Rong Qu

PhD, BSc in Computer Science, IEEE Senior Member

PROFILE SUMMARY

Research
- **World's Top 2% Scientist, 2020-2024,** Elsevier & Stanford University
- 2022 Leverhulme Trust **Senior Research Fellow**, **The Royal Society**
- 100+/60+ peer-reviewed journal/conference papers, **Google Scholar citation: 13,500**, h-index: 53
- **UK ranking 357th** by Research.com
- Leading author of **top 0.1% and 1% cited articles** in Computer Science by ISI Essential Science Indicators
- 2007-2011 **Five-Year Top Cited Article Award** at European Journal of Operational Research
- **Best Paper Award** by British Computing Society, 1999
- Co-author and co-editor of **two books** in artificial intelligence and machine learning algorithms at Springer

Supervision
- **Principal supervisor** of 14 PhD students graduated since 2010
- **Principal/co- supervisor** of eight Postdoc Researchers in seven external projects

Academic esteem
- **JSPS Invited Fellow** at Computational Intelligence Labo. at Osaka Prefecture University, Japan
- **Guest editor** of seven special issues at top journals including IEEE Transactions on Evolutionary Computation, Transaction on Pattern Analysis and Machine Intelligence and IEEE Computational Intelligence Magazine
- **Associate Editor** at seven international leading journals including IEEE Computational Intelligence Magazine, IEEE Transaction on Evolutionary Computation, Engineering Applications of AI, Journal of Operational Research Society, Journal of Scheduling, PeerJ Computer Science
- **IEEE Senior Member** since 2012
- **Chair and co-chair** of more than 10 Symposiums at IEEE Computational Intelligence Society (CIS)
- **Co-founder/Chair/Vice-Chair** of two Technical Committees and four Task Force at IEEE CIS
- **Co-organiser** of more than 30 international events/conferences
- **External PhD examiner** for 15 PhD theses since 2013

Teaching
- **PGR Director**, School of Computer Science, Aug 2020 – present
- **Course Director** of seven Undergraduate and Postgraduate Taught courses, Aug 2006 – Jul 2020
- Course lead/convenor of **night courses in artificial intelligence** since 2005
- Invited **six external courses** on Artificial Intelligence algorithms since 2007 in China, Germany, Japan and Turkey

UNIVERSITY & ACADEMIC SERVICE

JSPS Invited Fellow at Computational Intelligence Labo. at Osaka Prefecture University, Dec 2016 - Jan 2017

Journal Area Editor / Editor
- Applications of Artificial Intelligence (EAAI) Journal (2022-present)
- Journal of Information and Intelligence (2022-present)
- Journal of the Operational Research Society (2020-present)
- IEEE Transactions on Evolutionary Computation (202-present)
- PeerJ Computer Science (2015-present)
- IEEE Computational Intelligence Magazine (2016-present)
- Journal of Scheduling (2013-2015)

Guest editor
- Special Issue of Journal of Scheduling on Artificial Intelligence Planning and Scheduling, 12(3), June, 2009
- Special Issue of "Multi-objective Evolutionary Optimization in Machine Learning", IEEE Transactions on Evolutionary Computation, forthcoming. Leading journal on Evolutionary Computation, Impact Factor: 16.5
- Special issue of "Models of Representation in Computational Intelligence", IEEE Computational Intelligence Magazine (IEEE CIM), forthcoming. Impact factor: 5.71

- Special issue of "Smart Cities: Urban Profiling with Artificial Intelligence and Big Data", PeerJ Computer Science, forthcoming, Impact factor: 2.41
- Special issue of "Automated Design of Machine Learning and Search Algorithms", IEEE Computational Intelligence Magazine, 13(2), June 2018. Leading journal on Computational Intelligence, Impact factor: 5.71
- Special issue of "Artificial Intelligence Planning and Scheduling", Journal of Scheduling, 12(3), June 2009

