澳門城市大學
Universidade da Cidade de Macau
City University of Macau

FDS
數據科學學院
Faculty of Data Science

2023

ANNUAL REPORT

Faculty of Data Science

City University of Macau

WELCOME MESSAGE

Welcome to the annual report of the Faculty of Data Science (FDS), City University of Macau! We are thrilled to share with you the many accomplishments and milestones achieved by our faculty, students, and researchers over the past year.

As a fast-growing institution in data science education and research, we continue to grow tremendously and to push the boundaries of knowledge and innovation in this rapidly evolving field. We have successfully gained the accreditation of our new programs in Bachelor of Computer Science, Master of Computer Science and PhD in Computer Science, respectively, and have successfully recruited new students into these programs for the 2023/2024 academic year. Together with Central MinZu University, we have successfully recruited our first batch of 120 high quality students into the joint program in "Data Science and Big Data Technology" in Hainan. We also have gone through the re-accreditation process for our existing programs of Bachelor of Intelligent Technology and Services, Master of Data Science and PhD in Data Science, respectively, with the Education Quality Evaluation Agency of the Ministry of Education.

Our academics and students have made significant contributions in research to various areas of computer science, including artificial intelligence, information security, and data science, and their applications in various areas.
In this report, you will learn about the exciting achievements in teaching and learning and research projects conducted by our academics and students, including collaborations with industry partners and government agencies. You will also read about our new academic programs and curriculum designed to meet the growing demand for computer science professionals.
Our commitment to excellence, development, and inclusion is reflected in our efforts to create a welcoming environment for all members of our community. We believe that a development and inclusive environment fosters creativity, collaboration, and innovation, which are essential for excellence in computer science research and education.

We hope that this report will give you a sense of pride in being part of the Faculty of Data Science and inspire you to join us in shaping the future of the faculty.

Contents

Brief overview of the Faculty of Data Science

We have been growing rapidly in the last few years. At the end of 2022, the Faculty of Data Science had 662 students, 10 full-time academics and 3 professional staff. These numbers have increased to 1071, 25, and 4, respectively at the end of 2023.

Snapshot of FDS staff and student numbers at the end of 2023

Student numbers and levels. As shown in Table 1, FDS has 1071 students in all levels at the end of 2023.

Table 1. Student numbers

FDS Program Overview						
Program Name	**Student Number**					
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Deferral**	**Total**
Bachelor of Intelligent Technology and Services	174	184	158	60		576
Bachelor of Computer Science	39					39
The joint program with the Central MinZu University in Hainan	119					119
Master of Data Science	77	78			4	159
Master of Computer Science	39					39
Doctor of Data Science	37	39	19		12	107
Doctor of Computer Science	32					32
Total Student Number	**517**	**301**	**117**	**60**	**16**	**1071**

Where 12% are PhD students, 18% are master students and 70% are undergraduate students, respectively, as shown in Table 2.

Table 2. Student levels

Ph.D.	**Masters**	**Bachelors**	**Total**
139	198	734	1071
12%	18%	70%	100%

Academic and professional staff numbers. At the end of 2023, FDS have 25 full-time academics and 4 professional staff. Among the 25 full-time academics, 2 of them are full professors, 3 associate professors, 16 assistant professors, 2 lecturers and 2 specially appointed professors.

Five additional academics will join the faculty in January 2024, making the number of full-time academics in the faculty to be 30. We are also recruiting an additional 22 new academics for the 2024/2025 academic year, and these new academics will join the faculty from August 2024. Therefore, the planned total number of academics in the faculty will be over 50 in 2024.

Snapshot of FDS publication numbers at the end of 2023

Table 3 shows FDS has published 91 papers during 2023. Among the 91 number of publications, 64 are SCI indexed papers, and 52 of them belong to the JCR Q1. Table 3 also shows these numbers in 2022 as a comparation.

Table 3. Publication numbers in 2022 and 2023

	Q1	**Q2- Q4**	**EI**	**Monograph**	**CSSCI Core Journal**	**General Journal**	**ESCI**	**SCI Indexed**	**Total**
2022	41	21	14	1	1	0	2	62	80
2023	52	12	19	5	0	2	1	64	91

Teaching and learning

We have achieved tremendous outcomes in teaching and learning in 2023. Our new programs in computer science have started to recruit new students and all our existing programs have successfully gone through the re-accreditation process.

New programs and re-accreditation of existing programs in 2023

At the end of 2022, FDS had the following 3 programs:
- Bachelor of Intelligent Technology and Services, with an annual quota of 200.
- Master of Data Science, with an annual quota of 80.
- PhD in Data Science, with an annual quota of 40.

