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近年来主要开展计算机视觉与机器学习中的显著性检测 (Saliency Detection)、目标检测 (Object Detection)、特征提取 (Feature Extraction)、特征学习 (Feature Learning)、目标识别 (Object Recognition)、图像分类 (Image Classification) 等相关研究。

- **海洋浮游生物图像分析与识别**：海洋浮游生物的分析与识别对于海洋生态系统、环境监测和海洋渔业生产等多方面意义重大。传统人工监测手段存在样品分析空间分辨率低、易受破坏、时效性差等问题。原位光学成像可现场实时采集具有较高时空分辨率且满足人眼视觉观测要求的浮游生物图像，且目前有不少系统已长期连续采集了海量浮游生物图像数据。因此，海洋浮游生物图像分析与识别成为海洋生态监测（尤其赤潮监测）的关键。
- **水下目标视觉信息获取与处理**：水下目标视觉探测技术因其能够提供更高的空间分辨率和更直观的图像信息，对于海洋资源开发、生物多样性等方面的原位观测与监测，具有重要的研究意义和应用前景。然而，由于水体本身具有高吸收、强散射等特点，使得水下视觉探测难度远高于大气视觉探测。尤其在近海海域及河流中，受到泥沙及其他悬浮粒子的干扰，水质更加浑浊。因此，如何抑制散射、提高能量能见度和衬度能见度是水下视觉信息获取的核心，如何复原水下图像、提高低信噪比水下图像中目标检测能力是水下视觉信息处理的关键。
- **垂直探测电离层自动解译与度量**：作为“太阳活动的反光镜”和“大气扰动的放大镜”，电离层研究具有极其重要的学术意义和社会经济价值。针对目前电离层人工度量费时、费力等问题，基于中国电波传播研究所自主研制电离层垂测仪，将其记录探测数据转换为频高图灰度图像，根据电离层反射回波信号特点并结合电离层分层结构特征，运用图像处理与分析技术，通过“去噪—分层—判识—提取—度量”完成电离层参数自动解译及度量，以期实现长期稳定实时电离层监测，可为电离层及其相关研究奠定基础。

1. 教育背景

- **中国海洋大学** 青岛，中国
博士，海洋信息探测与处理专业，导师：姬光荣教授 2004年9月-2009年6月
- **中国海洋大学** 青岛，中国
本科，电子信息工程专业，工学学士学位 2000年9月-2004年6月

2. 工作经历

- **中国海洋大学** 青岛，中国
副教授，信息科学与工程学院电子工程系 2014年12月-至今
- **中国海洋大学** 青岛，中国
讲师，信息科学与工程学院电子工程系 2009年7月-2014年11月

3. 学术兼职

- 期刊审稿: IEEE Access, JOE; IEEE/ACM TCBB; Elsevier PR, NEUCOM, CVIU, JVCI, JOLT, COMPELECENG, FISH, ASOC, OPT COMMUN, ECOINF; SPIE JEI, JARS, OE; Springer MONE, COE, MTAP, NCA, WINE; Wiley MRT, CCPE; CLP COL.
- 会议审稿: IEEE ICCV2019 CVPR2019 TENCON2015; MTS/IEEE OCEANS 2019Marseille 2018Charleston 2018Kobe 2017Aberdeen 2016Monterey.
- 学术服务: IEEE Journal of Oceanic Engineering 编委 (Associate Editor), IEEE Access 编委 (Associate Editor); VALSE 首批常务领域主席委员会成员, 首届在线理事会理事; ISAIR 指导委员会成员; VALSE 2017 注册主席; ISAIR 2017 程序委员会委员; VALSE 2018 网站主席; ISAIR 2018 领域主席; VALSE 2019 网站主席; ISAIR 2019 领域主席.

