Ke Li

Computational Optimisation for Learning and Adaptive System Laboratory
Department of Computer Science
College of Engineering, Mathematics and Physical Sciences
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Research Interests

theme: Artificial intelligence

Data-Driven Evolutionary Optimisation and Decision Making

Multi- and Many-Objective Optimisation, Constraint Handling

Automated Problem Solving and Machine Learning

application: Search-Based Software Engineering

Water System Design and Management

Wireless Sensor Networks, Cloud Computing and IoTs

Education

2010 – 2014 **Doctor of Philosophy**, *Department of Computer Science*, City University of Hong Kong.

2007 – 2010 **Masters of Engineering**, *College of Information and Engineering*, Xiangtan University.

2003 – 2007 **Bachelor of Engineering**, *College of Information and Engineering*, Xiangtan University.

Working Experiences

2017 – now **Lecturer (∼Assistant Professor in U.S.) in Data Analytics**, *Department of Computer Science*, University of Exeter.

2015 – 2016 **Research Fellow**, *School of Computer Science*, University of Birmingham.

2014 – 2015 **Postdoctoral Research Associate**, *Department of Electrical and Computer Engineering*, Michigan State University.

2013 – 2014 **Research Associate**, *Department of Computer Science*, City University of Hong Kong.

2013 – 2014 **Visiting Scholar**, *Department of Electrical and Computer Engineering*, Michigan State University.

Publications

In total, 43 peer-reviewed academic papers including 24 peer-reviewed journal papers and 19 peer-reviewed conference papers. In particular, 16 papers are published in prestigious IEEE/ACM Transactions. 25 papers are published as the first/leading author.

+ indicates equal contribution and * indicates student worked with me.

Refereed Journal Articles

IEEE TFS **K. Li**, R. Chen*, D. Savić and X. Yao, Interactive Decomposition Multi-Objective Optimization via Progressively Learned Value Functions, IEEE Trans. Fuzzy Systems, accepted for publication, 2018. (SCI IF=8.415)

IEEE TCYB M. Wu*, **K. Li**, S. Kwong and Q. Zhang, Evolutionary Many-Objective Optimization Based on Adversarial Decomposition, IEEE Trans. Cybernetics, accepted for publication, 2018. (SCI IF=8.803)

