Houmin YAN of CityU Management Sciences serves as the Director of the Lab. The HKAIFT Lab provides transformative analytics solutions for the financial services industry across the Asia-Pacific region. The R&D combines artificial intelligence, big data and blockchain technology with modern financial tools, applying in the areas of micro-lending, production and supply chain financing, capital markets, banking, and regulatory technology. ●



LINKING UP DATA SCIENCE ELITES THROUGH SEMINARS AND WORKSHOPS

DATA SCIENCE DAY 2020 – DR. KAI FU LEE AS KEYNOTE SPEAKER

CityU's first Data Science Day, organised by the School of Data Science (SDSC) and the Hong Kong Institute for Data Science (HKIDS), was held on 7 August 2020.

The occasion marked the 2nd anniversary of SDSC and HKIDS, and commenced with President Way Kuo's opening address. World-renowned artificial intelligence scholar and entrepreneur Dr. Kai-Fu LEE delivered the keynote speech via an online platform. A panel discussion on data science for interdisciplinary research

and education was held in the late morning. The day also featured two technical sessions to showcase HKIDS project presentations by faculty members across CityU.

In his talk, Dr. LEE detailed the technology development history of both the US and China and illuminated how the two nations came to be today's modern tech superpowers. He also shared with the audience news of the latest progress in cutting-edge fields such as digital currency, quantum computing, CRISPR and genomics.

Dr. LEE is the Chairman and CEO of Sinovation Ventures, which manages US\$2 billion in dual-currency investment funds and is a leading venture capital firm focused on developing the next generation of Chinese high-tech companies.



The 1st CityU's Data Science Day in August 2020.

INTERNATIONAL FORUM ON DATA SCIENCE AND COVID-19, PRESENTED BY TOP SPEAKERS

Reflecting the university's growing reputation for excellence in data science, leading scholars from City University of Hong Kong; Harvard University; Massachusetts Institute of Technology (MIT); Cornell University; University of Texas at Austin; University of California, Irvine; University of Hong Kong; and Harbin Institute of Technology (Shenzhen) convened online for an international forum on data, statistics and the COVID-19 pandemic in May 2020.

Professor Xihong LIN of Harvard University, member of the U.S. National Academy of Medicine, discussed how multi-faceted intervention strategies are crucial to containing the current pandemic. On the second day, keynote speaker Professor David SIMCHI-LEVI of MIT explored resiliency and the need for stress tests following serious flaws in global supply chains during the COVID-19 outbreak.

The talks covered the best approaches to containing the societal impact and economic consequences of the pandemic using tools from across data science, including specialties in engineering, management science, medical science and artificial intelligence.

The CityU speakers included Professor Jian LU, Vice-President (Research and Technology); Professor QIN, Dean of SDSC and Directors of HKIDS and CSIE; and other renowned speakers expert in data science, medical sciences, management sciences and engineering. The international forum was jointly organized by SDSC, HKIDS, and the College of Business, CityU.



CSIE: DATA-DRIVEN MANAGEMENT FOR SAFE AND RELIABLE RAILWAY SYSTEMS

With high-speed rail and metro systems rapidly developing in speed and complexity in many cities and regions, identifying effective ways to ensure their safe, reliable and efficient operation has become increasingly pertinent. Our school has started a multi-disciplinary research project to develop a platform of tools to improve safety and reliability in railway system health monitoring, crowd safety and disruption management.

Professor TSUI Kwok-leung, Adjunct Professor in the School of Data Science, is the former project coordinator of the five-year Theme-based Research Scheme (TRS) project, which included team members from CityU and other local and overseas institutions. The aim of the project was to innovate and advance rail system technologies to ensure safety, avoid and manage disruptions, and ensure operational efficiency.



World-renowned AI scholar and entrepreneur Dr. Kai-Fu LEE as Keynote Speaker for Data Science Day 2020.