In 2023, 3 new programs and 1 joint program have been added into FDS offering. Therefore, FDS is currently running 2 PhD programs, 2 master programs and 2 bachelor programs, plus one joint program with the Central MinZu University in Hainan:
- Bachelor of Intelligent Technology and Services, with an annual quota of 200.
- Bachelor of Computer Science, 2023 quota was 60. Will be increase to 200.
- Master of Data Science, with an annual quota of 80.
- Master of Computer Science, 2023 quota was 40. Will be increased to 80.
- PhD in Data Science, with an annual quota of 40.
- PhD in Computer Science, with an annual quota of 40.
- The joint program with the Central MinZu University in Hainan, with an annual quota of 120.

A highlight of 2023 achievement in teaching and learning is the success of going through the re-accreditation process for our existing programs of Bachelor of Intelligent Technology and Services, Master of Data Science and PhD in Data Science, respectively, with the Education Quality Evaluation Agency of the Ministry of Education. These programs have received high commendations by the Agency. In particular, the Agency's assessment for our Bachelor of Intelligent Technology and Services program is "well demonstrating the program characteristics of the cross-integration of intelligent technology and modern services." The assessment for our Master of Data Science program is "the master's degree program with clear, strong and in-depth objectives is offered, and the interdisciplinary and diversified talent training model is explored". For our PhD in Data Science program, the assessment is "The program has distinctive characteristics and has had a great impact on domestic and international academic circles." Of course, a critical recommendation for all our existing programs is the lack of full-time academics, and we are in the process of recruiting more academics in the coming years.

Student organization activities, achievements, and awards

Table 4. Student organization activities

Activities Name	Date	No. of participants	Participants Group
Academic seminar：奇點時刻 AIGC 與 ChatGPT	2023/03/31	120	2022 級碩士研究生，2022 級博士研究生
Academic seminar：圖文智能計算和推理的研究、應用和未來	2023/04/20	120	2022 級碩士研究生，2022 級博士研究生
Academic seminar：Demystifying Deep Learning especially ChatGPT	2023/04/28	120	2022 級碩士研究生，2022 級博士研究生
Academic seminar：氣候變遷下的澳門：過去、現在、未來	2023/05/10	40	2022 級碩士研究生
Academic symposium: Academic salon	2023/05/25	130	FDS 全體研究生導師，2022 級碩士研究生，2022 級博士研究生
Academic seminar：My View on Research Methodology	2023/09/07	40	2023 級博士研究生
Academic seminar：人工神經網路在海嘯數據同化中的應用	2023/11/10	120	2023 級碩士研究生 2023 級博士研究生
Academic seminar：Towards Robust Autonomous Driving Systems	2023/11/20	80	2023 級碩士研究生 2023 級博士研究生
Academic symposium: Academic salon	2023/12/15	180	FDS 全體研究生導師，2023 級碩士研究生 2023 級博士研究生

Table 5. Student achievements and awards

Competition Name	Type	Date	Awards	Awardees	No. of Awardees
華為 ICT 大賽 2023-2024 澳門站	澳門區賽	2023/12	網絡賽道一等獎	導師：應作斌副教授 學生：方雲松、閆啟月、張一諾	4
2023 年“智青春·算未來”第五屆全球校園人工智慧算法精英大賽“全國總決賽”	全國賽	2023/12	一等獎	導師：劉文堅副教授 學生：許家豪、諸戒康、馬雨軒	3

2023 年“智青春·算未來”第五屆全球校園人工智慧算法精英大賽“全國總決賽”	全國賽	2023/12	一等獎	導師：劉文堅副教授 學生：姚安舟、胡鎮宇、楊豐源	3
2023 年“智青春·算未來”第五屆全球校園人工智慧算法精英大賽“精英 II 賽區選拔賽”	省決賽	2023/12	一等獎	導師：劉文堅副教授 學生：許家豪、諸戒康、馬雨軒	3
2023 年“智青春·算未來”——第五屆全球校園人工智慧算法精英大賽“精英 II 賽區選拔賽省級”	省決賽	2023/12	一等獎	導師：劉文堅副教授 學生：姚安舟、胡鎮宇、楊豐源	3
“華爲杯”第二十屆中國研究生數學建模競賽	全國賽	2023/09	全國二等獎	碩士研究生賈永建、鐘禧兒	2
廣東省計算機設計大賽-人工智能實踐賽	省決賽	2023/07	二等獎 (十九組之一)	導師：劉文堅副教授 學生：王耀康、史雪茹、康嘉菁	3
廣東省計算機設計大賽-人工智能實踐賽	全國賽	2023/08	三等獎	導師：劉文堅副教授 學生：王耀康、史雪茹、康嘉菁	3
廣東省計算機設計大賽-大數據實踐賽 廣東省決賽	省決賽	2023/07	二等獎 (十二組之一)	導師：胡卓民講師 學生：梁一博、范玉喆	2
廣東省計算機設計大賽-大數據實踐賽	全國賽	2023/08	三等獎	導師：胡卓民講師 學生：梁一博、范玉喆	2
第十三屆“挑戰盃”中國大學生創業計劃競賽	全國賽	2023/04	銅獎 (1079 項之一)	導師：劉文堅副教授 碩士生許舜、博士生王涵	2
第十三屆“挑戰盃”中國大學生創業計劃競賽	全國賽	2023/04	銀獎 (309 項之一)	導師：江愷瑤助理教授、葛梅助理教授 學生：陳廣舜及商學院 2 名碩士生胡芯滔、朱文慧	3
粵港澳大灣區 IT 應用系統開發大賽-大灣區決賽	省決賽	2023/02	二等獎 (十四組之一)	導師：朱家偉副教授 學生：王嘉许、杨若辰、郑光远、周泽君	4