4. 科研项目

4.1 海洋浮游生物图像分析与识别

- 类别不平衡条件下海洋浮游生物图像精细识别及其原位应用研究
批准号: 61771440 项目直接费用: 67 万元
国家自然科学基金 (负责人)
研究期限: 2018 年 01 月 - 2021 年 12 月
- 基于深度学习的类别不平衡条件下海洋浮游生物图像精细识别
批准号: 17-1-1-5-jcb 项目经费: 10 万元
青岛市科技计划源头创新计划 (负责人)
研究期限: 2017 年 03 月 - 2019 年 03 月
- 基于视觉注意结合生物形态特征的海洋浮游植物显微图像分析
批准号: 61301240 项目经费: 26 万元
国家自然科学基金 (负责人)
研究期限: 2014 年 01 月 - 2016 年 12 月
- 基于生物形态特征的中国海常见有害赤潮藻显微图像识别
批准号: 61271406 本人经费: 30 万元
国家自然科学基金 (第二位)
研究期限: 2013 年 01 月 - 2016 年 12 月
- 基于生物形态学的有害赤潮藻显微图像自动识别研究
批准号: ZR2010DQ002 项目经费: 5 万元
山东省自然科学基金 (负责人)
研究期限: 2010 年 11 月 - 2013 年 11 月

4.2 水下目标视觉信息获取与处理

- 海洋中小型浮游生物原位光学观测关键技术研究
批准号: 41776113 项目直接费用: 70 万元
国家自然科学基金 (第二位)
研究期限: 2018 年 01 月 - 2021 年 12 月
- 基于逻辑随机共振理论的水下视觉目标检测方法研究
批准号: 61703381 项目直接费用: 25 万元
国家自然科学基金 (第二位)
研究期限: 2018 年 01 月 - 2020 年 12 月
- 海洋浮游动物原位探测与分析系统
批准号: 201562023 项目经费: 95 万元
中央高校基本科研业务费 (负责人)
研究期限: 2015 年 11 月 - 2017 年 12 月

4.3 垂直探测电离图自动解译与度量

- 基于图像分析的垂测电离图自动判读研究
批准号: 13-1-4-223-jcb 项目经费: 5 万元
青岛市科技计划基础研究项目 (负责人)
研究期限: 2013 年 01 月 - 2015 年 09 月
- 电离层垂直探测频高图自动解释及度量
批准号: 201313011 项目经费: 16 万元
中央高校基本科研业务费 (负责人)
研究期限: 2013 年 01 月 - 2015 年 12 月
- 典型垂测电离图自动识别方法
编号: 20140106 项目经费: 10 万元
电波环境特性及模化技术国防科技重点实验室开放课题 (负责人)
研究期限: 2013 年 06 月 - 2015 年 05 月

5. 主要论著

电子印本 (* 通讯作者)

- [1] Ziqiang Zheng, Zhibin Yu*, Haiyong Zheng, Chao Wang, Nan Wang. *Pipeline generative adversarial networks for facial images generation with multiple attributes*. arXiv preprint arXiv:1711.10742, 2017.

期刊论文 (* 通讯作者)

- [1] Ziqiang Zheng, Chao Wang, Zhibin Yu, Nan Wang, Haiyong Zheng*, Bing Zheng. *Unpaired photo-to-caricature translation on faces in the wild*. Neurocomputing, 2019, DOI: 10.1016/j.neucom.2019.04.032. (SCI) [arXiv preprint arXiv:1711.10735]
- [2] Nan Wang, Jia Yu, Biao Yang, Haiyong Zheng*, Bing Zheng. *Vision-based in situ monitoring of plankton size spectra via a convolutional neural network*. IEEE Journal of Oceanic Engineering, 2018, DOI: 10.1109/JOE.2018.2881387. (SCI)
- [3] Chenchen Qiu, Shaoyong Zhang, Chao Wang, Zhibin Yu, Haiyong Zheng*, Bing Zheng*. *Improving transfer learning and squeeze-and-excitation networks for small-scale fine-grained fish image classification*. IEEE Access, 2018, DOI: 10.1109/ACCESS.2018.2885055. (SCI)
- [4] Mengnan Sun, Zhaorui Gu, Haiyong Zheng*, Bing Zheng*, John Watson. *Underwater wide-area layered light field for underwater detection*. IEEE Access, 2018, DOI: 10.1109/ACCESS.2018.2877591. (SCI)

