

CURRICULUM VITAE

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EDUCATION

Ph.D. June 2011
CPAMI, Electrical and Computer Engineering, University of Waterloo
Waterloo, ON
Supervisor, co-Director: Waterloo AI Institute, and CPAMI Director: Prof. Fakhri Karray (FCAE, FIEEE)

M.A.Sc., Information Systems Security October 2007
Concordia Institute for Information Systems Engineering, Concordia University
Montreal, PQ
Supervisor: Prof. Prabir Bhattacharya (FIEEE, FIAPR, FAAAS)

B.A., Spec. Hons. Computer Science June 2006
York University
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RESEARCH INTERESTS

Computer Vision, biometrics, artificial intelligence, pattern recognition, image processing, machine learning, feature extraction/detection, and classification

ACADEMIC EXPERIENCE

Associate Professor August 2019 – present
Computer and Information Science, University of Macau
Taipa, Macau

Assistant Professor August 2013 – August 2019
Computer and Information Science, University of Macau
Taipa, Macau

Post Doctoral Researcher October 2012 – April 2013
Electrical and Computer Engineering, Carnegie Mellon University
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MONOGRAPHS

M1.D. Zhang, H. Zhang, and **B. Zhang**, *Tongue Image Analysis*, Springer, Singapore: Springer, 2017.
M2.**B. Zhang**, Q. Zhao, and D. Zhang, *Facial Multi-Characteristics and Applications*, Singapore: World Scientific Publishing, 2018.
M3.J. Li, **B. Zhang**, and D. Zhang, *Information Fusion: Machine Learning Methods*, Springer Nature Singapore Pte Ltd., 2022.

JOURNAL PUBLICATION

- J1. J. Zhou, Q. Zhang, S. Zeng, **B. Zhang***, and L. Fang, "Latent linear discriminant analysis for feature extraction via isometric structural learning," *Pattern Recognition*, vol. 149, pp. 110218, 2024.
- J2. J. Zhou, G. Wang, S. Zeng, and **B. Zhang***, "Learning with Euler Collaborative Representation for Robust Pattern Analysis," *ACM Transactions on Intelligent Systems and Technology*, vol. 14, no. 6, pp. 1-25, 2023.
- J3. B. Jiang, Y. Lu, **B. Zhang**, and G. Lu, "AGP-Net: Adaptive Graph Prior Network for Image Denoising," *IEEE Transactions on Industrial Informatics*, pp. 1-12, 2023.
- J4. H. Zhang, J. Zhao, **B. Zhang**, C. Gong, J. Qian, and J. Yang, "Unified Framework for Faster Clustering via Joint Schatten p-Norm Factorization With Optimal Mean," *IEEE Transactions on Neural Networks and Learning Systems*, pp. 1-15, 2023.
- J5. S. Li, R. Ma, J. Zhou, **B. Zhang***, and L. Wu, "Joint Discriminative Analysis with Low-Rank Projection for Finger Vein Feature Extraction," *IEEE Transactions on Information Forensics and Security*, vol. 19, pp. 959-969, 2023.
- J6. C. Zhao, Y. Qin, and **B. Zhang***, "Adversarially Learning Occlusions by Backpropagation for Face Recognition," *Sensors*, vol. 23, no. 20, pp. 8559, 2023.
- J7. Q. Zhang, J. Zhou, Y. Xu, and **B. Zhang***, "Collaborative representation induced broad learning model for classification," *Applied Intelligence*, vol. 53, no. 20, pp. 23442-23456, 2023.
- J8. Q. Zhang, Z. Ying, J. Zhou, J. Sun, and **B. Zhang***, "Broad Learning Model with a Dual Feature Extraction Strategy for Classification," *Mathematics*, vol. 11, no. 19, pp. 4087, 2023.
- J9. H. Zhang, B. Wen, Z. Zha, **B. Zhang**, Y. Tang, G. Yu, and W. Du, "Accelerated PALM for Nonconvex Low-rank Matrix Recovery with Theoretical Analysis," *IEEE Transactions on Circuits and Systems for Video Technology*, pp. 1-14, 2023.
- J10. Z. Yang, H. Huangfu, L. Leng, **B. Zhang**, A.B.J. Teoh, and Y. Zhang, "Comprehensive Competition Mechanism in Palmprint Recognition," *IEEE Transactions on Information Forensics and Security*, vol. 18, pp. 5160-5170, 2023.
- J11. Z. Hao, G. Wang, **B. Zhang***, L. Fang, and H. Li, "An Isomerism Learning Model to Solve Time-Varying Problems Through Intelligent Collaboration," *IEEE/CAA Journal of Automatica Sinica*, vol. 10, no. 8, pp. 1772-1774, 2023.
- J12. Y. Qin, and **B. Zhang***, "Privacy-Preserving Biometrics Image Encryption and Digital Signature Technique Using Arnold and ElGamal," *Applied Sciences*, vol. 13, no. 14, pp. 8117, 2023.
- J13. H. Zhang, J. Gao, J. Qian, J. Yang, C. Xu, and **B. Zhang**, "Linear Regression Problem Relaxations Solved by Nonconvex ADMM with Convergence Analysis," *IEEE Transactions on Circuits and Systems for Video Technology*, pp. 1-11, 2023.
- J14. S. Li, F. Li, J. Li, H. Li, **B. Zhang**, D. Tao, and X. Gao, "Logical Relation Inference and Multiview Information Interaction for Domain Adaptation Person Re-Identification," *IEEE Transactions on Neural Networks and Learning Systems*, pp. 1-13, 2023.
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- J20. S. Li, H. Zhang, R. Ma, J. Zhou, J. Wen, and **B. Zhang***, "Linear discriminant analysis with generalized kernel constraint for robust image classification," *Pattern Recognition*, vol. 136, 109196, 2023.