粵港澳大灣區 IT 應用系統開發大賽-大灣區決賽	省決賽	2023/02	特等獎-銀獎(三組之一) 最佳報告獎(二組之一)	導師：朱家偉副教授，江愷瑤助理教授 學生：康嘉菁、王耀康、李亚璇	3
華為第七屆全球 ICT 大賽——澳門站	澳門區賽	2022/11	網絡賽道三等獎	導師：應作斌副教授 學生：金雨心、馬晨曉、劉蘊芝	4
"中國光谷·華為杯"第十九屆中國研究生數學建模競賽	全國賽	2022/10	一等獎(197 隊之一)	碩士生罗海琼	1
2022 澳門網絡安全技術大賽	澳門區賽	2022/09	大學組銀獎	學生：熊錦翔、倪爾泰，潘卓群、周岐和	4
2022 澳門網絡安全技術大賽	澳門區賽	2022/09	公開組優異獎	學生：金雨心、馬晨曉、孔藝彤、向宇雯	4
山東省健康醫療大數據應用競賽 AI 算法賽道	山東省賽	2022/09	第一名	博士生邢魯民	1
2022 年中國高校計算機大賽-網絡技術挑戰賽 C4-全國決賽	全國賽	2022/09	三等獎(131 項之一)	導師：朱家偉副教授 胡景皓、孔令岩	2
2022 年中國高校計算機大賽-網絡技術挑戰賽 C4 (港澳台賽區)	澳台賽區	2022/08	一等獎	導師：朱家偉副教授 胡景皓、孔令岩	2
Subtotal of Awards					**15**
Subtotal of Awardees					**20**

Alumni

Bachelor of Intelligent Technology and Service Program

The Bachelor of Intelligent Technology and Service program at our prestigious faculty has produced 43 talented graduates with an impressive graduate rate of 93.5% in the academic year 2022-2023.Many graduates have chosen to pursue master's degrees, with six accepted into the Master of Data Science program at the City University of Macau and two at the University of Technology of Macau. Eight graduates have chosen to study abroad, with three in the UK, four in Australia, and one in Singapore. Our graduates' study at world-class educational institutions such as the Australian National University, Sydney University, Melbourne University, National University of Singapore, and University College London. The success of our alumni demonstrates their hard work, dedication, and the quality of education provided by our institution. We are confident they will continue to make significant contributions to their fields.

Master of Data Science Program

Since the Master of Science in Data Science program began, 119 graduates have graduated from the University. According to the graduate survey report from class 2018 to class 2021, the most graduates were male (75.9%), while females accounted for a smaller proportion (24.1%). Most graduates came from mainland China (96.6%), with only one graduate from Macau (3.4%). Regarding professional prospects, most graduates held an optimistic attitude (44.8%), some had a relatively optimistic attitude (41.4%), a minority expressed no opinion (6.9%), and some felt confused (6.9%). Currently, most graduates were already employed (58.6%), while a minority chose to pursue further studies (41.4%).

Employment:

The employed graduates (58.6%) were engaged in data science-related work (41.2%), followed by network engineering and security (11.8%), software development (11.8%) and other fields (35.2%). Most of these graduates worked in mainland China (88.2%), with a small number working in Macau (11.8%). The main factors influencing their choice of current job were salary and benefits (35.3%), followed by popular industry (23.5%) and related to studying in their field (23.5%), followed by family hospitals (11.8%) and personal interest (5.9%). And their future job plans are mainly to continue working in the same company (88.2%), followed by plans to join other companies in data science-related industries (5.9%), and other unemployed (5.9%)

Further Studies:

Among the graduates who chose to pursue further studies (41.4%), the vast majority are pursuing doctoral degrees (87.3%), while the remainder are enrolled in other professional programs or a second master's degree (12.7%). In terms of field choice, an overwhelming majority (94.6%) continue to deepen their expertise in related cutting-edge areas such as Data Science, Artificial Intelligence, and Computer Science, with the remaining (5.4%) branching into other disciplines. Their primary goals are academic research (61.8%) and industry-oriented research roles (38.2%). As for perceived advantages in admission, the leading factor is individual capability and research potential (45.7%), followed by academic record (34.3%) and recommendations or research experience (20.0%).