Professor Min XIE, Chair Professor in the SDSC and Department of Advanced Design and Systems Engineering at CityU, is the current coordinator of the TRS project. Professor XIE aims to develop knowledge in self-cognisant fault detection and prognostics and in the health management of railway systems by synergising prominent sensor-based data management technologies and sophisticated modelling expertise, as well as to allow dynamic train deployment in response to abrupt events, accidents and other disruptions using real-time transportation network data.


One of their key studies is in the design of a novel domain-knowledge-guided data-driven framework to monitor and predict the health status of high-speed rail suspension systems by measuring real-time train vibration signals from sensors installed in multiple locations. Suspension systems

Professor Dingxuan ZHOU, Associate Dean and Chair Professor of SDSC, presided at the 3rd Workshop on Railway Operation for Safety and Reliability in November 2018.



play a major role in high speed railways. The failure of springs and dampers may lead to accelerated wear of wheels and rails. Suspension damage may even increase the risk of derailment.

To overcome certain limitations, the team proposed a model that can be trained quickly and adapted easily to different rail systems. It includes a feature extraction method, based on a simple dynamics model, to select the relevant information in the multi-location vibration data. This method also introduces a novel way to generate training datasets via a simple dynamic model and impact analysis.

Riding on the achievements of the TRS project, several research projects with industry and university collaborators from Hong Kong, Taiwan and mainland China are ongoing, including establishing an escalator health condition analytics model; monitoring the wear of high-speed train wheels based on wheel profile data and multi-location vibration data; passenger flow forecasting for disruption management; traffic scheduling; and maintenance planning. 



EARNING OUR PLACE IN THE WORLD

Data science is changing the world. Like oil before it, data science is driving a new industrial revolution, with our School among the pioneers. With the subject one of the pillars of the modern knowledge economy, we have made it our mission to nurture the next generation of data science professionals and to create data science services that will meet both local and international needs. We also help our students gain full data literacy and providing this as a General Subject to all who study at City University of Hong Kong. We proudly present some of our most noteworthy achievements below.

WORLDWIDE RECOGNITION: PROFESSOR QIN NAMED NAI FELLOW 2020



Professor Si-Zhao Joe QIN, Dean of School of Data Science, was elected as a Fellow of the National Academy of Inventors (NAI), one of 175 new worldwide fellows inaugurated in 2020. This election is recognition of Professor QIN's status as a truly prolific academic inventor.

The NAI recognises exceptional inventors with patents issued from the US Patent and Trademark Office who translate the inventions in a way that helps benefit society. Professor QIN received this great honour for his outstanding inventions, including neural network and AI technologies for the process industries. His expertise in data analytics and machine learning have had a huge impact on these subjects. He will be officially inducted as part of the 2020 Fellows class at the NAI Tenth Annual Meeting in November this year. To date, the NAI has elected 1,403 Fellows worldwide – 63 Fellows are recipients of the US National Medal of Technology and Innovation and US National Medal of Science, and 38 are Nobel Laureates, among other awards and distinctions.

SCHOOL OF DATA SCIENCE RECEIVING THREE HKPFS FELLOWSHIP STUDENTS



We are proud to announce that our School will be receiving three Hong Kong PhD Fellowship Scheme (HKPFS) students for the 2021/22 exercise. The number has tripled from last year, demonstrating the growing attraction of Data Science programmes at City University to international students. These three students come from the United States and mainland China. Established by the Research Grants Council (RGC) of the HKSAR government, HKPFS attracts the best and brightest students from across the globe to pursue their research degree programmes at Hong Kong universities. These three young scholars will be working with our Dean Professor QIN, Associate Dean Professor Ding Xuan ZHOU and Assistant Professor Dr. Xinyue LI. We look forward to their forthcoming achievements.

PROFESSOR CHEN ELECTED AS ACM DISTINGUISHED MEMBER



Our Professor, and Assistant Director of Hong Kong Institute for Data Science, Minghua CHEN received personal recognition upon his election to the Association for Computing Machinery (ACM) as a 2020 Distinguished Member.

