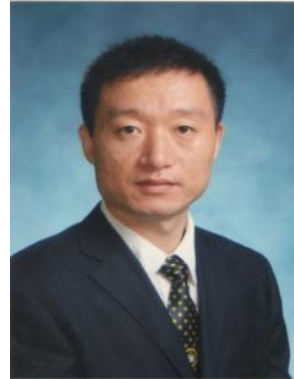# Zhanchuan Cai

Professor
Macau University of Science and Technology

Macau Environmental Research Institute

Office：A323
Tel.： +853-8897 2329
E-mail： zccai@must.edu.mo

Academic Qualification

Ph.D. in Computer Software and Theory, Sun Yat-sen University

Research & Teaching Area

Intelligent Information Processing
Applied Mathematics and Scientific Computing
Computer Graphics and Image Processing
Remote Sensing Data Processing and Analysis

Recent Events/Links(Selected)

✧ 26 Jan. 2021, the article "High-fidelity Reversible Image Watermarking Based on Effective Prediction Error-Pairs Modification" published on *IEEE Transactions on Multimedia* was reported by the CCF TC-Multimedia Technology through the article guide module. (Website: https://mp.weixin.qq.com/s/pF3Ey5tuOdRjN0q7uNSEFQ)

✧ 6 Apr. 2021, the article "A New Image Compression Algorithm Based on Non-Uniform Partition and U-System" published on *IEEE Transactions on Multimedia* was reported by the CCF TC-Multimedia Technology through the article guide module. (Website: https://mp.weixin.qq.com/s/IZv12szuakwWR_4aiNZPYg)

✧ The article "An Adaptive Triangular Partition Algorithm for Digital Images" published on *IEEE Transactions on Multimedia* was selected as "TMM Featured Articles". (Website: https://signalprocessingsociety.org/publications-resources/ieee-transactions-multimedia/adaptive-triangular-partition-algorithm-digital)

✧ 3-5 Sept. 2020, as the organizing chair, we held the 8th International Conference on Computational Visual Media. (Website: https://www.must.edu.mo/news/34371-article09041637)

Awards & Honors/Appointments (Selected)

Awards & Honors
✧ Second Prize of the Teaching Achievement Award (Co-awarded), Macau University of Science and Technology, 2020.

- ✧ Third Prize of Technological Invention Award of the Macau Science and Technology Awards (Co-awarded), 2018.
- ✧ Excellent Supervisor for Contemporary Undergraduate Mathematical Contest in Modeling, CSIAM, 2017.
- ✧ BOC Excellent Research Award, Macau University of Science and Technology, 2016
- ✧ Third Prize of Natural Science Award of the Macau Science and Technology Awards (Co-awarded), 2012.
- ✧ Excellent Organization Worker for Contemporary Undergraduate Mathematical Contest in Modeling, CSIAM, 2011.

Appointments
- ✧ Senior Member, Institute of Electrical and Electronics Engineers (IEEE).
- ✧ Distinguished Member, China Computer Federation (CCF).
- ✧ Member, Association for Computing Machinery (ACM).
- ✧ Member, Asia Graphics Association (AG).
- ✧ Committee Member, Computer-Aided Design & Computer Graphics (CCF TCCADCG).
- ✧ Committee Member, Geometric Design and Computing of China.

Working Experience

- ➢ 2008-Present, Assistant Professor/ Associate Professor/ Professor, Faculty of Information Technology, Macau University of Science and Technology, Macau, China
- ➢ 2007-2008, Visiting Scholar, University of Nevada, Las Vegas, USA

Academic Publications (selected)

Books
- • Z.C. Cai, Fundamentals of Engineering Mathematics, Science Press, 2018, ISBN-13: 978-7030568632. (in Chinese)
- • J. Huang, Z.C. Cai, K.Y. U, Y.Y. Liang, Local Interpolation Explicit Algorithm and Its Application, Science Press, 2016, ISBN-13: 978-7030462947. (in Chinese)

Journal Papers
- • W.G. He and **Z.C. Cai***, Reversible Data Hiding Based on Dual Pairwise Prediction-Error Expansion, *IEEE Transactions on Image Processing*, 2021,30:5045-5055.
- • B. Ye, X.X. Yuan, **Z.C. Cai***, and T. Lan, Severity Assessment of COVID-19 Based on Feature Extraction and V-Descriptors, *IEEE Transactions on Industrial Informatics*, DOI: 10.1109/TII.2021.3056386.
- • Q.Y. Huang, **Z.C. Cai***, and T. Lan, A New Approach for Character Recognition of Multi-Style Vehicle License Plates, *IEEE Transactions on Multimedia*, DOI: 10.1109/TMM.2020.3031074.
- • Y.Q. Xiao, **Z.C. Cai***, and X.X. Yuan, YuvConv: Multi-Scale Non-Uniform Convolution Structure Based on YUV Color Model, *IEEE Transactions on Multimedia*, DOI: 10.1109/TMM.2020.3013352.
- • J.Y. Yuan, W. Cao, **Z.C. Cai***, and B.H. Su, An Underwater Image Vision Enhancement Algorithm Based on Contour Bougie Morphology, *IEEE Transactions on Geoscience and Remote Sensing*, DOI: 10.1109/TGRS.2020.3033407.