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- J44. G. Wang, Q. Li, S. Liu, H. Xiao, and **B. Zhang***, “New zeroing neural network with finite-time convergence for dynamic complex-value linear equation and its applications,” *Chaos, Solitons & Fractals*, vol. 164, 112674, 2022.
- J45. J. Zhou, Q. Zhang, S. Zeng, and **B. Zhang***, “Fuzzy Graph Subspace Convolutional Network,” *IEEE Transactions on Neural Networks and Learning Systems*, pp. 1-15, 2022.
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- J69.**B. Zhang***, and J. Zhou, "Multi-feature representation for burn depth classification via burn images," *Artificial Intelligence in Medicine*, vol. 118, 102128, 2021.
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- J80.L. Fei, **B. Zhang***, Y. Xu, C. Tian, and I. Rida, "Jointly Heterogeneous Palmprint Discriminant Feature Learning," *IEEE Transactions on Neural Networks and Learning Systems*, pp. 1-12, 2021.
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- C43. S. Ting, and **B. Zhang***, "Diabetes Mellitus Detection Based on Facial Block Texture Features Using the Gabor Filter," Proceedings: *17th IEEE International Conference on Computational Science and Engineering*, Chengdu, China, Dec. 19-21, 2014.
- C44. H. Zhang, and **B. Zhang***, "Disease Detection Using Tongue Geometry Features with Sparse Representation Classifier," Proceedings: *2014 International Conference on Medical Biometrics*, pp. 102-107, Shenzhen, China, May 31-Jun. 1, 2014.
- C45. **B. Zhang**, L. Zhang, J. You, and F. Karray, "Microaneurysm (MA) Detection via Sparse Representation Classifier with MA and Non-MA Dictionary Learning," Proceedings: *International Conference on Pattern Recognition*, Istanbul, Turkey, Aug. 23-26, 2010.

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- C47. **B. Zhang**, and F. Karray, “Optic Disc Detection by Multi-scale Gaussian Filtering with Scale Production and a Vessels’ Directional Matched Filter,” Proceedings: *International Conference on Medical Biometrics*, pp. 173-180, Hong Kong, China, Jun. 28-30, 2010.
- C48. **B. Zhang**, and F. Karray, “Optic Disc and Fovea Detection via Multi-scale Matched Filters and a Vessels’ Directional Matched Filter,” Proceedings: *International Conference on Autonomous and Intelligent Systems*, pp. 1-5, Povo de Varzim, Portugal, Jun. 21-23, 2010.
- C49. Q. Li, J. Wang, J. You, **B. Zhang**, and F. Karray, “Refractive Error Detection via Group Sparse Representation,” Proceedings: *International Conference on Autonomous and Intelligent Systems*, pp. 1-5, Povo de Varzim, Portugal, Jun. 21-23, 2010.
- C50. **B. Zhang**, J. You, F. Karray, C. Kee, and Q. Li, “Astigmatism and Eye Shape,” Proceedings: *International Conference on Image Processing, Computer Vision, and Pattern Recognition*, pp. 72-77, Las Vegas, Nevada, USA, Jul. 13-19, 2009.
- C51. **B. Zhang**, X.Q. Wu, J. You, Q. Li, and F. Karray, “Hierarchical Detection of Red Lesions in Retinal Images by Multiscale Correlation Filtering,” Proceedings: *SPIE Medical Imaging 2009: Computer-Aided Diagnosis*, vol. 7260, 72601L, Orlando, Florida, USA, Feb. 7-12, 2009.
- C52. Q. Li, **Y.B. Zhang**, X. Jin, J. You, and P. Bhattacharya, “Screening Proliferative Diabetic Retinopathy Through Color Retinal Images,” Proceedings: *International Conference on Image Processing, Computer Vision, and Pattern Recognition*, pp. 574-578, Las Vegas, Nevada, USA, Jun. 25-28, 2007.
- C53. **Y.B. Zhang**, Q. Li, J. You, and P. Bhattacharya, “Palm Vein Extraction and Matching for Personal Authentication,” Proceedings: *International Conference on Visual Information Systems*, pp. 154-164, Shanghai, China, Jun. 28-29, 2007.