Chair / Vice Chair at IEEE Computational Intelligence Society
- Vice Chair of Evolutionary Computation Technical Committee (2019-present)
- Vice Chair of Intelligent Systems Applications Technical Committee (2015-2018)
- Task Force on Intelligent Systems in Healthcare (2018-present)
- Task Force on of Evolutionary Scheduling and Optimisation (2006-2009)
- Co-founder and Chair of Task Force on Hyper-heuristics (2013-2018)
- Co-founder and Chair/Vice Chair of Task Force on Evolutionary Scheduling and Combinatorial Optimisation
- Chair of Task Force on Timetabling and Scheduling and Combinatorial Optimisation (2007-2009)
- Member of IEEE Women in Computational Subcommittee (2021-present)

Other Duties
- Co-founder the IEEE Symposium Series on Computational Intelligence in Scheduling (IEEE CISched) 2009-2017
- Co-founder the IEEE Symposium Series on Evolutionary Scheduling and Combinatorial Optimisation since 2019

Grants

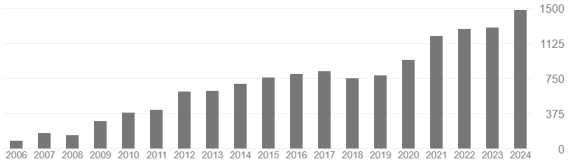
Leading/co-leading in total ten external grants of a total value of £6.4M, funded by various research councils including EPSRC, EU and Innovate UK. In particular:
- 2022 Royal Society Leverhulme Trust Senior Research Fellowship, which is awarded to only seven researchers across all disciplines each year in the UK.
- Principal Investigator at the University of Nottingham in ENLIVEN, a major grant of £2.2M at EU H2020, supervising two PDRAs, collaborating with different stakeholders and monitoring regular project progress with partners within a consortium of 10 participating countries across Europe and Australia.
- Co-Investigator in two major EPSRC grants of a value of £1M and £2.66M, respectively, led three research themes and supervised two PDRAs and two PhD students to completion, leading to 11 joint papers, four among the top 10% cited.
- Knowledge Base Supervisor and Academic Lead, respectively, in two KTP projects of a total value of £206k, leading to optimisation algorithms deployed at two SMEs, namely Webroster Ltd and Midland Software Ltd.
- Co-Investigator or academic collaborator in five joint grants at UNNC, of a total value of £230k, supervising/co-supervising a team of four PhD students across two campuses to develop and deploy optimisation solutions for Ningbo Port, reducing their fleet routing distance by 8%.

Research

In total 100+ journal papers, 31 ranked the top 0.1%, 1% or 10% cited in CS by the ISI Essential Science Indicators.

Google Scholar Citations

	All	Since 2018
Citations	14,001	7,046
h-index	51	41
i10-index	136	92



Awards
- E.K. Burke, B. MacCarthy, S. Petrovic, **R. Qu†**. Structured Cases in Case-Based Reasoning-Re-using and Adapting Cases for Timetabling Problems. **Best technical papers** at *ES'1999*, selected in a special issue at Knowledge Based System.
- H. Xing, **R. Qu**, G. Kendall, R. Bai. A Path-Oriented Encoding Evolutionary Algorithm for Network Encoding Resource Optimisation, JORS, 65: 1261-1277, 2014. **Ten influential articles** at JORS, November 2013
- E.K. Burke, B. McCollum, A. Meisels, S. Petrovic, **R. Qu†**, A Graph-Based Hyper-Heuristic for Educational Timetabling Problems, EJOR, 176: 177-192, 2007, **2007-2011 Five Year Top Cited Article** Award at EJOR
- E. K. Burke, M. Gendreau, M. Hyde, G. Kendall, G. Ochoa, E. Ozcan, **R. Qu**, Hyper-heuristics: A Survey of the State of the Art, JORS, 64: 1695-1724, 2013. **Ten Influential Articles** at JORS, **Top 0.1% cited**
- **World's Top 2% Scientist, 2020-2024,** Elsevier & Stanford University