- Y.M. Wang, **Z.C. Cai***, and W.G. He, High Capacity Reversible Data Hiding in Encrypted Image Based on Intra-block Lossless Compression, *IEEE Transactions on Multimedia*, DOI: 10.1109/TMM.2020.2999187.
- T. Lan and **Z.C. Cai***, Efficient Reconstruction of Industrial Images Using Optimized HMK Splines, *IEEE Transactions on Industrial Informatics*, 2021, 17(7): 4657-4668.
- T. Lan and **Z.C. Cai***, A Novel Image Representation Method Under a Non-Standard Positional Numeral System, *IEEE Transactio*ns on Multimedia, 2021, 23: 1301-1315.
- T. Lan and **Z.C. Cai***, Modeling of Lunar Digital Terrain Entropy and Terrain Entropy Distribution Model, *IEEE Transactions on Geoscience and Remote Sensing*, 2021, 59(2): 1052-1066.
- W.G. He, **Z.C. Cai***, and Y.M. Wang, High-fidelity Reversible Image Watermarking Based on Effective Prediction Error-Pairs Modification, *IEEE Transactions on Multimedia*, 2021, 23: 52-63.
- Y.M. Zhang, **Z.C. Cai***, and G.Q.Xiong, A New Image Compression Algorithm Based on Non-uniform Partition and U-System, *IEEE Transactions on Multimedia*, 2121, 23: 1069-1082.
- J.J. Chen and **Z.C. Cai***, A New Class of Explicit Interpolatory Splines and Related Measurement Estimation, *IEEE Transactions on Signal Processing*, 2020, 68:2799-2813.
- W.G. He and **Z.C.Cai**, An Insight Into Pixel Value Ordering Prediction-Based Prediction-Error Expansion, *IEEE Transactions on Information Forensics and Security*, 2020,15:3859-3871.
- X.X. Yuan and **Z.C. Cai***, An Adaptive Triangular Partition Algorithm for Digital Images, *IEEE Transactions on Multimedia*, 2019, 21(6): 1372-1383.
- T. Lan and **Z.C. Cai***, Lunar Brightness Temperature Map and TB Distribution Model, *IEEE Transactions on Geoscience and Remote Sensing*, 2018, 56(12): 7310-7323.
- W. Cao, **Z.C. Cai***, and B. Ye, Measuring Multiresolution Surface Roughness Using V-System, IEEE Transactions on Geoscience and Remote Sensing, 2018, 56(3): 1497-1506.
- **Z.C. Cai***, T. Lan, and C.M. Zheng, Hierarchical MK Splines: Algorithm and Applications to Data Fitting, IEEE Transactions on Multimedia, 2017, 19(5): 921-934.
- **Z.C. Cai*** and T. Lan, Lunar Brightness Temperature Model Based on the Microwave Radiometer Data of Chang'e-2, *IEEE Transactions on Geoscience and Remote Sensing*, 2017, 55(10): 5944-5955.
- W.G. He, **Z.C. Cai***, and Y.M.Wang, Flexible spatial location-based PVO predictor for high-fidelity reversible data hiding. *Information Sciences*, 2020, 520: 431-444.
- J.J. Chen and **Z.C. Cai***, Cardinal MK-spline Signal Processing: Spatial Interpolation and Frequency Domain Filtering, *Information Sciences*, 2019, 495: 116-135.

* – Corresponding author

Patents
- **Z.C. Cai** and T. Lan, Method and System for Secure Encryption, United States Patent, Patent No. 10,985,906 B2, April, 2021.
- **Z.C. Cai** and T. Lan, Methods and Apparatus for Encrypting Multimedia Information, United States Patent, Patent No. 10635786 B2, April 2020.
- **Z.C. Cai** and W. Cao, Method for Improving Calculations of Surface Roughness, United States Patent, Patent No. 10580150 B2, March 2020.
- **Z.C. Cai** and T. Lan, Methods and Apparatus for Image Construction, United States Patent, Patent No. 10332279 B2, June 2019.
- **Z.C. Cai**, Methods and Apparatus for Color Image Watermarking, United States Patent, Patent No. 10296999 B2, May 2019.

- **Z.C. Cai** and W. Cao, Omnidirectional Roughness Algorithm for Topographic Signature Analysis of Lunar Craters, United States Patent, Patent No. 10354398 B2, July 2019.
- **Z.C. Cai**, Lunar Brightness Temperature Modeling Based on the Microwave Radiometer Data, United States Patent, Patent No. 10346565 B2, July 2019.
- **Z.C. Cai**, B. Ye, T. Lan, and Y.Q. Xiao, Systems and Methods for Reducing Computer Resources Consumption to Reconstruct Shape of Multi-Object Image, United States Patent, Patent No. 10062187 B1, August 2018.
- **Z.C. Cai** and Z. Li, Image Stitching, United States Patent, Patent No. 9990753 B1, June 2018.
- **Z.C. Cai**, Color Image Watermarking, United States Patent, Patent No. 10037587 B2, July 2018.