- [5] Shaoyong Zhang, Na Li, Chenchen Qiu, Zhibin Yu*, **Haiyong Zheng**, Bing Zheng. *Depth map prediction from a single image with generative adversarial nets*. Multimedia Tools and Applications, 2018, DOI: 10.1007/s11042-018-6694-x. (SCI)
- [6] Na Li, Ziqiang Zheng, Shaoyong Zhang, Zhibin Yu*, **Haiyong Zheng***, Bing Zheng. *The synthesis of unpaired underwater images using a multistyle generative adversarial network*. IEEE Access, 2018, DOI: 10.1109/ACCESS.2018.2870854. (SCI)
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- [8] Ziqiang Zheng, Chao Wang, Zhibin Yu*, **Haiyong Zheng**, Bing Zheng. *Instance map based image synthesis with a denoising generative adversarial network*. IEEE Access, 2018, DOI: 10.1109/ACCESS.2018.2849108. (SCI) [arXiv preprint arXiv:1801.03252]
- [9] Jingyu Lu, Na Li, Shaoyong Zhang, Zhibin Yu*, **Haiyong Zheng**, Bing Zheng. *Multi-scale adversarial network for underwater image restoration*. Optics and Laser Technology, 2018, DOI: 10.1016/j.optlastec.2018.05.048. (SCI)
- [10] Nan Wang*, Bing Zheng, **Haiyong Zheng**, Biao Yang. *When underwater degraded images meet logical stochastic resonance*. Nonlinear Dynamics, 2018, DOI: 10.1007/s11071-018-4359-y. (SCI)
- [11] **Haiyong Zheng**, Ruchen Wang, Zhibin Yu, Nan Wang, Zhaorui Gu, Bing Zheng*. *Automatic plankton image classification combining multiple view features via multiple kernel learning*. BMC Bioinformatics, 2017, DOI: 10.1186/s12859-017-1954-8. (SCI)
- [12] Yan Wang, Na Li, Zongying Li, Zhaorui Gu, **Haiyong Zheng***, Bing Zheng, Mengnan Sun. *An imaging-inspired no-reference underwater color image quality assessment metric*. Computers and Electrical Engineering, 2017, DOI: 10.1016/j.compeleceng.2017.12.006. (SCI)
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- [15] Nan Wang, **Haiyong Zheng***, Bing Zheng. *Underwater image restoration via maximum attenuation identification*. IEEE Access, 2017, DOI: 10.1109/ACCESS.2017.2753796. (SCI)
- [16] Nan Wang, Bing Zheng*, **Haiyong Zheng**, Zhibin Yu. *Feeble object detection of underwater images through LSR with delay loop*. Optics Express, 2017, DOI: 10.1364/OE.25.022490. (SCI)
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- [18] **Haiyong Zheng***, Nan Wang, Zhibin Yu, Zhaorui Gu, Bing Zheng. *Robust and automatic cell detection and segmentation from microscopic images of non-setae phytoplankton species*. IET Image Processing, 2017, DOI: 10.1049/iet-ipr.2017.0127. (SCI)
- [19] 于芝涛, 姬婷婷, 程孝龙, 赵红苗, 姬光荣, **郑海永***. 基于自适应幅度谱分析的显著目标检测. 中国海洋大学学报 (自然科学版), 2017, DOI: 10.16441/j.cnki.hdx.20150080.
- [20] Bing Zheng, Nan Wang*, **Haiyong Zheng**, Zhibin Yu, Jinpeng Wang. *Object extraction from underwater images through logical stochastic resonance*. Optics Letters, 2016, DOI: 10.1364/OL.41.004967. (SCI)
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- [23] 于堃, 赵红苗, 姬光荣, **郑海永***. 结合显著性与 GrubCut 的无角毛类浮游植物显微图像分割. 中国海洋大学学报 (自然科学版), 2016, DOI: 10.16441/j.cnki.hdx.20140214.

