研究

小波分析、算法、视频件定义网络物学

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书记

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个人简介

高协平，男，1965年出生，湖南桃江人，中共党员，博士，教授，博士生导师，享受国务院政府特殊津贴专家。1995年确定为湖南省优秀青年骨干教师培养对象，1999年确定为教育部高等学校骨干教师首批培养对象，2002年确定为湖南省高等学校学科带头人，2004年确定为湖南省121人才工程第一层次人选，2007年确定为“新世纪百千万人才工程”国家级人选。

主要研究领域有小波分析、神经计算、进化算法、医学影像分析、视频与图像处理、软件定义网络与安全、计算生物学等。正在主持或主持完成国家自然科学基金4项，湖南省自然科学基金杰出青年科学基金、重点项目、一般项目各1项，湖南省教育厅重点项目1项，湖南省高校创新平台开放基金1项，湖南省科技厅项目2项等。获湖南省科技进步二等奖1项，湖南省自然科学二等奖1项，湖南省自然科学三等奖1项，获国家优秀教学成果二等奖1项，湖南省优秀教学成果一、二、三等奖各2项。在国内外重要学术刊物和学术会议上发表论文110余篇，其中被SCI、EI收录80余篇次。

现为中国人民解放军总参谋部三部八局兼职研究员，IEEE会员，中国计算机学会高级会员，中国人工智能学会高级会员，教育部第三届学科发展与专业设置专家委员会委员，中国高等教育学会第六届理事会理事，全国高等学校教学研究会第三届理事会理事，教育部高等学校计算机类专业教学指导委员会委员。

科研项目

近年主持的部分科研项目

[1] 国家自然科学基金面上项目，面向肿瘤精准诊断的病理图像定量分析研究，批号：61972333，2020.01-2023.12.

[2] 国家自然科学基金面上项目，多带多滤波器组的格型结构设计及其在图像融合中的应用，批号：61172171，2012.01-2015.12.

[3] 国家自然科学基金面上项目，子波参数化及自适应子波神经网络研究，批号：60375021，2004.01-2006.12.

[4] 国家自然科学基金面上项目，多子波模糊神经网络与信号重构，批号：69875014，1999.01-2001.12.

[5] 教育部高校骨干教师资助计划，自适应模糊多子波神经网络及在图像数据压缩中的应用研究，批号：GG-520-10530-1022，2000.01-2002.12.

[6] 教育部留学回国人员科研启动基金，自适应小波神经网络及用于蛋白质结构预测研究，批号：KL1153/z11006，2005.01-2007.12.

[7] 湖南省自然科学基金杰出青年基金，新型高效的自适应小波神经网络研究，批号：05JJ10011，2005.01-2007.12.

[8] 湖南省自然科学基金重点基金，二元非分离小波的参数化构造及其在图像压缩中的应用研究，批号：03JJY3096；04JJ20010，2004.01-2006.12.

主要代表性论文

IEEE期刊论文

[1] Kai Hu, Dong Liu, Zhineng Chen, Xuanya Li, Yuan Zhang, **Xieping Gao***, “Embedded Residual Recurrent Network and Graph Search for the Segmentation of Retinal Layer Boundaries in Optical Coherence Tomography,” IEEE Transactions on Instrumentation and Measurement, vol. 70, pp. 1-17, Art No. 5010117, May 2021

[2] Pingan Tan, Tao Peng, **Xieping Gao***, B. Zhang, “Flexible Combination and Switching Control for Robust Wireless Power Transfer System With Hexagonal Array Coil,” IEEE Transactions on Power Electronics, vol. 36, no. 4, pp. 3868-3882, April 2021

[3] Fen Xiao, Bin Li, Yimu Peng, Chunhong Cao, Kai Hu, **Xieping Gao***, “Multi-Modal Weights Sharing and Hierarchical Feature Fusion for RGBD Salient Object Detection,” IEEE Access, vol. 8, 26602-26611, February 2020

[4] Kai Hu, Qinghai Gan, Yuan Zhang, Shuhua Deng, Fen Xiao, Wei Huang, Chunhong Cao, **Xieping Gao***, “Brain Tumor Segmentation Using Multi-cascaded Convolutional Neural Networks and Conditional Random Field,” IEEE Access, vol. 7, pp. 92615-92629, July 2019

[5] Chunhong Cao, Jie Yu, Chengyao Zhou, Kai Hu, Fen Xiao, **Xieping Gao***, “Hyperspectral Image Denoising via Subspace-Based Nonlocal Low-Rank and Sparse Factorization,” IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 12, no. 3, pp. 973-988, March 2019