Doctor of Data Science Program

Since the Doctor of Science in Data Science program began, 50 graduates have graduated from the University. According to the graduate survey report from class 2018 to class 2021, the most graduates were male (82%), while females accounted for a smaller proportion (18%). Most graduates came from mainland China (88%), with only one graduate from Macau (8%) and came from other places (4%). Regarding professional prospects, most graduates held an optimistic attitude (88%), some had a relatively optimistic attitude (12%). Currently, most graduates are already employed (92%), while a minority chose to start their own business (4%), and doctoral student (4%).

Employment:

According to the graduate survey report from class 2018 to class 2021, the employed graduates were involved in data science-related work (56%), while a minority related to computer and data education (20%), followed by network engineering and security (4%), software development (8%), and other industry (12%). Most of these graduates were employed in mainland China (88%), with a small number working in Hong Kong (4%) and Macau (8%). The primary factor influencing their choice of current job was personal interest (28%), followed by relevance to their field of study (32%), their own ability (20%), salary and benefits (4%), and others (16%).

Entrepreneurship:

About 4% of doctoral graduates started their own businesses, all in the technology sector. This trend highlights the role of PhD talent in driving innovation and economic growth through tech-based ventures.

Research and Innovation

Overview of research areas and focus

In 2023, our faculty has achieved remarkable progress in research and innovation. Our dedication to pushing the boundaries of data science has led to several groundbreaking projects with the total amount of 5,310,000 MOP. One of the most notable funded projects was a collaboration between several faculty members and external partners to develop a cross-domain platform.

In addition to the funded projects, our faculty has published many papers in top-tier journals and conferences. These publications cover a range of topics, including cybersecurity, AI and bioinformatics.

To further share the expertise and knowledge, our faculty members have participated and delivered keynote speeches in various events. These events provide an opportunity for our faculty members to share the latest research findings and insights on the future of data science. As keynote speakers, they have delivered presentations on topics such as the latest trends in AI security, the future of ChatGPT, the future talent plan in data science, and the impact of female scientists.

Our faculty has made significant progress in research and innovation in 2023. The projects have received funding, our work has been published widely, and we have built solid collaborations with prestige organizations. With our staff's continued dedication and passion for data science, our faculty looks forward to making even more advancements in the field in the years to come.

Funded research projects

In 2023, we have attracted around 5,310,000 research funding in 2023. The areas ranged from cybersecurity, healthcare data analytics, collaborative platform and Artificial Intelligence. Those grants can support our faculty to contribution to the development of Macau and Greater Bay Area.

Table 6. Funded research projects in 2023

Ref	Funding Unit	Project Title	Grant Amount	Principal Investigator	Key findings and breakthroughs
1	澳門科學技術發展基金與國家自然科學基金委員會聯合科研資助(FDCT-NSFC 項目)	面向徵信的跨境數据協同管理與隱私計算研究 (2022.12.28 – 2026.01.28)	MOP$1,600,000.00	周萬雷教授	階段性成果方面： 1. 已經撰寫兩篇關於區塊鏈的文章。 2. 已經撰寫兩篇關於跨境協同構建技術的文章。 3. 已經撰寫一篇會議文章。 人才培養方面：目前該項目已有 3 名博士生同學和 4 名碩士生同學加入，在項目負

					責人和其他參與老師的帶領下，各位同學分工明確，項目開展秩序井然。目前已有部分同學提出了一些初步的解決方案，部分同學已經開始撰寫相關論文。
2	澳門科學技術發展基金——一般科研資助	面向澳門智慧醫療的康養數據隱私保護模型及關鍵技術研究 (2022.09.04 – 2024.09.03)	MOP$487,000.00	應作斌副教授	1. 一共寫作了九篇論文，其中的三篇論文未發表；六篇發表的論文中五篇為期刊論文一篇为会议论文，其中 4 篇論文被 SCI 收錄；6 篇論文被 EI 收錄； 2. 參與起草了中国图学学会标准中的《医学影像数据联合建模流程与隐私增强》以及《医学影像数据全生命周期隐私增强要求》 3. 人才培養方面，目前培養了博士研究生 1 名，碩士研究生 9 名
3	澳門基金會項目（研究類）	大灣區民生數據跨境的障礙、策略與技術研究:以醫療康養數據跨境為例 (2022.09 – 2023.06.30)	MOP$240,000.00	應作斌副教授	1. 在項目執行期間，本項目共發表或錄用學術論文 10 篇，其中會議論文 8 篇；在投中論文 3 篇；完成著作藍皮書撰寫 1 篇。 2. 本項目在粵港澳大灣區三地醫療康養數據流通的法律障礙、道德障礙和技術障礙等問題方面展開研究，現階段跨境醫療康養數據區塊鏈溯源平臺正在籌劃構建中。 3. 通過本項目培養的骨幹與後備人才共計 19 名，具體包括：博士後 1 人；博士研究生 1 人；碩士研究生 12 人；本科生 5 人。 4. 項目負責人應作斌在項目研究期間，成為 IEEE 澳門理事會理事和 IEEE/CCF 會員