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- [25] **Haiyong Zheng**, Bin Wu, Tengda Wei, Linshan Wang, Yangfan Wang*. *Global exponential robust stability of high-order Hopfield neural networks with S-type distributed time delays*. Journal of Applied Mathematics, 2014, DOI: 10.1155/2014/705496. (SCI)
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- [27] **Haiyong Zheng***, Guangrong Ji, Guoyu Wang, Zhenwei Zhao, Shaohong He. *Automatic scaling of F layer from ionograms based on image processing and analysis*. Journal of Atmospheric and Solar-Terrestrial Physics, 2013, DOI: 10.1016/j.jastp.2013.09.007. (SCI)

会议论文 (* 通讯作者)

- [1] Chao Wang, **Haiyong Zheng***, Zhibin Yu, Ziqiang Zheng, Zhaorui Gu, Bing Zheng. *Discriminative region proposal adversarial networks for high-quality image-to-image translation*. European Conference on Computer Vision (ECCV), 2018, DOI: 10.1007/978-3-030-01246-5_47. [arXiv preprint arXiv:1711.09554]
- [2] Jing Liu, Angang Du, Chao Wang, **Haiyong Zheng***, Nan Wang, Bing Zheng. *Teaching squeeze-and-excitation PyramidNet for imbalanced image classification with GAN-based curriculum learning*. International Conference on Pattern Recognition (ICPR), 2018, DOI: 10.1109/ICPR.2018.8546037.
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- [4] Chao Wang, Zhibin Yu, **Haiyong Zheng***, Nan Wang, Bing Zheng. *CGAN-Plankton: Towards large-scale imbalanced class generation and fine-grained classification*. IEEE International Conference on Image Processing (ICIP), 2017, DOI: 10.1109/ICIP.2017.8296402.
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- [7] Li Ma, Min Fu*, Nan Wang, **Haiyong Zheng**, Zhibin Yu, Zhaorui Gu, Jia Yu, Bing Zheng, Xuefeng Liu. *Simulation of stochastic resonance in underwater laser communication*. OCEANS MTS/IEEE Aberdeen, 2017, DOI: 10.1109/OCEANSE.2017.8084775.
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- [9] **Haiyong Zheng**, Lin Chang, Tengda Wei, Xinxin Qiu, Ping Lin, Yangfan Wang*. *Registering retinal vessel images from local to global via multiscale and multicycle features*. The 29th IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops, 7th International Workshop on Biomedical Image Registration (WBIR), 2016, DOI: 10.1109/cvprw.2016.68.
- [10] Jialun Dai, Ruchen Wang, **Haiyong Zheng***, Guangrong Ji, Xiaoyan Qiao. *ZooplanktoNet: Deep convolutional network for zooplankton classification*. OCEANS MTS/IEEE Shanghai, 2016, DOI: 10.1109/OCEANSAP.2016.7485680.
- [11] Ruchen Wang, Jialun Dai, **Haiyong Zheng***, Guangrong Ji, Xiaoyan Qiao. *Multi features combination for automated zooplankton classification*. OCEANS MTS/IEEE Shanghai, 2016, DOI: 10.1109/OCEANSAP.2016.7485675.
- [12] Xinxin Qiu, Ning Tang, **Haiyong Zheng***, Guangrong Ji, Xiaoyan Qiao. *Automatic segmentation of Chaetoceros microscopic images via pixel-wise classification*. OCEANS MTS/IEEE Shanghai, 2016, DOI: 10.1109/OCEANSAP.2016.7485603.
- [13] Yafei Zhu, Lin Chang, Jialun Dai, **Haiyong Zheng***, Bing Zheng. *Automatic object detection and segmentation from underwater images via saliency-based region merging*. OCEANS MTS/IEEE Shanghai, 2016, DOI: 10.1109/OCEANSAP.2016.7485598.