The ACM is the largest computing society in the world, bringing together computing educators, researchers and professionals to share resources and address the field's challenges. Its Distinguished Members program recognises up to 10 percent of ACM worldwide members with at least 15 years of professional experience and five years of Professional Membership in the last 10 years.

Professor CHEN's key research includes online optimisation and algorithms; energy systems; intelligent transportation systems; distributed optimization; delay-constrained network coding; machine learning in networked and societal systems; and capitalising data-driven prediction in algorithm, etc. These research interests undoubtedly captured the attention of the ACM. Congratulations to Professor CHEN for this distinguished honour.

PROFESSOR QIN: SEMI-PLenary SPEAKER AT IFAC WORLD CONGRESS 2020

One of the few International Federation of Automatic Control (IFAC) Fellows from City



University Hong Kong, Professor Qin was invited last year to be one of the 11 plenary/semi-planetary speakers at the IFAC World Congress 2020 in Germany.

This multinational federation, founded in 1957, is concerned with automatic control and its representation in the fields of engineering, science and the impact of control technology on society.

The only speaker from Greater China presenting at IFAC 2020,

Professor QIN shared his insights on "Integrated Framework of Systems, Data, and Industrial Intelligence towards Industry 4.0", a speech which discussed the development of an integrated framework of systems with the assistance of dynamic data analytics, automated knowledge extraction and visualisation tools.





DATA SCIENCE TEAM WINNING INFOCOM 2021 BEST POSTER AWARD

Moving on to collective efforts, our research team (Professor QIN, Professor Minghua CHEN and post doc Yanfang MO) completed their project on "Optimal Peak-Minimizing Online Algorithms for Large-Load Users with Energy Storage".

Their project won the "Best Poster Award" at the 40th Institute of Electrical and Electronics Engineers (IEEE) International Conference on Computer Communications (INFOCOM 2021). IEEE INFOCOM is a top-ranked conference on networking in the research community, covering both theoretical and systems research.

It is a major event where researchers present and exchange significant and innovative contributions and ideas in the field of networking and other closely related subjects.

DR YANG ACQUIRING FUNDING FOR EARLY CAREER SCHEME

Dr. YANG has been awarded a research fund via the Early Career Scheme (ECS) for his project "Representation Learning for Subset Generation".

He is the first to propose to combine representation learning and adversarial learning to learn subset distribution and subset generator, which can benefit many high-impact applications such as social marketing and e-commerce warehouse inventory management.

The ECS, introduced in 2012/13 by the Research Grants Council, is intended to nurture junior academics and to prepare them for a career in education and research. The project will be completed in 2023.



PROFESSOR QIN ACCEPTING NSFC GRANT AWARD OF ¥2.64 MILLION

As well as his other various successes, Professor QIN has also secured a key-supported grant for "Data-driven abnormal situation diagnosis and self-healing control for complex industrial systems".

The National Natural Science Foundation of China (NSFC) granted an award of ¥2.64 million plus overhead. The NSFC, established in 1986 under the jurisdiction of the State Council, has been supporting basic research and fostering talented researchers, aiming to develop international cooperation and promote socioeconomic development.

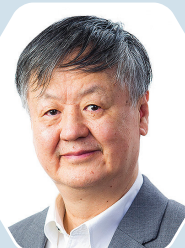
Professor QIN's NSFC grant award will go towards tackling challenges in industrial big data and providing a solution on data-driven abnormal situation diagnosis and self-healing control. The project is a collaboration with the National Key Lab on Synthetic Automation at Northeastern University.

PROFESSOR WANG ELECTED FOREIGN MEMBER OF THE ACADEMIA EUROPAEA

Congratulations to Professor Jun WANG, Chair Professor of the School of Data Science and the Department of Computer Science at CityU, for being elected as a Foreign Member of the Academia Europaea in 2021.