[6] Wanchun Yang, Kai Zhou, Pingan Tan, **Xieping Gao***, “An effective method using duty cycles for assessment of exposure to mobile communication systems,” IEEE Electromagnetic Compatibility Magzine, vol. 8, no. 2, pp. 57-63, 2019

[7] Zhengfa Li, Zebin Lu, Shuhua Deng, **Xieping Gao***, “A Self-Adaptive Virtual Network Embedding Algorithm Based on Software-Defined Networks,” IEEE Transactions on Network and Service Management, vol. 16, no. 1, pp. 362-373, March 2019

[8] Wanchun Yang, **Xieping Gao***, Chunhong Cao, Fen Xiao, Kai Hu, Yuan Zhang, “An Effective Approach for Prediction of Exposure to Base Stations Using Wavelets to Fit the Antenna Pattern,” IEEE Transactions on Antennas and Propagation, vol. 66, no. 12, pp. 7519-7524, December 2018

[9] Shuhua Deng, Xing Gao, Zebin Lu, **Xieping Gao***, “Packet Injection Attack and Its Defense in Software-Defined Networks,” IEEE Transactions on Information Forensics and Security, vol. 13, no. 3, pp. 695-705, March 2018

[10] Wanchun Yang, Yanxia Hu, **Xieping Gao***, Kai Hu, Fen Xiao, Chunhong Cao, “The Duty Cycle Analysis for Electromagnetic Field Exposure From WLAN in a Busy Period,” IEEE Transactions on Electromagnetic Compatibility, vol. 58, no. 6, pp. 1772-1775, December 2016

[11] Dapeng Xiong, Rongjie Liu, Fen Xiao, **Xieping Gao***, “ProMT: Effective Human Promoter Prediction Using Markov Chain Model Based on DNA Structural Properties,” IEEE Transactions on Nanobioscience, vol. 13, no. 4, pp. 374-383, December 2014

[12] **Xieping Gao**, Bodong Li, Fen Xiao, “Lattice structure for generalized-support multidimensional linear phase perfect reconstruction filter bank,” IEEE Transactions on Image Processing, vol. 22, no. 12, pp. 4853-4864, December 2013

[13] Bodong Li, **Xieping Gao***, Fen Xiao, “A new design method of the starting block in lattice structure of arbitrary-length linear phase paraunitary filter bank by combining two polyphase matrices,” IEEE Transactions on Circuits and Systems-II: Express Briefs, vol. 59, no. 2, pp. 118-122, February 2012

[14] Kai Hu, **Xieping Gao***, Fei Li, “Detection of Suspicious Lesions by Adaptive Thresholding Based on Multiresolution Analysis in Mammograms,” IEEE Transactions on Instrumentation and Measurement, vol. 60, no. 2, pp. 462-472, February 2011

[15] **Xieping Gao**, Fen Xiao, Bodong Li, “Construction of Arbitrary Dimensional Biorthogonal Multiwavelet Using Lifting Scheme,” IEEE Transactions on Image Processing, vol. 18, no. 5, pp. 942-955, May 2009

[16] Bodong Li, **Xieping Gao***, “Lattice structure for regular linear phase paraunitary filter bank with odd decimation factor,” IEEE Signal Processing Letters, vol. 21, no. 1, pp. 14-17, January 2014

其它英文期刊论文

[1] Kai Hu, Yingjie Huang, Wei Huang, Hui Tan, Zhineng Chen, Zheng Zhong, Xuanya Li, Yuan Zhang, **Xieping Gao***, “Deep Supervised Learning Using Self-Adaptive Auxiliary Loss for COVID-19 Diagnosis from Imbalanced CT Images,” Neurocomputing, 458: 232-245, June 2021.

[2] Yuan Zhang, Sai Zhang, Xizhi He, Jing Lu, **Xieping Gao***, “DeepRibSt: a multi-feature convolutional neural network for predicting ribosome stalling,” Multimedia Tools and Applications, vol. 80, pp. 17239-17255, May 2021

[3] Yihao He, Zebin Lu, Junru Lei, Shuhua Deng, **Xieping Gao***, “Joint optimization on energy saving and load balancing for data center networks based on software defined networks,” Concurrency and Computation: Practice and Experience, vol. 33, no. 9, pp. e6134, May 2020

[4] Junru Lei, Shuhua Deng, Zebin Lu, Yihao He, **Xieping Gao***, “Energy-saving traffic scheduling in backbone networks with software-defined networks,” Cluster Computing, vol. 24, pp. 279-292, March 2021

[5] Kai Hu, Kai Chen, Xizhi He, Yuan Zhang, Zhineng Chen*, Xuanya Li, **Xieping Gao***, “Automatic Segmentation of Intracerebral Hemorrhage in CT Images Using Encoder-Decoder Convolutional Neural Network,” Information Processing & Management, vol. 57, no. 6, pp. 102352, November 2020