Book/Proceedings/Book chapters
1. N. Pillay, **R. Qu** (eds.) Automated Machine Learning and Search Algorithms, Springer, 2021.
2. N. Pillay, **R. Qu**, Hyper-Heuristics: Theory and Applications, Springer ISBN 978-3-319-96514-7. 2018

3. **R. Qu** (ed.) Proceedings of the 25th Workshop of the UK Planning and Scheduling Special Interest Group (PlanSIG2006), December, 2006, Nottingham, UK. ISSN 1368-5708
4. E.K. Burke, M. Dror, S. Petrovic, **R. Qu**†. Hybrid Graph Heuristics in Hyper-Heuristics Applied to Exam Timetabling Problems. B.L. Golden, S. Raghavan and E.A. Wasil (eds.). *The Next Wave in Computing, Optimization, and Decision Technologies*. 79-91. Springer, 2005. **Top 10% cited**

Selected Publications 2021-2024 († - main author, see full list at http://www.cs.nott.ac.uk/~pszrq/publications.htm)

1. X Chen, R Bai, R Qu, J Dong. Deep Reinforcement Learning Assisted Genetic Programming Ensemble Hyper-Heuristics for Dynamic Scheduling of Container Port Trucks. IEEE Transactions on Evolutionary Computation.
2. Z Xiao, H Xing, R Qu, H Li, L Feng, B Zhao, J Yang. Self-Bidirectional Decoupled Distillation for Time Series Classification. IEEE Transactions on Artificial Intelligence. doi: 10.1109/TAI.2024.3360180, 2024.
3. Z Xiao, X Xu, H Xing, B Zhao, X Wang, F Song, R Qu, L Feng. DTCM: Deep Transformer Capsule Mutual Distillation for Multivariate Time Series Classification. IEEE Transactions on Cognitive and Developmental Systems. 2024.
4. B Lin, J Li, T Cui, H Jin, R Bai, R Qu, J Garibaldi. A Pattern-Based Algorithm with Fuzzy Logic Bin Selector for Online Bin Packing Problem. Expert Systems with Applications. doi: 10.1016/j.eswa.2024.123515, 2024.
5. H Wang, A Bellotti, R Qu, R Bai. Discrete-time Survival Models with Neural Networks for Age-Period-Cohort Analysis of Credit Risk. Risks. doi: 10.3390/risks12020031, 2024.
6. Z. Xiao, H. Xing, R. Qu, L. Feng, S. Luo, P. Dai, B. Zhao, Y. Dai. Densely Knowledge-aware Network for Multivariate Time Series Classification. IEEE Transactions on Systems, Man and Cybernetics. Jan 2024.
7. Z. Xiao, H. Tong, R. Qu, H. Xing, S. Luo, Z. Zhu, F. Song, L. Feng. CapMatch: Semi-supervised Contrastive Transformer Capsule with Feature-based Knowledge Distillation for Human Activity Recognition. IEEE Transactions on Neural Networks and Learning Systems. doi: 10.1109/TNNLS.2023.3344294, December 2023.
8. J. Jin, T. Cui, R. Bai, R. Qu. Container Port Truck Dispatching Optimization using Real2Sim based Deep Reinforcement Learning. European Journal of Operational Research. oi: 10.1016/j.ejor.2023.11.038, November 2023.
9. W. Yi, R. Qu. Automated Design of Search Algorithms based on Reinforcement Learning. Information Sciences. doi: 10.1016/j.ins.2023.119639, 649, 119639, November 2023.