BOOK CHAPTERS

- B1. **B. Zhang***, “Tongue Pattern Recognition to Detect Diabetes Mellitus and Non-Proliferative Diabetic Retinopathy,” in *Pattern Recognition and Big Data*, A. Pal, and S.K. Pal, Eds., Singapore: World Scientific Publishing, 2017, pp. 663-686.
- B2. Y. Wei, and **B. Zhang***, “Robust Constrained Concept Factorization,” in *Computational Intelligence for Pattern Recognition*, W. Pedrycz, and S.Y. Chen, Eds., Springer International Publishing, 2018, pp. 207-225.
- B3. S. Zhao, W. Nie, and **B. Zhang***, “Deep Learning-Based Hyperspectral Multimodal Biometric Authentication System Using Palmprint and Dorsal Hand Vein,” in *AI and Deep Learning in Biometric Security*, G. Jaswal, V. Kanhangad, and R. Ramachandra, Eds., USA: CRC Press-Taylor and Francis, 2021.

RESEARCH PROJECTS

- R1. Science and Technology Development Fund of Macao SAR (PI), “A security system with high accuracy and high anti-counterfeiting ability - A study of key technologies in multimodal contactless palmprint authentication,” FDCT 0028/2023/RIA1, MOP2,095,000.00, January 2024 – November 2026
- R2. Multi-Year Research Grant (PI), University of Macau, “Study on the Computation of Material Illumination and Object Geometry from an Image,” MYRG2019-00006-FST, MOP375,000, January 2020 – December 2022
- R3. Multi-Year Research Grant (PI), University of Macau, “Analysis of Hyperspectral Palm and Hand Vein Images for the Development of a Biometrics System,” MYRG2018-00053-FST, MOP405,000, January 2019 – December 2022
- R4. Young Scientists Fund of the National Natural Science Foundation of China (NSFC青年科学基金项目) (PI), “基于特征学习的融合掌纹和手掌手背静脉信息的鲁棒身份认证方法研究,” 61602540, CNY210,000, January 2017 – December 2019

- R5. Science and Technology Development Fund of Macao SAR (**PI**), “Adaptive Approach in Fluid Dynamic Simulation,” FDCT 068/2015/A2, MOP850,000, March 2016 – March 2019
- R6. Science and Technology Development Fund of Macao SAR (**PI**), “Big Data Analysis of Non-Invasive Visual Sensing for Computerized Healthcare,” FDCT 124/2014/A3, MOP1,364,000, October 2015 – October 2018
- R7. Science and Technology Development Fund of Macao SAR (**PI**), “Haptic Techniques for Virtual Treatment of Dentofacial Deformity,” FDCT 136/2014/A3, MOP1,332,000, October 2015 – October 2018
- R8. Science and Technology Development Fund of Macao SAR Special Equipment Fund (**PI**), “電腦舌像及面像採集與分析系統,” FDCT 028/2014/SA, MOP183,150, June 2015
- R9. Matching Research Grant (**PI**), University of Macau, MRG026/ZYB/2015/FST, MOP150,000, March 2015 – October 2017
- R10. Science and Technology Development Fund of Macao SAR (**PI**), “Non-Invasive Automatic Pre-Diabetes Mellitus Detection,” FDCT 128/2013/A, MOP500,000, October 2014 – October 2017

