

# SHENGLONG ZHOU

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## EDUCATION

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<i>University of Southampton</i>	Southampton, UK
Ph.D. in Operational Research, School of Mathematics	Oct. 2014 – Dec. 2018
<i>Beijing Jiaotong University</i>	Beijing, China
M.Sc. in Operational Research, Department of Applied Mathematics	Sep. 2011 – July 2014
<i>Beijing Jiaotong University</i>	Beijing, China
B.Sc. in Information and Computing Sciences, Department of Applied Mathematics	Sep. 2007 – July 2011

## WORKING EXPERIENCE

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<i>Research Associate</i>	May. 2021 – present
Department of EEE, Imperial College London	London, UK
<i>Teaching Fellow</i>	Feb. 2020 – Feb. 2021
School of Mathematics, University of Southampton	Southampton, UK
<i>Research Fellow</i>	Oct. 2017 – Oct. 2020
School of Mathematics, University of Southampton	Southampton, UK

## HONOURS AND AWARDS

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<i>Honourable Mention of Doctor thesis, New World Mathematics Awards</i>	2019
<i>PhD Research Studentship, University of Southampton</i>	2014
<i>National Postgraduate Scholarship, China</i>	2012
<i>Postgraduate First-class Scholarship, Beijing Jiaotong University</i>	2012
<i>Undergraduate First-class Scholarship, Beijing Jiaotong University</i>	2010

## RESEARCH INTERESTS

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### *Sparse optimization*

- Characterized the variational properties of the sparse set including the Normal and Tangent cones. Established comprehensive sufficient/necessary optimality conditions for the sparsity constrained/regularized optimizations
- Developed many theoretically and numerically effective first/second-order algorithms which have been proved to enjoy the global or quadratically convergence properties
- Created some packages: [MIRL1](#), [NHTP](#), [NLOR](#), and [NSSVM](#), with high performance for solving compressive sensing, regression and classification, and complementarity problems

### *Euclidean distance matrix optimization*

- Designed several theoretically and numerically effective algorithms using the majorization techniques
- Invented two packages: [PREEDM](#) and [SQREDM](#), being capable of dealing with the wireless sensor network localization, molecular conformation and dimensionality reduction problems

### *Bilevel optimization*

- Reformulated the bilevel problems into single level problems using techniques such as optimal set-value function, KKT, and inequality reformulations and conducted comprehensive theoretical analysis
- Built an Matlab-based toolbox [BiOpt](#) comprising a big collection of academic and real-world bilevel optimization examples [BOLIB](#), three solvers [SNLLVF](#), [SNQVI](#) and [SNKKT](#) and several useful tools

## CONFERENCE TALKS

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1. Bilevel Optimization with Applications into Hyper-parameter Tuning into Machine Learning, *Turing Optimization Club Meeting*, The Alan Turing Institute, 11 Nov 2019.
2. Globally and quadratically convergent Newton method for sparse optimization, *Cormsis Seminar*, Southampton, United Kingdom, 13 Dec 2018.
3. A fast matrix majorization-projection method for penalized stress minimisation with box constraints, *SIAM UKIE Annual Meeting*, Southampton, UK, 11 Jan 2018.
4. Exact recovery for sparse signal via weighted  $\ell_1$  minimisation, *CMP2014*, Luoyang, Henan, China, 12 May 2014.
5. New RIC bounds via  $\ell_q$  minimisation with  $0 < q \leq 1$  in compressed sensing, in *The 9th International Conference on Numerical Optimization and Numerical Linear Algebra*, Changchun, China, 13 Sep 2013.

**Submitted papers**

1. Jun Sun, Lingchen Kong and Shenglong Zhou, Gradient projection Newton algorithm for sparse collaborative learning, [arxiv:2108.06605](#), 2021
2. Shenglong Zhou, Ziyang Luo and Naihua Xiu, Computing one-bit compressive sensing via double-sparsity constrained optimization, [arXiv:2101.03599](#), 2021.
3. Shenglong Zhou, Lili Pan and Naihua Xiu, Heaviside set constrained optimization: optimality and newton method, [arXiv:2007.15737](#), 2020.