[6] Yuan Zhang, Fei Ye, Dapeng Xiong, **Xieping Gao***, “LDNFSGB: prediction of long non-coding rna and disease association using network feature similarity and gradient boosting,” BMC Bioinformatics, vol. 21, pp. 377, September 2020

[7] Kai Hu, Si Liu, Yuan Zhang, Chunhong Cao, Fen Xiao, Wei Huang, **Xieping Gao***, “Automatic Segmentation of Dermoscopy Images Using Saliency Combined with Adaptive Thresholding Based on Wavelet Transform,” Multimedia Tools and Applications, vol. 79, pp. 14625-14642, June 2020

[8] Kai Hu, Binwei Shen, Yuan Zhang, Chunhong Cao, Fen Xiao, **Xieping Gao***, “Automatic segmentation of retinal layer boundaries in OCT images using multiscale convolutional neural network and graph search,” Neurocomputing, vol. 365, pp. 302-313, November 2019

[9] Fen Xiao, Xue Gong, Yiming Zhang, Yanqing Shen, Jun Li, **Xieping Gao*,** DAA: Dual LSTMs with Adaptive Attention for Image Captioning, Neurocomputing, vol. 364, pp. 322-329, October 2019

[10] Kai Hu, **Xieping Gao***, Y. Zhang, “Markov multiple feature random fields model for the segmentation of brain MR images,” Expert Systems with Applications, vol. 134, no. 1, November 2019

[11] Kai Hu, Xiaorui Niu, Si Liu, Yuan Zhang, Chunhong Cao, Fen Xiao, Wanchun Yang, **Xieping Gao***, “Classification of melanoma based on feature similarity measurement for codebook learning in the bag-of-features model,” Biomedical Signal Processing and Control, vol. 51, no. 1, pp. 200-209, May 2019

[12] Chunhong Cao, **Xieping Gao***, “Stable Recovery of Compressed Sensing Signals via Optimal Dual Frame Based ℓ_q-minimization for $0<q\leq1,” IET Signal Processing, vol. 13, no. 3, pp. 296-303, May 2019

[13] Shuhua Deng, Xing Gao, Zebin Lu, Zhengfa Li, **Xieping Gao***, “DoS vulnerabilities and mitigation strategies in software-defined networks,” Journal of Network and Computer Applications, vol. 125, no. 1, pp. 209-219, January 2019

[14] Fen Xiao, Wenzheng Deng, Chunhong Cao, Kai Hu, **Xieping Gao***, “Multi-Scale Deep Neural Network for Salient Object Detection,” IET Image Processing, vol. 12, no. 11, 2036-2041, November 2018

[15] Kai Hu, Zhenzhen Zhang, Xiaorui Niu, Yuan Zhang, Chunhong Cao, Fen Xiao, **Xieping Gao***, “Retinal vessel segmentation of color fundus images using multiscale convolutional neural network with an improved cross-entropy loss function,” Neurocomputing, vol. 309, pp. 179-191, October 2018

[16] Fen Xiao, Liangchan Peng, Lei Fu, **Xieping Gao***, “Salient object detection based on eye tracking data,” Signal Processing, vol. 144, pp. 392-397, March 2018

[17] Kai Hu, Qiaocui Cheng, Bodong Li, **Xieping Gao***, “The complex data denoising in MR images based on the directional extension for the undecimated wavelet transform,” Biomedical Signal Processing and Control, vol. 39, pp. 336-350, January 2018

[18] Kai Hu, We Yang, **Xieping Gao***, “Microcalcification diagnosis in digital mammography using extreme learning machine based on hidden Markov tree model of dual-tree complex wavelet transform,” Expert Systems with Applications, vol. 86, pp. 135-144, November 2017

[19] Chunhong Cao, **Xieping Gao***, “Compressed sensing image restoration based on data-driven multi-scale tight frame,” Journal of Computational and Applied Mathematics, vol. 309, pp. 622-629, January 2017

[20] Kai Hu, Qiaocui Cheng, **Xieping Gao***, “Wavelet-domain TI Wiener-like filtering for complex MR data denoising,” Magnetic Resonance Imaging, vol. 34, no. 8, pp. 1128-1140, October 2016

[21] Pingan Tan, Haibin He, **Xieping Gao**, “A Frequency-Tracking Method Based on a SOGI-PLL for Wireless Power Transfer Systems to Assure Operation in the Resonant State,” Journal of Power Electronics, vol.16, no.3, pp. 1056-1066, May 2016