"I am deeply honoured to be recognised as a Foreign Member of this distinguished Academy as many Nobel Laureates, Wolf Prize and Fields Medal winners are counted among its members," said Professor WANG.

Professor WANG is internationally recognised for his research excellence in computational intelligence, neural computation, optimisation methods, data processing and intelligent control. He has published some 260 journal papers, 15 book chapters, 11 edited books and numerous conference papers in those areas. His current research interests include neural networks and their applications.



EIGHT FACULTY FROM THE SCHOOL OF DATA SCIENCE RECEIVING GENERAL RESEARCH FUNDS

Eight faculty members (listed on the right) have been awarded grants from the General Research Fund (GRF) in the 2021-22 funding exercise.

Our School prides itself on fostering a strong research culture and these funds are evidence that SDSC is home to a high quality research capability and environment.

Congratulations also to Professor Dingxuan ZHOU for his success in getting the 25th GRF at CityU!

- Professor Joe QIN
- Professor Dingxuan ZHOU
- Professor Jun WANG
- Professor Min XIE
- Professor Minghua CHEN
- Professor Junhui WANG
- Dr. Qingpeng ZHANG
- Professor Alain BENSOUSSAN in collaboration with Professor Phillip YAM Sheung-chi of the Department of Statistics, CUHK

A VARIETY OF LEARNING OPPORTUNITIES ENHANCE STUDENTS' OPENNESS TO DIVERSITY

While relatively new, the School of Data Science has been growing and gaining popularity, thanks to students who dare to embody the vision of our School. Seeing aspiring data scientists grow and use their education to better the world, get recognised for their work, and take on successful roles after graduation, has been a great source of inspiration for the entire SDSC community. In this section, we highlight these individuals, and their untiring dedication to their discipline within and outside the school grounds. Here, we also talk about the support initiatives which have been put in place to aid our students' learning and progress.

AWARDS

At SDSC, outstanding students abound. Given the right learning environment and resources, these young data scientists discover more of their potential as they unlock more possibilities from this ever-evolving discipline. Here are just a few notable school milestones and student achievements we have witnessed over the past two years.

SDSC TEAM IN DIGITAL CHINA INNOVATION CONTEST 2019 FINALS

The "Intelligent Missing Data Imputation of SCADA in Offshore Wind Farm" project, led by Dr. Zijun ZHANG, Associate Professor of SDSC, made it into the top three of the 2019 Digital China Innovation Competition. Composed of CityU students Xin LIU, Zhong ZHENG and wind energy domain expert Zheming CAO, the team bested over 860 teams at the national finals. They presented a solution that fills in the missing data typically encountered by Supervisory Control and Data Acquisition (SCADA) systems when remotely monitoring wind turbine performance. Using big data analysis, they wowed the judges and the audience with their project's data recovery accuracy of up to 99 per cent.



The youth contestants from SDSC led by Dr. Zijun ZHANG bested over 860 teams.

MSDS STUDENTS' WORK ACCEPTED BY AN ACADEMIC CONFERENCE

A group of MSDS students led by Chenxi DONG joined global AI innovators at the IEEE International Conference on Biomedical and Health Informatics (BHI '21) on 27-30 July 2021 to showcase their 6002 project, "An Integrated System for Online Pharmacy Drug Product Matching". IEEE BHI '21 is a major International conference and networking platform for scholars in the topics of informatics and computing in healthcare and life sciences.





The winning team, led by a student leader from SDSC (3rd from right), received HK\$100,000 as a seed fund to support them to develop their innovative ideas into a start-up project.

HK TECH 300 – SDSC STUDENT ON THE LIST OF SEED FUND-WINNING TEAMS

Project title: Mission Board (城堡)

HK Tech 300 is a large-scale flagship innovation and entrepreneurship programme organised by CityU for aspiring entrepreneurs among CityU students, alumni, research staff and others to launch start-ups and ignite their entrepreneurship journey. The programme aims to create 300 start-ups in three years, providing educational and growth opportunities for CityU students, and translating CityU research results and intellectual properties into practical applications.