IEEE TEVC	M. Wu*, **K. Li**, S. Kwong, Q. Zhang and J. Zhang, Learning to Decompose: A Paradigm for Decomposition-Based Multi-Objective Optimization, IEEE Trans. Evolutionary Computation, accepted for publication, 2018. (SCI IF=8.124) DOI: 10.1109/TEVC.2018.2865931
IEEE TCYB	**K. Li**, R. Chen*, G. Min and X. Yao, Integration of Preferences in Decomposition-Based Evolutionary Multi-Objective Optimization, IEEE Trans. Cybernetics, accepted for publication, 2018. (SCI IF=8.803) DOI: 10.1109/TCYB.2018.2859363
IEEE TEVC	**K. Li**, R. Chen*, G. Fu and X. Yao, Two-Archive Evolutionary Algorithm for Constrained Multi-Objective Optimization, IEEE Trans. Evolutionary Computation, accepted for publication, 2018. (SCI IF=8.124) DOI: 10.1109/TEVC.2018.2855411
IEEE TEVC	**K. Li**, K. Deb and X. Yao, R-Metric: Evaluating the Performance of Preference-Based Evolutionary Multi-Objective Optimization Using Reference Points, IEEE Trans. Evolutionary Computation, accepted for publication, 2017. (SCI IF=8.124) DOI: 10.1109/TEVC.2017.2737781
IEEE TEVC	R. Cheng, M. Li, **K. Li** and X. Yao, Evolutionary Multiobjective Optimization Based Multimodal Optimization: Fitness Landscape Approximation and Peak Detection, IEEE Trans. Evolutionary Computation, 22(5): 692–706, 2018. (SCI IF=8.124)
ACM TOSEM	T. Chen, **K. Li**, R. Bahsoon, X. Yao, FEMOSAA: Feature Guided and Knee Driven Multi-Objective Optimization for Self-Adaptive Software at Runtime, ACM Trans. Software Engineering and Methodology, 27(2): 1–50, 2018. (SCI IF=8.124)
IEEE TEVC	R. Chen[+,*], **K. Li**[+] and X. Yao, Dynamic Multi-Objectives Optimization with a Changing Number of Objectives, IEEE Trans. Evolutionary Computation, 21(1): 157–171, 2018. (SCI IF=8.124) (**Top 10 popular article in IEEE TEVC, ranked #6**)
IEEE TCYB	**K. Li**, K. Deb, Q. Zhang and Q. Zhang, Efficient Non-domination Level Update Approach for Steady-State Evolutionary Multiobjective Optimization. IEEE Trans. Cybernetics, 47(9): 2838–2849, 2017. (SCI IF=8.803) (**Top 50 popular documents in IEEE TCYB, ranked #1**)
IEEE TEVC	M. Wu*, **K. Li**, S. Kwong, Y. Zhou and Q. Zhang, Matching-Based Selection with Incomplete Lists for Decomposition Multi-Objective Optimization, IEEE Trans. Evolutionary Computation, 21(4): 554–568, 2017. (SCI IF=8.124) (**Top 50 popular documents in IEEE TEVC, ranked #12**)
NEUCOM	H. Xie, X. Li, T. Wang, L. Chen, **K. Li**, F-L Wang, Y. Cai, Q. Li and H. Min, Personalized Search for Social Media via Dominating Verbal Context. Neurocomputing, 172: 27–37, 2016. (SCI IF=3.241)
IEEE TEVC	**K. Li**, K. Deb, Q. Zhang and S. Kwong, An Evolutionary Many-Objective Optimization Algorithm Based on Dominance and Decomposition. IEEE Trans. Evolutionary Computation, 19(5): 694–716, 2015. (SCI IF=8.124) (**ESI Top 1% highly cited since 2017; nominated as IEEE TEVC outstanding paper award 2017; top 50 popular documents in IEEE TEVC, ranked #4; ranked #1 'Journal Impact Factor contributing items' for IEEE TEVC (Clarivate Analytics)**)
IEEE TCYB	**K. Li**, S. Kwong, Q. Zhang and K. Deb, Interrelationship-based Selection for Decomposition Multiobjective Optimization. IEEE Trans. Cybernetics, 45(10): 2076–2088, 2015. (SCI IF=8.803) (**Top 50 popular documents in IEEE TCYB, ranked #4**)
INS	**K. Li**, S. Kwong and K. Deb, A Dual Population Paradigm for Evolutionary Multiobjective Optimization. Information Sciences, 309: 50–72, 2015. (SCI IF=4.305)
IEEE TEVC	**K. Li**, Q. Zhang, S. Kwong, M. Li and R. Wang, Stable Matching Based Selection in Evolutionary Multiobjective Optimization. IEEE Trans. Evolutionary Computation, 18(6): 909-923, 2014. (SCI IF=8.124) (**Nominated as IEEE TEVC outstanding paper award 2016; top 50 popular documents in IEEE TEVC, ranked #7**)
NEUCOM	J. Cao, S. Kwong, R. Wang, X. Li, **K. Li** and X. Kong, Class-Specific Soft Voting based Multiple Extreme Learning Machines Ensemble. Neurocomputing, 149: 275-284, 2015. (SCI IF=3.241)