10. W. Meng, R. Qu. Automated design of search algorithms: Predicting algorithmic components with LSTM. Expert Systems with Applications, September 2023. doi: 10.1016/j.eswa.2023.121431
11. W. Yi, R. Qu, L. Jiao. Automated algorithm design using proximal policy optimisation with identified features. Expert Systems with Applications. doi: 10.1016/j.eswa.2022.119461, Volume 216, 15 April 2023, 119461.
12. Y Xu, H Zhang, L Huang, R Qu, Y Nojima. A Pareto Front grid guided multi-objective evolutionary algorithm. Applied Soft Computing, 110095, Feb 2023. doi: 10.1016/j.asoc.2023.110095
13. W. Yi, R Qu, L. Jiao, B. Niu. Automated Design of Metaheuristics Using Reinforcement Learning within a Novel General Search Framework. IEEE Transactions on Evolutionary Computation 27(4): 1072-1084, August 2023, doi: 10.1109/TEVC.2022.3197298
14. H. Zhong, Z. Lian, B. Xue, B. Niu, R. Qu, T. Zhou. An Integrated Container Terminal Scheduling Problem with Different-berth Sizes via Multi-objective Hydrologic Cycle Optimization. International Journal of Intelligent Systems, 37(12): 11909-11925, December 2022. doi: 10.1002/int.23069
15. M. Chen, R. Qu, W. Fang. Case-Based Reasoning System for Fault Diagnosis of Aero-engines. Expert Systems with Applications, 202, 117350, September 2022. doi: 10.1016/j.eswa.2022.117350. Web of Science Top 10% cited
16. B Lin, J. Li, R Bai, R Qu, T. Cui, H. J. Identify Patterns in Online Bin Packing Problem: An Adaptive Pattern-Based Algorithm. Symmetry 2022, 14(7), 1301. doi.org/10.3390/sym14071301.
17. X. Li, L. Jiao, H. Zhu, F. Liu, S. Yang, X. Zhang, S. Wang, R. Qu. A Collaborative Learning Tracking Network for Remote Sensing Videos. IEEE Transactions on Cybernetics, doi: 10.1109/TCYB.2022.3182993, March 2023, 53(3): 1954-1967.
18. X. Chen, R. Bai, R. Qu, H. Dong. Cooperative Double-Layer Genetic Programming Hyper-Heuristic for Online Container Terminal Truck Dispatching. IEEE Transactions on Evolutionary Computation, 25(5), 1220-1234, Oct, 2023
19. Y. Guo, L. Jiao, R. Qu, S. Wang, S. Wang, F. Liu, Z. Sun. Adaptive fuzzy learning superpixels representation for PolSAR image classification. IEEE Transactions on Geoscience and remote sensing, 60: 1-18. 2022.
20. W. Meng, R. Qu. Automated Design of Search Algorithms: Learning on algorithmic components. Expert Systems with Applications, , doi: 10.1016/j.eswa.2021.115493, Volume 185, 115493, December 2021.
21. N. Xue, R. Bai, R Qu, U. Aicklein. A Hybrid Pricing and Cutting Approach for the Multi-Shift Full Truckload Vehicle Routing Problem. European Journal of Operational Research, 292(2): 500-514, 2021. doi: 10.1016/j.ejor.2020.10.037
22. N. Pillay, R. Qu. Assessing hyper-heuristic performance. Journal of the Operational Research Society, 72(11), 2021