STUDENT SUPERVISION

Ph.D. Students

1. Weijing Zhao, August 2024
2. Yuqi Wang, August 2023 – present
3. Zhihao Hao, August 2021 – present
4. Guancheng Wang, August 2020 – 2023, Associate Professor at Guangdong Ocean University, China
5. Qi Zhang, August 2020 – 2023, Lecture at Communication University of China, China
6. Jianhang Zhou, August 2020 – 2023, Pursuing a Postdoc Fellowship at the Chinese University of Hong Kong (Shenzhen), China
7. Ruijun Ma, August 2019 – 2022, Lecture at South China Agricultural University, China
8. Shuyi Li, August 2019 – 2022, Lecture at Beijing University of Technology, China
9. Jielu Yan, August 2018 – 2023, Pursuing a Postdoc Fellowship at the University of Saint Joseph
10. Wei Cao, August 2015 – 2021, Lecture at Communication University of China, China
11. Shaoning, Zeng, January 2018 – 2020, Associate Professor at the University of Electronic Science and Technology of China, China
12. Shuping Zhao, August 2017 – 2020, Pursuing a Postdoc Fellowship at the Shenzhen International Graduate School, Tsinghua University, China
13. Wei Nie, August 2017 – 2020, Lecture at Zhuhai College of Jilin University, China
14. Wei Yan, August 2016 – 2019, Pursuing a Postdoc Fellowship at the Guangdong University of Technology, China
15. Ting Shu, August 2015 – 2019, Currently a Postdoctoral Research Fellow at the University of Queensland, Australia

M.Sc. Students

1. Ang Jian Hwee, August 2023 – present
2. Shuoyuan Wang, August 2023 – present
3. Ying Qin, August 2022 – present
4. Caijie Zhao, August 2022 - present
5. Jianxiu Cai, August 2020 – 2022, Pursuing a PhD degree at the Macau Polytechnic University
6. Shuang Gu, August 2020 – 2023, Working at CITIC Bank
7. Zhihao Hao, August 2019 – 2021, Pursuing a PhD degree at the University of Macau
8. Qi Zhang, August 2018 – 2020, Pursuing a PhD degree at the University of Macau
9. Jianhang Zhou, August 2018 – 2020, Pursuing a PhD degree at the University of Macau
10. Liuhang Zhou, August 2017 – 2020, Product Manager at Bringbuys
11. Li Zhang, August 2017 – 2020, Pursuing a PhD degree at the University of Macau
12. Peng Zhang, September 2013 – July 2017, Working at CCB
13. Han Zhang, September 2013 – June 2015

14. Ting Shu, September 2013 – June 2015, Completed a PhD degree at the University of Macau

B.Sc. Students

1. Kenneth Chan and Ansel Tang, FST Dean's Final Year Project List 2014/2015
2. Bruce Xu, Dept. of CIS Best Overall Project 2015/2016 and FST Dean's Final Year Project List 2015/2016
3. Jeremy Zhu, FST Dean's Final Year Project List 2016/2017
4. Chan Tin Chon, Shi Boming, and Wang Zehao, FST Dean's Final Year Project List 2017/2018
5. Xu Chongchao and Zhang Hanxiang, Dept. of CIS Best Overall Project 2018/2019 and FST Dean's Final Year Project List 2018/2019
6. William Zhang and David Francisco Zhu Sun, FST Dean's Final Year Project List 2019/2020
7. Lok Chon Weng and Qi Yuanyuan, FST Dean's Final Year Project List 2020/2021
8. Zhang Yuwei, Dept. of CIS Best Overall Project 2021/2022 and FST Dean's Final Year Project List 2021/2022
9. Tam Hoi Chon and Chu Ka Seng, FST Dean's Final Year Project List 2022/2023

ACADEMIC AWARDS

1. 2019-2022 World's Top 2% Scientists, Elsevier BV
2. Lotfi Zadeh Best Paper Award, 17th International Conference on Machine Learning and Cybernetics (ICMLC) and 15th International Conference on Wavelet Analysis and Pattern Recognition (ICWAPR), July 2018
3. Retina Online Challenge Microaneurysm Detection 2009, placing 2nd (<http://roc.healthcare.uiowa.edu/>)

SERVICE

1. Associate Editor, *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 2022 – present
2. Associate Editor, *IEEE Transactions on Neural Networks and Learning Systems*, 2022 – present
3. Associate Editor, *Artificial Intelligence Review*, 2021 – present
4. Associate Editor, *IET Computer Vision*, 2017 – present
5. Associate Editor, *International Journal of Image and Graphics*, 2013 – present
6. Technical Committee Member, *IEEE Systems, Man, and Cybernetics Society*, 2013 – present

MISCELLANEOUS

IEEE Senior Member
Erdős Number: 5