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- [20] Hongguang Lu, Guangrong Ji, **Haiyong Zheng***, Zhenwei Zhao, Shaohong He. *Ionogram trace enhancement based on image pixel connectedness*. SPIE Vol. 8878 ICDIP 2013, 887809, DOI: 10.1117/12.2030690.
- [21] **Haiyong Zheng***, Bing Zheng, Guangrong Ji, ZhongwenGuo, Yuting Sun. *Image enhancement of underwater target detection by inhomogeneous illumination*. OCEANS MTS/IEEE Yeosu, 2012, DOI: 10.1109/OCEANS-Yeosu.2012.6263374.
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学位论文

- [1] **郑海永**. 基于生物形态学的有害赤潮显微图像诊断研究 [博士学位论文]. 青岛: 中国海洋大学, 2009.

发明专利

- [1] **郑海永**, 邱晨晨, 俞智斌. 一种基于深度卷积神经网络的鱼类图像分类方法. 申请号: 201810984130.1. 申请日: 2018年08月28日.
- [2] **郑海永**, 刘静, 杜昂昂, 俞智斌. 基于深度卷积神经网络的类别不平衡的图像分类方法. 申请号: 201810866743.5. 申请日: 2018年08月01日.
- [3] **郑海永**, 王超, 俞智斌. 一种基于判别区域候选对抗网络的图像转图像翻译方法. 申请号: 201810820240.4. 申请日: 2018年07月24日.
- [4] **郑海永**, 汤宁, 顾肇瑞, 俞智斌, 郑冰. 一种基于无监督逐像素分类的角毛藻图像分割方法. 申请号: 201810763944.2. 申请日: 2018年07月12日.
- [5] **郑海永**, 王超, 俞智斌, 戴嘉伦, 郑冰. 基于多特征融合卷积神经网络的浮游生物图像分类方法. 申请号: 201610912684.1. 申请日: 2016年10月20日.
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My research interests mainly focus on Saliency Detection, Object Detection, Feature Extraction, Feature Learning, Object Recognition, and Image Classification in Computer Vision and Machine Learning, especially Underwater Vision and Deep Learning.

- Marine Plankton Image Analysis and Recognition/Classification
- Underwater Target Visual Information Acquisition and Processing
- Vertical Sounding Ionogram Parsing/Interpretation and Scaling

1. Education

- Ocean University of China Qingdao, China
DSc: Ocean Information Sensing and Processing, Supervisor: Prof. Guangrong Ji Sep. 2004 - Jun. 2009
- Ocean University of China Qingdao, China
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- Ocean University of China Qingdao, China
Associate Professor, Department of Electronic Engineering Dec. 2014 - present
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3. Profession

- **Journal Reviews:** IEEE Access, JOE; IEEE/ACM TCBB; Elsevier PR, NEUCOM, CVIU, JVCI, JOIT, COMPELECENG, FISH, ASOC, OPT COMMUN, ECOINF; SPIE JEL, JARS, OE; Springer MONE, COE, MTAP, NCA, WINE; Wiley MRT, CCPE; CLP COL.
- **Conference Reviews:** IEEE ICCV2019 CVPR2019 TENCON2015; MTS/IEEE OCEANS 2019Marseille 2018Charleston 2018Kobe 2017Aberdeen 2016Monterey.
- **Professional Activities:** *IEEE Journal of Oceanic Engineering* Associate Editor, *IEEE Access* Associate Editor; VALSE LACC, VODB; ISAIR Steering Committee; VALSE 2017 Registration Chair; ISAIR 2017 Program Committee; VALSE 2018 Website Chair; ISAIR 2018 Area Chair; VALSE 2019 Website Chair; ISAIR 2019 Area Chair.