Top 10% cited

- Y. Zhang, R. Bai, **R. Qu**, C. Tu, J. Jin. A deep reinforcement learning based hyper-heuristic for combinatorial optimisation with uncertainties. European Journal of Operational Research, 300(2): 418-427, July 2022.

- H. Xing, J Zhu, R. Qu, P Dai, S Luo, M Iqbal. An ACO for Energy-Efficient and Traffic-aware Virtual Machine Placement in Cloud Computing. Swarm and Evolutionary Computation, 68, 101012, Feb 2022
- X. Hao, **R. Qu**, J. Liu. A Unified Framework of Graph-Based Evolutionary Multitasking Hyper-heuristics. IEEE Transaction on Evolutionary Computation, 7(9): 8780-8799, 2020, 2020,
- Y. Xu, O. Ding, **R. Qu**, K. Li. Hybrid Multi-objective Evolutionary Algorithms based on Decomposition for Wireless Sensor Network Coverage Optimization. Applied Soft Computing, 68: 268-282, 2018.
- K. Lwin, **R. Qu**, B. MacCarthy, Mean-VaR Portfolio Optimization: A Nonparametric Approach, European Journal of Operational Research, 260(2): 751-766, 2017,
- H. Xing, Z. Wang, T. Li, H. Li, **R. Qu**, An Improved MOEA/D Algorithm for Multi-objective Multicast Routing with Network Coding, Applied Soft Computing, 59: 88-103, 2017,
- J. Arturo Castillo-Salazar, D. Landa-Silva, **R. Qu**, Workforce scheduling and routing problems: literature survey and computational study, Annals of Operations Research, 239(1): 39-67, 2016,
- Z. Wang, H. Xing, T. Li, Y.Yang, **R. Qu**, and Y. Pan, A Modified Ant Colony Optimization Algorithm for Network Coding Resource Minimization, IEEE Transactions on Evolutionary Computation, 20(3): 325-342, 2016.
- N.R. Sabar, M. Ayob, G. Kendall, **R. Qu**, A Dynamic Multiarmed Bandit-Gene Expression Programming Hyper-Heuristic for COPs. IEEE Transac. on Cybernetics, 45(2): 217-228, 2015.
- N.R. Sabar, M. Ayob, G. Kendall, **R. Qu**, The Automatic Design of Hyper-heuristic Framework with Gene Expression Programming, IEEE Transactions on Evolutionary Computation, 19(3): 309 - 325, 2015.
- K. Lwin, **R. Qu**, Graham Kendall, A learning-guided Multi-objective Evolutionary Algorithm for Constrained Portfolio Optimization, Applied Soft Computing, 24: 757-772, 2014.
- † **R. Qu**, Y. Xu, J. Castro, D. Landa-Silva. Particle Swarm Optimization for the Steiner Tree in Graph and Delay-Constrained Multicast Routing Problems. Journal of Heuristics, 19(2): 317-342, 2013.
- M.Hadwan, M. Ayob, N.R. Sabar, **R. Qu**, A Harmony Search Algorithm for Nurse Rostering Problems. Information Sciences, 233: 126-140, 2013.
- E.K. Burke, T. Curtois, **R. Qu** and G. Vanden Berghe. A Time Predefined Variable Depth Search for Nurse Rostering. INFORMS Journal on Computing, 25: 411-419, 2013.
- N. R. Sabar, M. Ayob, G. Kendall, and **R. Qu**, Grammatical Evolution Hyper-heuristic for Combinatorial Optimization problems. IEEE Transactions on Evolutionary Computation, 17(6): 840-861, 2013,
- N.R. Sabar, M. Ayob, G. Kendall, **R. Qu**, A Honey-bee Mating Optimization Algorithm for Educational Timetabling Problems. European Journal of Operational Research, 216(3), 533-543, 2012,
- N.R. Sabar, M. Ayob, G. Kendall, **R. Qu**, A Graph Coloring Constructive Hyper-Heuristic for Examination Timetabling Problems, Applied Intelligence, 37(1): 1-11, 2012.
- P. Brucker, **R. Qu**, E.K. Burke, Personnel Scheduling: Models and Complexity, EJOR, 210(3): 467-473, 2011.
- **R. Qu**†, E.K. Burke. Hybridisations within a Graph Based Hyper-heuristic Framework for University Timetabling Problems. Journal of Operational Research Society, **60**: 1273-1285, 2009.
- E.K. Burke, B. MacCarthy, S. Petrovic, **R. Qu**†. Multi-Retrieval Case-based Reasoning for Course Timetabling Problems, Journal of Operational Research Society, **57**(2): 148-162, 2006.