4.	澳門基金會項目（研究類）	粵港澳大灣區的碳匯量化估計與減排策略研究 (2023.01.01 – 2024.06.30)	MOP$180,000.00	郭永德 助理教授	郭永德. 基於多源數據驅動的商住建築碳排放關聯預測與優化研究. 華中科技大學出版社, 2023
5	澳門科學技術發展基金與國家科技部聯合科研資助（FDCT-MOST 項目）	珠澳合作製造服務多主體協同平臺研究與應用示範 (2020.08.21 – 2023.09.21)	MOP$1,729,000.00	蔡智明教授 朱家偉 副教授	1.本項目圍繞著研究主題共發表了 18 篇學術論文，其中 SCI 檢索期刊論文 11 篇，國際會議論文 7 篇。 2.發明專利共申請 62 項，其中 7 項已獲批准，其餘均在實審階段。 3.軟件著作權共申請通過 5 項。 4.人才培養方面，本項目共培養 12 位博士生與 11 位碩士生，項目期間有 7 位成員由碩士繼續就讀博士。
6	澳門特別行政區科學技術發展基金、澳門先進材料研發中心（澳門大學）開放課題	人工智能輔助納米流控分子識別研究 (2023.10.01 – 2024.12.31)	MOP$200,000.00	葛東嬌 助理教授	Recently approved
7	澳門科學技術發展基金"科技創新提升計劃"	基於深度哈希技術的跨模態快速圖文檢索 (2023.11.10 – 2025.08.10)	MOP$423,800.00	吳庚申 助理教授	Recently approved
8	澳門科學技術發展基金"科技創新提升計劃"	利用搶佔式多任務處理提升深度學習系統資源調度效率 (2023.12.11 – 2026.01.11)	MOP$451,000.00	吳曉峰 助理教授	Recently approved

Publications

	Q1	Q2- Q4	EI	Monograph	CSSCI Core Journal	General Journal	ESCI	SCI Indexed	Total
2022	41	21	14	1	1	0	2	62	80
2023	52	12	19	5	0	2	1	64	91

In 2023, we have published 91 papers in total. Among them, 64 papers are SCI indexed, and more than 50% are from Q1 journals. We have published some world-recognized journals such as TIFS (cybersecurity), IEEE Transaction on Computers (Data Engineering), and ACM Computing Surveys. The topics are aligned with the future research directions of our faculty.

Notable publications and their impacts

Here we have highlighted some key publication and their impact on the communities:

- Machine unlearning: A survey. H Xu, T Zhu, L Zhang, W Zhou, PS Yu ACM Computing Surveys 56 (1), 1-36.

  This paper focuses on a new area named machine unlearning; this is the first survey paper that has published on ACM Computing Survey in this area. In a very short time, the paper has been cited over 30 times.

- Wang, Y., Peng, Y., Liu, X., Ying, Z., Cui, J., Niu, D., & Xia, X. (2023). aChain: A SQL-empowered Analytical Blockchain as a Database. IEEE Transactions on Computers.

  This paper proposed a new query scheme in Blockchain database, which shows a new paradigm of Blockchain database.

- Fedrecovery: Differentially private machine unlearning for federated learning frameworks. L Zhang, T Zhu, H Zhang, P Xiong, W Zhou. IEEE Transactions on Information Forensics and Security. 2023.

  This paper proposed a practical way to protect a client from a federated learning platform, which builds a new foundation of federated learning area.

Invited talks, keynote speeches, and conference engagements

In 2023, our faculty has organized, and our staff members have participated in multiple events. These events can help us to communicate with other organizations, accelerating collaboration with other organizations and sharing our latest research and insight with others.