NEUCOM	**K. Li** and S. Kwong, A General Framework for Evolutionary Multiobjective Optimization via Manifold Learning. Neurocomputing, 146: 65-74, 2014. (SCI IF=3.241)
IEEE TCYB	M. Li, S. Yang, **K. Li** and X. Liu. Evolutionary Algorithms with Segment-based Search for Multiobjective Optimization Problems. IEEE Trans. Cybernetics, 44(8): 1295-1313, 2014. (SCI IF=8.803)
IEEE TEVC	**K. Li**, Á. Fialho, S. Kwong and Q. Zhang, Adaptive Operator Selection with Bandits for Multiobjective Evolutionary Algorithm Based on Decomposition. IEEE Trans. Evolutionary Computation, 18(1): 114-130, 2014. (SCI IF=8.124) (**Top 10 popular documents in IEEE TEVC, ranked #12**)
IJFUKS	**K. Li**, R. Wang, S. Kwong and J. Cao, Evolving Extreme Learning Machine Paradigm with Adaptive Operator Selection and Parameter Control. International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, 21(supp02): 143-154, 2013. (SCI IF=1.000)
INS	**K. Li**, S. Kwong, R. Wang, K-S Tang and K-F Man, Learning Paradigm Based on Jumping Genes: A General Framework for Enhancing Exploration in Evolutionary Multiobjective Optimization. Information Sciences, 226(1): 1-22, 2013. (SCI IF=4.305)
INS	**K. Li**, S. Kwong, J. Cao, M. Li, J. Zheng and R. Shen. Achieving Balance Between Proximity and Diversity in Multi-objective Evolutionary Algorithm. Information Sciences, 182(1): 220-242, 2012. (SCI IF=4.305)
ICIC EL	**K. Li**, J. Zheng, M. Li, C. Zhou and H. Lv, A Novel Slicing Based Algorithm to Calculate Hypervolume for Multi-Objective Optimization Problems. ICIC Express Letters: An International Journal of Research and Surveys, 4(4): 1113-1120, 2010.

Conference Proceedings

ICPADS 2018	S. Kumar, R. Bahsoon, T. Chen, **K. Li** and R. Buyya, Multi-Tenant Cloud Service Composition using Evolutionary Optimization, In "ICPADS'18: The 24th International Conference on Parallel and Distributed Systems" accepted for publication, 2018.
GECCO 2018	**K. Li** and Q. Zhang, Decomposition Multi-objective Optimisation: Current Developments and Future Opportunities, In "GECCO'18: Proc. of the 19th Annual Conference on Genetic and Evolutionary Computation", ACM Press: p. 903–936, July 2018.
GECCO 2017	M. Wu*, S. Kwong, Y. Jia, **K. Li** and Q. Zhang, Adaptive Weights Generation for Decomposition-Based Multi-Objective Optimization Using Gaussian Process Regression, In "GECCO'17: Proc. of the 18th Annual Conference on Genetic and Evolutionary Computation", ACM Press: p. 641–648, July 2017.
EMO 2017	**K. Li**, K. Deb, T. Altinoz and X. Yao, Empirical Investigations of Reference Point Based Methods When Facing a Massively Large Number of Objectives: First Results, In "EMO'17: Proc. of the 9th International Conference on Evolutionary Multi-Criterion Optimization", Springer, LNCS, Volume 10173: p. 390–405, 2017.
PPSN 2016	**K. Li**, M. Omidvar, K. Deb and X. Yao, Variable Interaction in Multi-Objective Optimization. In "PPSN'16: Proc. of the 14th International Conference on Parallel Problem Solving from Nature", Springer, LNCS, Vol. 9921: p. 399-409, September, 2016.
SMC 2015	M. Wu*, S. Kwong, Q. Zhang, **K. Li**, R. Wang and B. Liu, Two-Level Stable Matching-Based Selection in MOEA/D. In "SMC'15: Proc. of 2015 IEEE Conference on Systems, Mans and Cybernetics", IEEE Press: p. 1720-1725, October 2015
CEC 2015	**K. Li**, K. Deb and Q. Zhang, Evolutionary Multiobjective Optimization with Hybrid Selection Principles. In "CEC'15: Proc. of 2015 IEEE Congress on Evolutionary Computation", IEEE Press: p. 900-907, May 2015.
SMC 2012	**K. Li**, S. Kwong, R. Wang, J Cao and I. Rudas, Multi-Objective Differential Evolution with Self-Navigation. In "SMC'12: Proc. of 2012 IEEE International Conference on Systems, Mans and Cybernetics", IEEE Press: p. 508-513. October 2012.