[22] Bodong Li, **Xieping Gao***, “A method to initialize free parameters in lattice structure of arbitrary-length linear phase perfect reconstruction filter bank,” Signal Processing, vol. 106, pp. 319-330, January 2015

[23] Bodong Li, **Xieping Gao***, “Lattice structure for arbitrary-length oversampled linear phase paraunitary filter bank with unequal numbers of symmetric and antisymmetric filters,” AEU - International Journal of Electronics and Communications, vol. 68, no. 6, pp. 565-568, June 2014

[24] Bodong Li, **Xieping Gao***, “A method for initializing free parameters in lattice structure of linear phase perfect reconstruction filter bank,” Signal Processing, vol. 98, pp. 243-251, May 2014

[25] Dapeng Xiong, Fen Xiao, Li Liu, Kai Hu, Yanping Tan, Shunmin He, **Xieping Gao***, “Towards a Better Detection of Horizontally Transferred Genes by Combining Unusual Properties Effectively,”PLoS One, vol. 7, no. 8, pp. 1-5, August 2012

[26] Bodong Li, **Xieping Gao***, Fen Xiao, “Reversible design of the starting block in lattice structure of arbitrary-length linear phase paraunitary filter banks,” AEU - International Journal of Electronics and Communications, vol. 65, no. 6, pp. 599-601, June 2011

[27] Chunhong Cao, **Xieping Gao***, “Minimum-energy wavelet frame on the interval with arbitrary integer dilation factor,” Journal of Computational and Applied Mathematics, vol. 235, no. 8, pp. 1885-1896, February 2011

[28] Xia Guo, **Xieping Gao***, “A novel hierarchical ensemble classifier for protein fold recognition”, Protein Engineering Design and Selection, vol. 21, pp. 659-664, 2008

[29] **Xieping Gao**, Chunhong Cao, “Minimum-energy wavelet frame on the interval”, Science in China Series F: Information Sciences, vol. 51, pp. 1547-1562, 2008

[30] **Xieping Gao**, Siwang Zhou, “A study of orthogonal, balanced and symmetric multi-wavelets on the interval”, Science in China Series F: Information Sciences, vol. 48, pp. 761-781, 2005

[31] **Xieping Gao**, Hua Zhong, “Parameterization of 3-channel non-separable 2-D wavelets and filters”, Science in China Series F: Information Sciences, vol. 47, pp. 362-371, 2004

[32] Caiyan Jia, **Xieping Gao***, “A general sampling theorem for multiwavelet subspaces”, Science in China Series F, vol. 45, pp. 365-372, 2002

[33] **Xieping Gao***, Shi Shu, Kaixin Fu, “Quartic spline-on-spline interpolation”, Journal of Computational and Applied Mathematics, vol. 71, no. 2, pp. 213-223, July 1996

中文期刊论文

[1] 陈智能, 高协平*, “双正交小波的提升构造研究”,计算机学报, vol. 32, pp. 288-298, February 2009

[2] 肖芬, 高协平*, “参数可变系统时间序列短期预测方法”, 软件学报, vol. 17, pp. 1042-1050, May 2006

[3] 高协平, 贾彩燕, “广义插值多小波及其反馈神经网络构造”, 计算机研究与发展, vol. 40, pp. 861-868, June 2003

[4] 高协平, 张钹, “区间小波神经网络(II)——性质与模拟”, 软件学报, vol. 9, pp. 246-250, April 1998

[5] 高协平, 张钹, “区间小波神经网络(I)——理论与实现”, 软件学报, vol. 9, pp. 217-221, March 1998

发明专利

[1] 高协平，胡凯，马尔可夫多特征随机场模型构建方法及其脑部MR图像分割技术，中国，ZL201310205383.1，已授权.

[2] 高协平，仇权，形状描述符的构建方法及基于该描述符的图像检索方法，中国，ZL201310122040.9，已授权.

[3] 高协平，张胜龙，胡凯，一种文本图像二值化的优化方法，中国，ZL201510257271.X，已授权.

成果获奖

[1] 国家优秀教学成果二等奖，2014年（排第四）

[2] 湖南省自然科学二等奖，2009年（排第二）

[3] 湖南省科技进步二等奖，2006年（排第一）

[4] 湖南省优秀教学成果一等奖，2013年（排第四）、2009年（排第五）、1997年（排第五）

[5] 湖南省优秀教学成果二等奖，2006年（排第三）

[6] 湖南省优秀教学成果三等奖，2013年（排第二）、2009年（排第二）

[7] 湖南省优秀博士学位论文奖（指导老师），2010年

[8] 湖南省优秀硕士学位论文奖（指导老师），2014年、2009年、2003年

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