Top 1% cited

- H. Xing, Z. Xiao, R. Qu, Z. Zhu, B. Zhao. An Efficient Federated Distillation Learning System for Multi-task Time Series Classification. IEEE Transactions on Instrumentation & Measurement 71: 1-12, 2022. doi: 10.1109/TIM.2022.3201203
- L. Jiao, F. Zhang, F. Liu, S. Yang, L. Li, Z. Feng, **R. Qu**. A Survey of Deep Learning-based Object Detection. IEEE Access, 7: 128837-128868, 2019.
- **R. Qu**†, E.K. Burke, B. McCollum, L.T.G. Merlot, S.Y. Lee. A Survey of Search Methodologies and Automated System Development for Examination Timetabling. Journal of Scheduling, **12**(1): 55-89, 2009.
- E.K. Burke, T.E. Curtois, G. Post, **R. Qu**, B. Veltman, A Hybrid Heuristic Ordering and Variable Neighbourhood Search for the Nurse Rostering Problem, European Journal of Operational Research, **2**: 330-341, 2008.
- E.K. Burke, S. Petrovic, **R. Qu**†. A Graph-Based Hyper-Heuristic for Educational Timetabling Problems, European Journal of Operational Research, **176**: 177-192, 2007.
- E.K. Burke, S. Petrovic, **R. Qu**†. Case-Based Heuristic Selection for Timetabling Problems, Journal of Scheduling, **9**: 115-132, 2006.

Administration & Teaching

Module convenors

Artificial Intelligence Programming	Introduction to Artificial Intelligence	Decision Support Methodologies
Knowledge Representation	Artificial Intelligence Methods	Constraint Logic Programming

Invited keynotes/seminars

- "A General Model and Framework for Automated Algorithm Design", Keynote at Workshop "Evolutionary Computation for the Automated Design of Algorithms", GECCO'23, Lisbon, Portugal, 15-19 Jul 2023.
- "Automated Algorithm Design – Modelling and Learning on Combinatorial Optimisation Problems" at Task Force "Evolutionary Scheduling and Combinatorial Optimisation Problems", IEEE CIS, online talk, 26 Jul 2022.
- "Towards a Better Understanding of Search Algorithms: A New Standard on Algorithm Design", Workshop of "Understanding of Evolutionary Optimisation Behaviour". Wellington, New Zealand, 10-13, Jun 2019
- "An Ongoing Pathway to Become a Leading Researcher" at Women AT GECCO Workshop. The Genetic and Evolutionary Computation Conference 2018, Kyoto, Japan, 15-19 Jul 2018.
- "A Brief Career Path of a Female Scientist in the UK", to female researchers as a Japan Society for the Promotion of Science Invited Fellow, Osaka Prefecture University, Japan, 18 Jan 2017.
- "Hybridising Constructive Heuristics in Hyper-heuristics", Workshop "Self-tuning, Self-configuring and Self-generating Search Heuristics". Krakow, Poland, 11–15, Sept 2010
- "Recent Research on Nurse Rostering and Scheduling", XiDian University, China, March, 2008
- "Recent Developments on Combinatorial Optimisation Problems", Masaryk University, Czech Republic, Oct, 2015
- "Hybridising Constructive Heuristics within Hyper-heuristic Frameworks"", Xidian University, China, August 2012
- "Hybridising constructive heuristics in hyper-heuristics", PPSN 2010, 11 - 15, September, 2010
- "Recent Research on Nurse Rostering at ASAP Group"", Atoss, Munich, Germany, 17th-18th, September, 2007

Course Director:

- PGR Director (2020-present)
- PG Taught Course Advisor of four MSc courses (2017-2020)
- UG course "E-commerce and Digital Business" (2006-2008)
- UG course "Computer Science and Management Studies" (2008)
- PG course "Computer Science and Entrepreneurship" (2009-2012)

PERSONAL INFORMATION

Professor Aug 2023 –
Associate Professor Aug 2013 – Jul 2023
Lecturer May 2005 – Jul 2013
Post-Doctoral Research Associate Aug 2001 – May 2005
School of Computer Science, The University of Nottingham, UK, NG8 1BB

PhD in Computer Science, December 2002
Case-Based Reasoning for Course Timetabling Problems
University of Nottingham, Nottingham, U.K.

BSc in Computer Science, July 1996, Honours
Computer Science and Its Applications
XiDian University, Xi'an, Shaanxi, 710071, China