ICMLC 2012	J. Cao, S. Kwong, R. Wang and **K. Li**, A Weighted Voting Method Using Minimum Square Error based on Extreme Learning Machine. In "ICMLC'12: Proc. of 2012 IEEE International Conference on Machine Learning and Cybernetics", IEEE Press: p. 411-414. July 2012.
SMC 2011	J. Cao, H. Wang, S. Kwong and **K. Li**, Combining Interpretable Fuzzy Rule-based Classifiers via Multi-objective Hierarchical Evolutionary Algorithm. In "SMC'11: Proc. of 2011 IEEE International Conference on Systems, Mans and Cybernetics", IEEE Press: p. 1771-1776. October 2011.
GECCO 2011	**K. Li**, S. Kwong and K-F Man, JGBL Paradigm: A Novel Strategy to Enhance the Exploration Ability of NSGA-II. In "GECCO'11: Proc. of the 12th Annual Conference on Genetic and Evolutionary Computation", ACM Press: p. 99-100. July 2011.
LION 2011	**K. Li**, Á. Fialho and S. Kwong, Multi-Objective Differential Evolution with Adaptive Control of Parameters and Operators. In "LION'11: Proc. of the 5th International Conference on Learning and Intelligent OptimizatioN", Springer Verlag, LNCS, p. 473-487, January 2011.
PPSN 2010	M. Li, J. Zheng, **K. Li**, Q. Yuan and R. Shen, Enhancing Diversity for Average Ranking Method in Evolutionary Many-Objective Optimization. In "PPSN'10: Proc. of the 11th International Conference on Parallel Problem Solving from Nature", Springer, LNCS, Vol. 6238: p. 647-656. September 2010.
GECCO 2010	M. Li, J. Zheng, R. Zhen, **K. Li** and Q. Yuan, A Grid-based Fitness Strategy for Evolutionary Many-Objective Optimization. In "GECCO'10: Proc. of the 11th Annual Conference on Genetic and Evolutionary Computation", ACM Press: p. 463-470. July 2010. (**Nominated as best paper candidate**)
SMC 2009	**K. Li**, J. Zheng, M. Li, C. Zhou and H. Lv, A Novel Algorithm for Non-dominated Hypervolume-based Multiobjective Optimization. In "SMC'09: Proc. of 2009 IEEE International Conference on Systems, Mans and Cybernetics", IEEE Press: p. 5220-5226. December 2009.
SMC 2009	M. Li, J. Zheng, **K. Li**, J. Wu and G. Xiao, An Spanning Tree Based Method For Pruning Non-Dominated Solutions in Multi-Objective Optimization Problems. In "SMC'09: Proc. of 2009 IEEE International Conference on Systems, Mans and Cybernetics", IEEE Press: p. 4882-4887. December 2009.
ICNC 2009	C. Zhou, J. Zheng, **K. Li** and H. Lv, Objective Reduction based on the Least Square Method for Large-dimensional Multiobjective Optimization Problem. In "ICNC'09: Proc. of the 5th International Conference on Natural Computation", IEEE Press: p. 350-354. August 2009.
ICNC 2009	H. Lv, J. Zheng, J. Wu, C. Zhou and **K. Li**, The Convergence Analysis of Genetic Algorithm based on Space Mating. In "ICNC'09: Proc. of the 5th International Conference on Natural Computation", IEEE Press: p. 557-562. August 2009.
CSIE 2009	**K. Li** and J. Zheng, An Improved Multi-objective Evolutionary Algorithm based on Differential Evolution. In "CSIE'09: Proc. of 2009 WRI World Congress on Computer Science and Information Engineering", IEEE Press: p. 825-830. April 2009.