With the Seed Fund of HK\$100,000, a six-member student team entitled "Trendsetter" (萬事屋) comprising Team Leader Peter (School of Data Science Year 2, CityU), Sunny (College of Business Year 2, HKUST), Melody (College of Business Year 1, CityU), and Wayne, Janet and Ethan (all School of Law Year 2, CityU) is able to

put its idea into action in the coming year. The team endeavours to provide a for-hire platform for everyone under the trend of slashie. Whether you have a full-time job or not would not affect your use of the app. The greatest selling point is the flexibility which allows customers to tailor-make their quests, ranging from buying a coffee to hiring a tutor. On the other hand, other users can accept the posted quests to achieve a win-win situation. As such, the gap between marketplace app and delivery app can be filled. The app targets university students in the current stage, but will be rolled out to Hong Kong citizens and then foreign users ultimately. Finally the team would like to present their heartfelt gratitude towards Professor Johanthan ZHU, Chair Professor of Department of Media and Communication (COM) and School of Data Science; and Dr. Vincent WANG of COM for their assistance all along.

MILESTONE:

1st quarter of 2022:
Complete the project proposal and solve hidden problems

2nd quarter of 2022:
Build the trading system and develop corresponding apps

3rd quarter of 2022:
Beta-test on City University of Hong Kong

Ultimate Goal:
Provide service to Hong Kong citizens and overseas users

REFLECTIONS ON INTERNSHIP EXPERIENCE

THE SCHOOL OF DATA SCIENCE PROVIDES EXCLUSIVE INTERNSHIP OPPORTUNITIES FOR STUDENTS

To augment students' classroom learning with real-world education, the School of Data Science has been beefing up its internship programme with corporate partners around Hong Kong. To date, SDSC has set up internship arrangements with close to 20 companies, including Active Care Group, APSTAR, ASTRI, China Telecom, Fleet Management Limited, InnoHK, KG Data, NetEase Games, Nova Credit, Ocean Park, Reinsurance Group of America, Innovation and Technology Commission of the HKSAR Government (STEM Internship Scheme), SF Express, Skieer, TianYanCha and Wenggroup, among others.

The programme seeks to offer SDSC students priority on-the-job learning placements in these companies. It provides them an opportunity to put their theoretical knowledge into practice and address real-world problems. It also introduces students to the working environment, where they can further develop their technical, communication and leadership skills. Additionally, they can network with people fulfilling data science roles or who are potential users of data science in the workplace, such as business and data analysts, programmers, machine learning engineers and systems professionals. By meeting these potential mentors, our future data scientists can better prepare for their career after graduation.

Briefing sessions led by our Internship Coordinator, Dr. Qingpeng ZHANG, are scheduled to inform students about the programmes, as well as recruitment talks and pre-internship training.

Around 50 local, mainland and international students in our programme gained fruitful hands-on experiences during their 2021 Summer Semester local and international internship placements. Spanning the public and private sectors, these internships provided a valuable platform for our students to network, put their skills into practice and learn directly from experts from a range of industries.

Mr. QIU Yuchen

Name of Company: RGA (Hong Kong)
Intern's Position: Internal Audit Intern

I'm currently working with RGA's internal audit team, helping them assess the organisation's operations.

Having no audit and accounting knowledge was my major challenge. But since we can't always be ready in reality – unlike in school – I've learned that bringing a proactive and humble attitude matters.

Fortunately, colleagues have been accommodating, answering my questions such that what puzzled me at first gradually made sense. As data is involved in every audit stage, my work has been a good opportunity for applying data science, improving processes and making some real-world difference.

I thank SDSC for helping me make an informed decision through its internship presentations and sharing sessions. This experience has been valuable, fulfilling, and beneficial to my future development.