4. Project Grants

4.1 Marine Plankton Image Analysis and Recognition/Classification

- Fine-Grained Image Recognition of Marine Plankton under Class Imbalance and its *In Situ* Application NSFC (Principal Investigator)
Grant No. 61771440 ¥670 Thousand Duration: January 2018 - December 2021
- Fine-Grained Image Recognition of Marine Plankton under Class Imbalance based on Deep Learning QDSTC (Principal Investigator)
Grant No. 17-1-1-5-jcb ¥100 Thousand Duration: March 2017 - March 2019
- Microscopic Image Analysis of Marine Phytoplankton Based on Visual Attention Combined with Biomorphic Characteristics NSFC (Principal Investigator)
Grant No. 61301240 ¥260 Thousand Duration: January 2014 - December 2016

- **Automatic Identification of Harmful Algal Blooms in Chinese Coast Areas by Microscopic Images Based on Biomorphic Characteristics**
Grant No. 61271406 ¥300 Thousand
NSFC (Main Investigator)
Duration: January 2013 - December 2016
- **Automatic Identification of Harmful Algal Blooms by Microscopic Images Based on Biological Morphology**
Grant No. ZR2010DQ002 ¥50 Thousand
SDNSF (Principal Investigator)
Duration: November 2010 - November 2013

4.2 Underwater Target Visual Information Acquisition and Processing

- **Research on Key Technologies of In-Situ Optical Observation for Marine Meso- and Micro-Plankton**
Grant No. 41776113 ¥700 Thousand
NSFC (Main Investigator)
Duration: January 2018 - December 2021
- **Logical Stochastic Resonance Based Underwater Image Object Detection**
Grant No. 61703381 ¥250 Thousand
NSFC (Main Investigator)
Duration: January 2018 - December 2020
- **In-situ Sensing and Analyzing System of Ocean Zooplankton**
Grant No. 201562023 ¥950 Thousand
FRFCU (Principal Investigator)
Duration: November 2015 - December 2017

4.3 Vertical Sounding Ionogram Parsing/Interpretation and Scaling

- **Automatic Scaling of Vertical Sounding Ionogram Based on Image Analysis**
Grant No. 13-1-4-223-jcb ¥50 Thousand
QDSTC (Principal Investigator)
Duration: January 2013 - September 2015
- **Automatic Interpretation and Scaling of Ionospheric Vertical Sounding Ionogram**
Grant No. 201313011 ¥160 Thousand
FRFCU (Principal Investigator)
Duration: January 2013 - December 2015
- **Automatic Identification of Typical Vertical Sounding Ionogram**
No. 20140106 ¥100 Thousand
CRIRP (Principal Investigator)
Duration: June 2013 - May 2015

5. Publications

E-prints (* indicates corresponding author)

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Journals (* indicates corresponding author)

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- [10] Nan Wang*, Bing Zheng, **Haiyong Zheng**, Biao Yang. *When underwater degraded images meet logical stochastic resonance*. Nonlinear Dynamics, 2018, DOI: 10.1007/s11071-018-4359-y. (SCI)
- [11] **Haiyong Zheng**, Ruchen Wang, Zhibin Yu, Nan Wang, Zhaorui Gu, Bing Zheng*. *Automatic plankton image classification combining multiple view features via multiple kernel learning*. BMC Bioinformatics, 2017, DOI: 10.1186/s12859-017-1954-8. (SCI)
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Doctoral Thesis

- [1] **Haiyong Zheng**. *Researches on Microscopic Image Diagnosis of Harmful Algal Blooms Based on Biological Morphology*. College of Information Science and Engineering, Ocean University of China, Qingdao, China, 2009.

Patents

- [1] **Haiyong Zheng**, Chenchen Qiu, Zhibin Yu. *A fish image classification method based on deep convolutional neural network*. Application serial number: 201810984130.1. Application date: 28 August 2018.
- [2] **Haiyong Zheng**, Jing Liu, Angang Du, Zhibin Yu. *The class-imbalanced image classification method based on deep convolutional neural network*. Application serial number: 201810866743.5. Application date: 01 August 2018.
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