1. The list of faculty members who have participated in academic seminars as guest speakers

Table 7. Faculty members who have participated in academic seminars

Ref	Event Name	Organizer	Date	Keynote Speaker
1	學科前沿技術講座：ChatGPT 時代的衝擊與思考	北京理工大學（珠海）	2023/03/11	劉文堅副教授
2	海外名師學術系列講座，奇點時刻：AIGC 與 ChatGPT	廣東科技學院	2023/03/24	劉文堅副教授
3	2023 年中國高等教育學會工程教育專委會年會暨第一屆粵港澳大灣區工程教育論壇 分論壇 2-新工科教育理論與實踐，報告題目：AIGC 時代點教育新挑戰	中國高等教育學會工程教育專委會	2023/05/25	劉文堅副教授
4	海絲論壇	教育部學校規劃建設發展中心	2022/12/19	應作斌副教授
5	IEEE Macau 年會	IEEE Macau	2023/04/15	應作斌副教授
6	IEEE Macau 交流研討會	IEEE Macau	2023/04/23	應作斌副教授
7	協會任職主題報告	澳門公用事業文職人員協會	2023/05/28	應作斌副教授
8	ChatGPT 變革對時代的影響	民聯智庫	2023/04/18	郭永德助理教授
9	2023 年琴澳人才行暨橫琴粵澳數字經濟產業論壇	橫琴深合區經濟發展局	2023/04/07	應作斌副教授 朱家偉副教授 郭永德助理教授
10	第二屆海峽兩岸暨港澳女科學家論壇	中山大學、粵港澳高校聯盟	2023/04/27 — 2023/04/28	江愷瑤助理教授
11	珠海科技學院阿裡雲大數據應用學院專題講座	珠海科技學院	2023/03/09	劉文堅副教授、應作斌副教授
12	北理珠信息學院專題講座	北京理工大學珠海學院	2023/03/12	劉文堅副教授、應作斌副教授
13	IEEE 澳門訪問中山大學軟件工程學院/暨南大學智能科學與工程學院、能源電力研究中心活動	IEEE 澳門	2023/04/23	應作斌副教授
14	第二屆海峽兩岸暨港澳女科學家論壇	中山大學、粵港澳高校聯盟、中國女科技工作者協會、香港工程師學會、澳門工程師學會、臺灣中國工程師學會和海峽兩岸學術文化交流	2023/04/26 -28	江愷瑤助理教授

		協會		
15	粵港澳大灣區創新標準聯盟 生命和生物技術委員會啟動會暨首次工作會議	深圳 CNGB 國家基因庫	2023/05/6	應作斌副教授
16	FDCT-NSFC 聯合項目（周校主持）項目立項會	澳門城市大學數據科學學院	2023/05/19	周萬雷教授、劉文堅副教授、應作斌副教授、郭永德助理教授
17	IEEE Macau 澳門城市大學學生分會成立	IEEE Macau 澳門城市大學學生分會	2023/05/25	周萬雷教授、劉文堅副教授、應作斌副教授、郭永德助理教授、江愷瑤助理教授、吳庚申助理教授、黃志峰助理教授、江小鳳講師
18	2023 年第三屆數字貿易創新應用峰會暨跨境數據聯合實驗室簽約儀式	浪潮集團有限公司、中國信息通信研究院工業互聯網與物聯網研究所	2023/06/01	周萬雷教授、應作斌副教授
19	【名家論壇】系列講座——2023 學第 5 期	廣西醫科大學生命科學研究院	2023/06/09	劉文堅副教授
20	2023 海上絲綢之路國際產學研用合作會議“網絡空間安全與數字化應用分論壇”	福建師範大學	2023/12/01	應作斌副教授
21	第二屆健康大數據與智能醫療學術會議	珠海科技學院	2023/10/27-29	劉文堅副教授

2. The list of hosted academic seminars

Table 8. Hosted academic seminars

Ref	Event Name	Organizer	Date	Participate
1	氣象學研討會—雲屬專場	澳門城市大學數據科學學院	2023/04/12	江愷瑤助理教授、方志剛（世界氣象組織颱風委員會氣象專家）

3. The list of state policy related events

Table 9. State policy related events

Ref	Event Name	Organizer	Date	Participate
1	澳門基層社團和青年團體代表學習二十大精神座談會	中央宣講團	2022/12/03	郭永德助理教授
2	國防大學“新時代戰略思維研修班”	中央人民政府駐澳門特別行政區聯絡辦公司	2023/12/03-05	郭永德助理教授

4. The list of distinguish academic seminars

Table 10. Distinguish academic seminars

Ref	Category	Seminar Topic	Date	Presenter
1	學術專題講座	企業數字化轉型趨勢與實踐路徑	2022/11/03	丁亞輝先生
2	學術專題講座	圖文智能計算和推理的研究、應用和未來	2023/04/20	黃雙萍教授
3	學術專題講座	Demystifying Deep Learning especially ChatGPT	2023/04/28	徐亦達教授
4	學術專題講座	氣候變遷下的澳門：過去、現在、未來	2023/05/10	黃振星先生
5	學術專題講座	My view on research methodology	2023/09/07	張成奇教授
6	學術專題講座	人工神經網絡在海嘯預測中的應用	2023/11/10	王宇晨博士
7	學術專題講座	Towards Robust Autonomous Driving Systems	2023/11/20	鄭曦博士

Faculty Development and Achievements

Academic hiring and promotions

Table 11. Recruitment plan for academic staff

	Professors	Associate Professors	Assistant Professors	Lecturers
Year 23/24 Semester 1	0	0	9	0
Year 23/24 Semester 2	2	1	2	0
Sub-Total	2	1	11	0
Total new academic Staff	**14**			

In the past year, we have successfully recruited 14 new staff, including two prestige professor, one associate professor and 11 associate professors. Their research areas cover AI, cybersecurity, Data analytics, and Bioinformatics. All our new staff have the oversea learning experiences.