I am happy to serve as an interns here together with my fellow classmates from SDSC Miss Renee YEUNG and Mr Kunal Singh CHAUHAN.

Mr. Muhammad DANISH

Name of Company: Fleet Management (Hong Kong)
Intern's Position: Data Analytics Intern

I'm a full-time Data Analytics Intern at Fleet Management Limited. For this 12-week internship, I am working on a data science project, gathering data via SQL, data cleaning, optimisation and data visualisation.

Apart from technical skills, I am also learning communication, professionalism, networking, presentation and other soft skills which are immensely important in the industry and to one's growth. Applying learned concepts to real-world big data and to solving practical problems is very amazing, and makes me more enthusiastic about my future career.

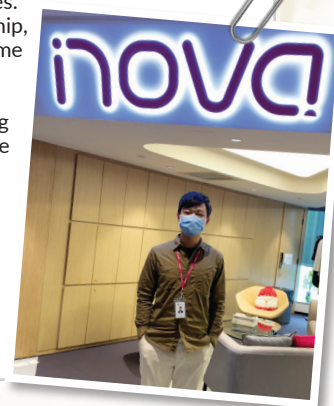
Although SDSC just started three years ago, I'm happy about how it keeps bringing forward many exciting internship opportunities. This internship will enhance my hard and soft skills, helping me establish a career in data science.

Mr. LUO Haolong

Name of Company: Nova Credit Limited (Hong Kong)
Intern's Position: Intern – Business Insights and Risk Strategy Advisory
(Department name changed on 2/7)
Before: Intern – Bureau Data and Risk Strategy Advisory

I interned at Nova Credit Limited (Nova) from June to August. I performed User Acceptance Testing (UAT) for the product's back-end web portal and front-end app, and prepared visualisation reports using Qlik Sense. I also applied my academic knowledge of machine learning to detect outliers and help accelerate the data cleaning process. Nova indeed enabled me to engage in different types of jobs and enhance my abilities.

Throughout the internship, my biggest challenge was time management. There were various tasks we needed to do simultaneously. Balancing different work routines while ensuring we were on track was difficult. However, a colleague guided me and helped me improve. I immensely enjoyed working with them, and I truly appreciate this unique internship experience.



Mr. TSOI Wai Cheung

Name of Company:

Electrical and Mechanical Services Department (EMSD, HKSAR)

Intern's Position: Summer Intern—Software Engineer



As a Software Engineer in the Boundary Crossing Facilities and Transport Services Division of the Electrical and Mechanical Services Department (EMSD), I worked on a new financial system for managing work orders and the Electrical and Mechanical Services Trading Fund.

I am fortunate to have experienced firsthand the EMSD work in Hong Kong International Airport. Besides learning how to launch new projects using a standardisation procedure, I also gained more insight into the various roles I could perform. The diverse work environment trained me to solve problems without guidance, and communicate effectively and timely with colleagues for solutions.

This summer internship taught me a lot more than expected, and I'm now more determined to be a software engineer after graduation.

Mr. HUNG Yeung Sing

Name of Company:

Cathay Pacific Services Limited (Hong Kong)

Intern's Position: IT

I interned at Cathay Pacific Catering Services as part of its information management team, helping to build an ordering system for the deli-delight shop and 7-11 that deployed on the AWS cloud service.

Meetings with users and the dev-ops team taught me how cloud service benefits different industries' growth and operations. Though building an ordering system from scratch was quite challenging, I learned about the front-end and back-end problems that developers face. It was really great to see how IT works with different users in fulfilling their requirements and expectations, as well as in automating their daily work.

This programme led me to think about better equipping myself for the future, like getting myself familiar with more computer languages and data analytic tools.



Miss TANG Xinya

Name of Company: Cider, Beijing (China)

Intern's Position: Data Analysis Intern

My summer internship at Cider in Beijing, mainland China has been one of the most important learning experiences of my university life. As a Data Analysis Intern, I managed customer data, helping develop reports, visualisation dashboard and analysis, and evaluating changes. I also helped optimise website functions, such as the replenishment strategy and keyword association, through model-building.