Research Grants

submitted	UKRI Future Leader Fellowship: Transfer Optimisation System for Adaptive Automated Nature-Inspired Optimisation, request £1,191,972
2018	Chinese National 1000 Young Talents Plan, PI, RMB 3,000,000.
2018-2020	North-European Associated Team Project between Inria Lille Nord Europe and University of Exeter, Three-Fold Decomposition in Multi-objective Optimization, PI, EURO 10,000.
2018-2020	Royal Society: #IEC/NSFC/170243, Key Questions in Multi-Label Active Learning: Multi-objective Optimisation, Uncertainty Modelling, and Multi-Criteria Decision-Making, PI, £11,863.
2012 – 2018	EPSRC: #EP/J017515/1, DAASE: Dynamic Adaptive Automated Software Engineering, Key Member, £6,834,903.

2013 – 2017	EPSRC: #EP/K001523/1, Evolutionary Computation for Dynamic Optimisation in Network Environments, Key Member, £512,325.
2014 – 2017	Hong Kong GRF: #11205314, Stable Matching Theory in Multiobjective Evolutionary Algorithm based on Decomposition (MOEA/D), Co-PI at large, HK$ 692,894
2015 – 2018	NSFC: #61502408, Research on Key Problems in Dynamic Environment Multi-objective Evolutionary Optimization, Co-I, RMB 250,000.

Awards

2013	Research Tuition Scholarship of City University of Hong Kong
2013	College of Science and Engineering Student Research Excellence Awards (First Class)
2012	College of Science and Engineering Student Research Excellence Awards (Second Class)
2012	Research Tuition Scholarship of City University of Hong Kong
2010 – 2013	Studentship of City University of Hong Kong
2010	Outstanding Master Thesis of Xiangtan University
2010	Outstanding Graduate of Hunan Province
2010	Outstanding Graduate of Xiangtan University
2010	President Scholarship of Xiangtan University
2009	"Lian Xin Yong Yi" Computer Science Scholarship
2009	Three-good Student of Xiangtan University
2009	Prize of Excellent Team in Innovation of Science and Technology
2009	Excellent Member of The Communist Youth League for Graduate Student
2007	Excellent Undergraduate Dissertation of Xiangtan University
2007	Outstanding Graduate of Xiangtan University

Invited Talks

Jul. 2018	Decomposition Multi-objective Optimisation: Current Developments and Future Opportunities, 110mins Tutorial, 19th Annual Conference on Genetic and Evolutionary Computation (GECCO'18), Kyoto, Japan.
Sep. 2015	Evolutionary Multi-Objective Optimization: Pushing the Boundaries, Job Talk, University of Exeter, Lancaster University (offered by declined at the end).
Sep. 2016	Achieving Balance Between Convergence and Diversity in Evolutionary Multi-Objective Optimization, Department of Mathematical Sciences, University of Essex.
Apr. 2016	Achieving Balance Between Convergence and Diversity in Evolutionary Multi-Objective Optimization, IEEE Computational Intelligence Society (CIS) Webinar for Early Career Researcher.
Apr. 2016	Achieving Balance Between Convergence and Diversity in Evolutionary Multi-Objective Optimization, Nature Inspired Computing and Engineering research group, University of Surrey.
May 2015	Evolutionary Multiobjective Optimization with Hybrid Selection Principles, 2015 IEEE Congress on Evolutionary Computation (CEC'15), Sendai, Japan.
Jan. 2015	Performance Assessment for Preference-Based Evolutionary Multi-Objective Optimization, BEACON NSF STC Congress, Michigan State University.
Jan. 2011	Multi-Objective Differential Evolution with Adaptive Control of Parameters and Operators, 2011 International Conference on Learning and Intelligent OptimizatioN, Rome, Italy.