<u>Recruitment Strategy and Promotions</u>

A. Through overseas visits for recruitment
Following last year's visits to Australia, Singapore, or other countries and regions, directly conduct preliminary face-to-face exchanges, and then guide them into the recruitment system of our university.

B. Through recommendations from partner universities
Establish cooperation with other universities and institutions, such as cooperation with well-known domestic and foreign universities and research institutions, to carry out joint training, exchange visits, and other activities to expand the source of talents.

C. Attracting talent through project exchanges or academic conferences
i. Actively participate in domestic and international academic conferences and seminars to enhance the visibility and influence of the college, attracting more outstanding talents to join.
ii. Encourage teachers and researchers to participate in the exchange of research projects, not only to improve the research capabilities and level of achievements but also to attract more outstanding talents to join.

D. Attracting talent through internal talent optimization system of the faculty
i. Provide good teacher training and development plans to help teachers continuously improve their professional skills and academic level.
ii. Establish an effective team cooperation mechanism to improve work efficiency and level of achievement.
iii. Provide a good international platform and exchange opportunities, encouraging teachers and researchers to participate in international cooperation and exchange activities.

Awards and honors received by faculty members

Our faculty has encouraged our staff and students to participate in various competitions internally and externally. For example, our team has been awarded No.1 in Huawei ICT competition in Macao.

Table 12. Awards received by faculty members

Competition Name	Awards	Awardees	Instructor	Date
華為 ICT 大賽 2023-2024 澳門站	網絡賽道一等獎	方雲松、閆啟月、張一諾	應作斌副教授	2023/12
2023 年“智青春·算未來”第五屆全球校園人工智慧算法精英大賽	“全國總決賽”一等獎	許家豪、諸戒康、馬雨軒、姚安舟、胡鎮宇、楊豐源	劉文堅副教授	2023/12
廣東省計算機設計大賽-人工智能實踐賽	廣東省決賽 二等獎 (十九組之一) 全國賽 三等獎	王耀康、史雪茹、康嘉菁	劉文堅副教授	2023/07
廣東省計算機設計大賽-大數據實踐賽	廣東省決賽 二等獎 (十二組之一) 全國賽 三等獎	梁一博、范玉喆	胡卓民講師	2023/07
第十三屆“挑戰盃”中國大學生創業計劃競賽	銅獎 (1079 項之一)	碩士生許舜、博士生王涵	劉文堅副教授	2023/04
第十三屆“挑戰盃”中國大學生創業計劃競賽	銀獎 (309 項之一)	陳廣舜及商學院 2 名碩士生胡芯滔、朱文慧	江愷瑤助理教授、葛東嬌助理教授	2023/07
粵港澳大灣區 IT 應用系統開發大賽-大灣區決賽	“‘膠’APP 項目計劃” 二等獎 (十四組之一)	王嘉许、杨若辰、郑光远、周泽君	朱家偉副教授	2023/02
“元計劃”’互聯網+學習共享平台”	特等獎-銀獎 (三組之一) 最佳報告獎 (二組之一)	康嘉菁、王耀康、李亚璇	朱家偉副教授，江愷瑤助理教授	2023/02

Leadership roles and contributions in professional organizations

We encourage our faculty members to take diverse leadership roles in the community. These activities can help us train our members to be future leaders and contribute our faculty members' expertise to the communities.

Table 13. Leadership roles in Macau society

Organization Name	Position	Academic Staff
澳門科學技術協進會	副會長	周萬雷教授
澳門科技委員會	委員	
澳門科學技術協進會	理事	劉文堅副教授
澳門高等教育促進協會	理事	
廣東省科學技術協進會	港澳特邀委員	
成都海聯會	理事	
澳門國際文化教育交流協會	副理事長兼秘書長	
澳門智慧城市協會	監事長	
澳門科技教育協會	副會長	
雲南省軟件工程重點實驗室學術委員會	委員、特聘教授	
IEEE 澳門理事會	理事	應作斌副教授
IEEE / CCF	會員	
中國工業與應用數學學會區塊鏈專委會	委員	
廣東省科技企業孵化器協會	廣東省創業導師	
澳門大灣區數字經濟協會	副會長	郭永德助理教授
澳門物理奧林匹克中心	副主席	江愷瑤助理教授
澳門氣象學會	理事	

Retirements and farewells

In 2023, our colleague professor Cai Zhiming took a new role and left our faculty. He joined city university of Macau in 2016 and moved to our faculty from 2022. It is a pity that he left our faculty from 2023, but we are grateful that he will have a new start in a higher career pursuit.