The most interesting and difficult part was learning how to combine data with business. Compared to our Year 3 school projects, the real-life application is far more complicated but more interesting at the same time. This internship also broadened my data analysis knowledge, helping me find proper indicators for updated market performance, and exposing me to the latest analysis methods and technical tools.



Mr. GUAN Jiahao

Name of Company

Hang Seng Bank (Hong Kong)

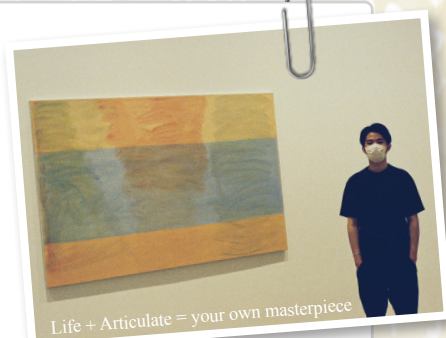
Intern's Position

Summer Seed Internship (Digital Banking Service)

I was fortunate to be part of the Summer Seed Internship (Digital Banking Service) programme of Hang Seng Bank (Hong Kong), aiding the retail banking department's data management team with data science-related projects through SQL and Tableau.

Besides the technical job aspects, I learned about soft skills which are hardly taught in university, including observing good relations with your seniors, work ethics and even proper workplace attire. Vital to our future career, these soft skills help us adapt to the real world after graduation.

If you want to accelerate your growth, internship is the way to go. Don't hesitate to grab this opportunity. Whatever you want to be, it's time to equip yourself. If not now, when?



Miss LEE Yewon

Name of Company: Vandalsoft (South Korea)

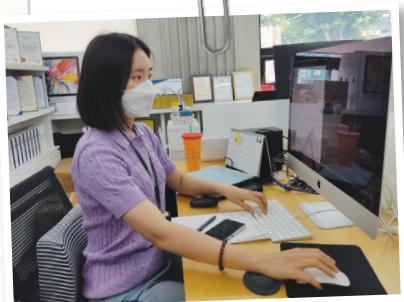
Intern's Position: Back-end Developer

As a Back-end Developer Intern at Vandalsoft in South Korea, I build applications to form the optimal edible insect breeding environment, including a cricket-breeding robot manipulation system. Applying my Year 3 academic knowledge, I design databases, as well as build servers and Application Programming Interfaces.

This internship experience taught me that communication skills are as important as technical skills in the software engineering field. Communication is necessary when working with team members and managers, and understanding client requirements. Documentation helped me handle clarity issues.

I also learned how to define a feature from the user's perspective prior to developing it.

My Vandalsoft journey allowed me to gain hands-on work experience, and to truly navigate a professional environment.



OUR POSTGRADUATES – EMBARKING ON A NEW JOURNEY AS DATA SCIENTISTS

GIVING BIRTH TO THE FIRST TWO BATCHES OF ALUMNI

The School of Data Science (SDSC) recently held its Commencement for the second graduating batch of PhD and Master's programme students. On this occasion, Dean Professor Joe QIN shared that SDSC will be home to 500 students across all levels after this summer. In particular, the Dean acknowledged the growth of postgraduate students to be instrumental to the continued expansion of SDSC.

The School honoured the first batch of 85 postgraduates for the Classes of 2019 and 2020 in a virtual graduation ceremony held in February this year, while the second batch of 40 PhD and Master of Data Science (MSDS) students attended Commencement in May 2021. SDSC's postgraduate programmes continue to gain traction with students looking to upgrade their educational and career prospects with advanced data science knowledge.

Graduate representative Miss Catherine Margaret MOONEY, in her speech during the recent Commencement in May 2021, expressed her appreciation towards the School's postgraduate programme. She also remarked on the rapid digitalisation of the world which has made graduates like her more determined to practice their data science profession and "transform the world for the better".