Academic Supervision

2018 – now	Dongya Wang (PhD) at the Department of Computer Science, University of Exeter
2018 – now	Savas Yueć (PhD) at the Department of Computer Science, University of Exeter

2017 – now   Joseph Billingsley (PhD) at the Department of Computer Science, University of Exeter (Co-supervising with Prof. Geyong Min)

2015 – 2018 Renzhi Chen (PhD) at the School of Computer Science, University of Birmingham (Co-supervising with Prof. Xin Yao).

2015 – 2018 Mengyuan Wu (PhD) at the Department of Computer Science, City University of Hong Kong (Co-supervising with Prof. Sam Kwong).

Teaching Experiences

University of Exeter

2017 – 2019 Nature-Inspired Computation (ECM3412/ECMM409), Fall Term, Module Leader.

2017 – 2019 Evolutionary Computation and Optimisation (ECMM423), Spring Term, Lecturer.

2017 – 2019 Web Development (ECM1417), Spring Term, Module Leader.

2017 – 2019 Individual Literature Review and Project (ECM3401), Project Supervisor.

2017 – 2019 Networks, Data and Information (ECMM420), Spring Term, Lecturer.

Michigan State University

2014/2015 Evolutionary Multi-Criterion Optimization and Decision Making (ECE 802-605), Fall Semester, Guest Lecturer.

City University of Hong Kong

2012/2013 Introduction to Internet and Programming (CS1303), Semester B, TA.

2011 – 2013 Computer Networks and Internets (CS5222), Semester A, TA.

2011/2012 Object-Oriented Programming (CS2332), Semester B, TA.

2010/2011 Software Engineering (CS5351), Semester B, TA.

2010/2011 Software Quality Engineering (CS5348), Semester A, TA.

Professional Services

Memberships

2017 – now   IEEE member

2010 – 2014 IEEE student member

2013 – now   ACM professional member

Editorships

2017 – now   Associate Editor of International Journal of Machine Learning and Cybernetics

2016 Special Issue of Neurocomputing Journal on Recent Advances in Semantic Computing and Personalization

Chairs

2017 – now   Founding Chair of IEEE CIS Task Force on Decomposition-based Techniques in Evolutionary Computation

2017 General Co-Chair of IEEE International Conference on Cyber, Physical, and Social Computing (CPSCom)

2018 Co-Chair of GECCO Workshop on Decomposition Techniques in Evolutionary Optimization (DTEO)

Conference Program Committee

2017 International Conference on Evolutionary Multi-Criterion Optimization

2016 IEEE Symposium Series on Computational Intelligence (SSCI)

2014 – 2018 Genetic and Evolutionary Computation Conference (GECCO)

2013 – 2018	IEEE International Conference on Machine Learning and Cybernetics (ICMLC)
2015	International Conference on Soft Computing & Machine Intelligence (ISCMI)

Reviewer of Journals

IEEE Transactions on Evolutionary Computation

IEEE Transactions on Cybernetics

IEEE Transactions on Fuzzy Systems

IEEE Transactions on Industrial Electronics

IEEE Transactions on Knowledge and Data Engineering

IEEE Transactions on Vehicular Technology

Swarm and Evolutionary Computation

European Journal of Operational research

Frontiers of Computer Science

Information Sciences

Expert Systems with Applications

Neurocomputing

Computers & Operations Research

Memetic Computing

Soft Computing

Reviewer of Conferences

2016	IEEE Symposium Series on Computational Intelligence (SSCI)
2014 – 2018	IEEE Congress of Evolutionary Computation (CEC)
2014 – 2018	Genetic and Evolutionary Computation Conference (GECCO)
2013 – 2018	IEEE International Conference on Machine Learning and Cybernetics (ICMLC)
2013	International Conference on Swarm, Evolutionary and Memetic Computing (SEMCCO)

Computer skills

Programming:	C/C++, Java, MATLAB, Python, HTML, CSS
Typography:	LaTeX, Microsoft Office

References

Sam Kwong
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