Strategic Planning and Future Directions

Vision and mission statement

We are committed to building the Faculty of Data Science into a leading research organization and education platform in Macao and for the Guangdong-Hong Kong-Macao Greater Bay Area. Through cutting-edge technology exploration, inter-disciplinary cooperation and innovative talent cultivation, we will promote the widespread application of data science in scientific research, industry and social services. We will continuously providing strong education and intellectual support for the sustainable development and digital transformation of Macao and the Greater Bay Area. We will work closely with all walks of life to jointly promote knowledge innovation and technology application in the field of data science, follow the glorious tradition of our City University of Macau of patriotism and love for Macao, tell Chinese stories well, promote Chinese culture, and "root in Macao and integrate into the Bay Area". The mission of our faculty is to integrate into the overall development of our country and contribute to the talent cultivation of the Guangdong-Hong Kong-Macao Greater Bay Area.

Goals and objectives for the upcoming years

To realize our vision, in the next 3-5 years, we have the following goals:

- We plan to enter the top 500 in ARWU of data science subject by 2027;
- Establish a key laboratory at or upper the provincial level that leads by the faculty of data science;
- Our new major, Electronic Computer Engineering (Bachelor, Master and Doctoral programs), can be approved by the Education and Youth Development Bureau of Macau;
- The student-teacher ratio of the faculty can be reached to 18:1;
- Within 3 years, our student numbers reach 2000.

Challenges and opportunities

To achieve these goals, our Faculty of Data Science will face several challenges and opportunities:

Challenge:

Interdisciplinary cooperation and communication: The wide application of data science in scientific research, industry and social services requires us to have close interdisciplinary cooperation with other colleges and fields. However, there may be differences in knowledge systems and research methods in different fields, and how to communicate and cooperate effectively is an important challenge.

Technology updates and iterations: Technologies and tools in the field of data science are constantly developing and updating, requiring staff and students in our faculty to maintain continuous lifelong learning to catch up with technology. At the same time, we also need to constantly update and optimize the curriculum to ensure that our teaching content keeps pace with industry needs.

Attracting high intelligence talents: Attracting the best data science talents has always been an important task of our faculty. We face competition with universities around the world. We strive to provide these talents with high-quality research resources and environment, as well as necessary support and services to help them transition smoothly and integrate into the new environment.

Opportunities:

Opportunities for recent great development of City University of Macau: Our has ushered in great development opportunities in the international environment and scientific and technological resources in recent years. We have more students, better researchers, and greater investment in education, and greater social support. Our School of Data Science must continue to make progress and promote the development of the school under this major development trend.

Opportunities of rising of artificial intelligence and big data: The rapid development of artificial intelligence and big data has provided powerful tools and algorithms for data science, helping us to better process and analyze data. At the same time, these technological advances also provide us with new research directions and application areas. This enables our college to better find our own positions in industry, academia and research development.

Society's demand for data science is growing: With the acceleration of digital transformation, the demand for data science from all areas continues to grow. In scientific research, industry or social services, we are required to provide professional support and solutions. This provides our graduates with a broad job market and development prospects.

Our School of Data Science faces some challenges as well as many incredible opportunities. We need to actively respond to those challenges and make full use of those opportunities to promote our faculty with the scientific research, industry and social progress of the Greater Bay Area.

Conclusion

As the year ends, this is a moment's report to reflect on our 2023.

This year, we welcomed new staff and new students, and we hosted an incredible number of student and staff events. There were announcements of new, groundbreaking partnerships and an abundance of achievements for our professional and academic staff. There was farewell for our old colleague and new members we welcomed into our faculty.

We couldn’t have achieved any of this without our faculty members. Their dedication, generosity and thoughtfulness for one another over the past 12 months have contributed to our faculty growing stronger and more confident than ever.

We also entered the new stage of 2024, guided by a new set of initiatives that continue to propel us on the path to becoming a leading faculty of data science that has be and will be recognized by the world.

Appendix

FDS Publication (including papers and monograph)

1. Wang, M., Zhu, T., Zuo, X., Ye, D., Yu, S., & Zhou, W. (2023). Blockchain-Based Gradient Inversion and Poisoning Defense for Federated Learning. IEEE Internet of Things Journal.
2. Ye, D., Zhu, T., Zhu, C., Wang, D., Shen, S., & Zhou, W. (2023). Reinforcement Unlearning. arXiv preprint arXiv:2312.15910.
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8. Wang, M., Zhu, T., Zuo, X., Ye, D., Yu, S., & Zhou, W. (2023). Blockchain Empowered Multi-Agent Systems: Advancing IoT Security and Transaction Efficiency. IEEE Internet of Things Journal.
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