Professor QIN and Programme Leaders in dialogue with MSDS students.



Miss Catherine MOONEY representing her class to give a speech during the Commencement.



Congratulating our fresh alumni on their Commencement.

OUR UNDERGRADUATES – ACQUIRING DIVERSE LEARNING EXPERIENCE

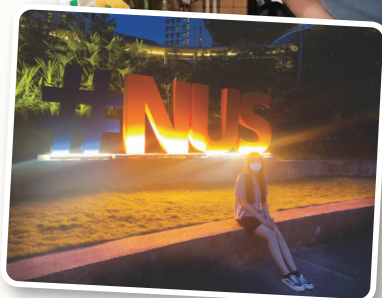
ACADEMIC EXCHANGE EXPERIENCE AT THE NATIONAL UNIVERSITY OF SINGAPORE

SDSC's academic exchange programme is a fruitful experience for many undergraduate students. Miss Xinya TANG (Cecilia), who studied at the National University of Singapore (NUS) during the second semester of academic year 2020/21, talked about her learning experience in a brand-new environment.

Knowing that data science-related courses are rare, Cecilia was glad to have taken courses

like machine learning and computer-aided data analysis at NUS.

Besides learning on campus, she also loved meeting new people and making friends. Her classmates showed her the city and its culture, while she told them about her life in Hong Kong. "It was an interesting and memorable experience. All these activities in Singapore have broadened my horizons and enriched my life," she said.



INTERACTIVE MEET-UPS WITH THE DEAN

SDSC students had the opportunity to meet and connect casually with Dean Professor Joe QIN during the "Dean's List Awards Presentation" and "Meeting with the Dean". These two events were held on 12 March 2021 and 29 March 2021 respectively, offering an interactive communication channel for students to talk about their school experience, goals and ambitions. These occasions also served as a platform for the Dean to offer advice and inspiration, as well as obtain insights to improve the curriculum.

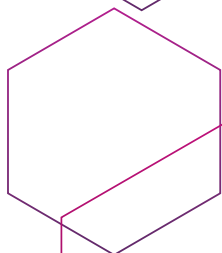
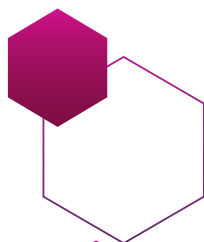
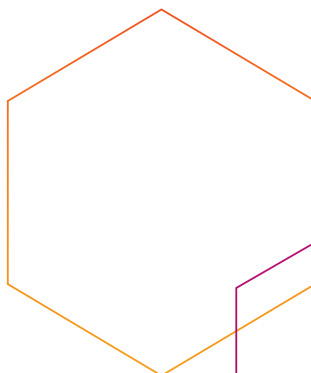
Undergraduate students in the academic year 2019/20 and 2020/21 who achieved an SGPA of 3.7 or higher in a semester were recognised during the Dean's List Awards Presentation. After the awards ceremony, the Dean spent time with the students to encourage them. Programme Leaders Dr. Xiang ZHOU and Dr. Zijun ZHANG, as well as Deputy Programme Leaders Dr. Qingpeng ZHANG



Our Programme Leaders joined the Dean to meet with our outstanding students at the "Dean's List Awards Presentation" and mingled with them to share experience and advice.

and Dr. Clint HO, were also presented to share this joyful moment.

The "Meeting with the Dean" event brought together MSDS students and Professor QIN. They exchanged inputs about the MSDS programme. Programme Leader Dr. Matthias TAN and Deputy Programme Leader Dr. Long FENG also enriched the conversation with their career stories and advice. ●



SCHOOL OF DATA SCIENCE

+852 3442 7887
sdscgo@cityu.edu.hk
www.cityu.edu.hk/sdsc

16/F, Lau Ming Wai Academic Building
City University of Hong Kong
83 Tat Chee Avenue Kowloon Hong Kong



Printed on environmental friendly paper