**Journal publications**

1. Shenglong Zhou, Lili Pan, Naihua Xiu and Houduo Qi, Quadratic convergence of Smoothing Newton's method for 0/1 loss optimization, accepted by SIAM Journal on Optimization, [arXiv:2103.14987](#), 2021.
2. Andreas Fisher, Alain Zemkoho and Shenglong Zhou, Semismooth Newton type method for bilevel optimization: global convergence and extensive numerical experiments, Optimization Methods and Software, 2021
3. Shenglong Zhou, Sparse SVM for sufficient data reduction, [IEEE Transactions on Pattern Analysis and Machine Intelligence](#), 2021.
4. Huajun Wang, Yuanhai Shao, Shenglong Zhou, Ce Zhang and Naihua Xiu, Support vector machine classifier via  $L_{0/1}$  soft-margin loss, [IEEE Transactions on Pattern Analysis and Machine Intelligence](#), 2021.
5. Shenglong Zhou, Naihua Xiu and Houduo Qi, Global and quadratic convergence of newton hard-thresholding pursuit, [Journal of Machine Learning Research](#), 22(12): 1-45, 2021,
6. Shenglong Zhou, Lili Pan and Meijuan Shang, Newton hard-thresholding pursuit for sparse LCP via a new merit function, [SIAM Journal on Scientific Computing](#), 43(2), A772–A799, 2021.
7. Shenglong Zhou, Lili Pan, Naihua Xiu, Newton method for  $\ell_0$ -regularized optimization, [Numerical Algorithms](#), 2021.
8. Rui Wang, Naihua Xiu and Shenglong Zhou, An extended Newton-type algorithm for  $\ell_2$ -regularized sparse logistic regression and its efficiency for classifying large-scale datasets, [Journal of Computational and Applied Mathematics](#), 397: 1-17, 2021.
9. Alain Zemkoho and Shenglong Zhou, Theoretical and numerical comparison of the KKT and value function reformulations in bilevel optimization, [Computational Optimization and Applications](#), 78, 625-674, 2021.
10. Shenglong Zhou, Alain Zemkoho and A. Tin, BOLIB 2019: Bilevel Optimization LIBrary of test problems version 2, a chapter in [Bilevel optimization: advances and next challenges](#), Springer, 2020.
11. Xinrong. Li, Naihua Xiu and Shenglong Zhou, Matrix optimization over low-rank spectral sets: stationary points, local and global minimizers, [Journal of Optimization Theory and Applications](#), 184: 895–930, 2020.
12. Shenglong Zhou, Naihua Xiu and Houduo Qi, Robust euclidean embedding via EDM optimization, [Mathematical Programming Computation](#), 12: 337–387, 2020.
13. Shenglong Zhou, Naihua Xiu and Houduo Qi, A fast matrix majorization-projection method for penalized stress minimization with box constraints, [IEEE Transactions on Signal Processing](#), 66(16): 4331-4346, 2018.
14. Lili Pan, Shenglong Zhou, Naihua Xiu and Houduo Qi, A convergent iterative hard thresholding for sparsity and nonnegativity constrained optimization, [Pacific Journal of Optimization](#), 13(2): 325-353, 2017.
15. Lianjun Zhang, Lingchen Kong and Shenglong Zhou, A smoothing iterative method for quantile regression with non-convex  $l_p$  penalty, [Journal of Industrial and Management Optimization](#), 13 (1): 93-112, 2017.
16. Yanqing Liu, G. Liu, Xianchao Xiu and Shenglong Zhou, The l1-penalized quantile regression for traditional Chinese medicine syndrome manifestation, [Pacific Journal of Optimization](#), 13(2): 279-300, 2017.
17. Shenglong Zhou, Naihua Xiu, Ying Wang, Ling Kong and Houduo Qi, A null-space-based weighted  $\ell_1$  minimization approach to compressed sensing, [Information and Inference: A Journal of the IMA](#), 5(1): 76-102, 2016.
18. Lili Pan, Naihua Xiu and Shenglong Zhou, On solutions of sparsity constrained optimization, [Journal of the Operations Research Society of China](#), 3(4): 421-439, 2015.
19. Shenglong Zhou, Naihua Xiu, Ziyang Luo and Lingchen Kong, Sparse and low-rank covariance matrix estimation, [Journal of the Operations Research Society of China](#), 3(2): 231-250, 2015.
20. Meijuan Shang, Shenglong Zhou and Naihua Xiu, Extragradient thresholding methods for sparse solutions of co-coercive NCPs, [Journal of Inequalities and Applications](#), 34, 2015.
21. Meijuan Shang, Chao Zhang, Dingtao Peng and Shenglong Zhou, A half thresholding projection algorithm for sparse solutions of LCPs, [Optimization Letters](#), 9(6): 1231-1245, 2015.
22. Shenglong Zhou, Lingchen Kong and Naihua Xiu, New bounds for RIC in compressed sensing, [Journal of the Operations Research Society of China](#), 1(2): 227-237, 2013.