

- ❖ 英国《科学文摘》(INSPEC) 来源期刊
- ❖ 俄罗斯《文摘杂志》(AJ) 来源期刊
- ❖ 美国《乌利希期刊指南(网络版)》(Ulrichsweb) 收录期刊
- ❖ 2017—2019 年中国国际影响力优秀学术期刊(自然科学与工程技术)
- ❖ 第二届国家期刊奖百种重点科技期刊
- ❖ 中国科技核心期刊 ❖ 全国中文核心期刊
- ❖ 中国科技论文统计源期刊
- ❖ 中国学术期刊综合评价数据库来源期刊
- ❖ RCCSE 核心学术期刊 ❖ 中国期刊方阵双效期刊
- ❖ 《日本科学技术振兴机构数据库》(JST) 来源期刊
- ❖ 美国《艾博思科学数据库》(EBSCO) 全文来源期刊
- ❖ 美国《剑桥科学文摘(自然科学)》(CSA (NS)) 核心期刊
- ❖ 波兰《哥白尼索引》(IC) 来源期刊
- ❖ 中国科学引文数据库(CSCD) 来源期刊
- ❖ 《中文科技期刊数据库》来源期刊
- ❖ 《中国期刊网》《中国学术期刊(光盘版)》来源期刊
- ❖ 中国精品科技期刊顶尖学术论文(F5000)项目来源期刊
- ❖ 《电子科技文献数据库》来源期刊
- ❖ 《中国工程技术电子信息网》来源期刊

**计算机应用研究**  
**Jisuanji Yingyong Yanjiu**  
**第 43 卷 第 2 期 2026 年 2 月**  
**目 次**

综述评论

规则引擎的方法与技术进展综述 ..... 朱家声, 芮小平, 汤恒, 毕一鸣(321)

基于深度学习的小样本图像分类方法综述 ..... 陈镜宇, 吴加莹, 罗佳, 郁文倩, 古月敬之, 仲兆满(332)

多模态学习专题

基于统一对齐与多阶段融合机制的多模态情感分析模型 ..... 冯广, 刘馨婷, 林忆宝, 赵志文, 肖俊鸿, 周科栋, 黄俊辉(342)

基于全局-局部交互与对比学习的多模态对话情感识别 ..... 钮焱, 乐颖, 李军(353)

基于超图学习与成对跨模态融合的多模态对话情绪识别 ..... 李尚往, 缪裕青, 刘同来, 张万桢, 周明(361)

融合语音多层次特征的情绪识别算法 ..... 胡云鑫, 袁野, 刘娜, 李清都(369)

基于多尺度双重注意力与多模态融合的心电图分类模型 ..... 张丽娜, 王博毅, 张晨煜, 姜天, 申腾飞(377)

结构文本驱动的小样本专业图像检测方法 ..... 刘磊, 袁永宏, 何海鹏, 冯瀚森, 王子琪(385)

算法研究探讨

基于分级信息素的无人机集群协同搜索算法 ..... 李旭东, 陈俊升, 刘恒川(393)

基于深度学习-动态蚁群融合算法的船载多无人机协同路径规划 ..... 黄子健, 王秀红, 袁雪峰(403)

多策略协同扩展的变步长 CDBA-RRT\* 机器人路径规划算法 ..... 韩龙岗, 盛洲, 徐浩(411)

基于 Q-learning 的专家权重优化与多级共识反馈决策 ..... 杜秀丽, 程伟龙, 高星, 潘成胜, 吕亚娜(420)

基于异构图与会话图的知识追踪 ..... 张子豪, 王松, 苏欣怡, 杨全富(427)

基于 BART 的渐进式信息融合情感对话生成 ..... 汤泽辉, 缪裕青, 刘同来, 张万桢, 周明(435)

基于局部敏感哈希聚类的双通道自编码器-协同过滤混合推荐算法 ..... 梅少伟, 张圣筛(443)

多模糊  $\beta$  覆盖粗糙集的属性约简方法 ..... 陈战伟, 李娟, 赵新元(452)

基于孪生 Transformer 的业务流程异常检测方法 ..... 潘克旭,方 娜(463)

一种基于矩阵记忆长短期记忆网络的行人轨迹预测算法 ..... 库向阳,王艺龙(472)

面向运动伤害预警的多源融合与因果推断方法 ..... 魏晓晓,刘 峰,郭 洪(479)

基于时间序列增强与人机协同的语言型可持续群决策方法 ..... 张起荣,王 虹(486)

基于多尺度卷积和局部到全局 Transformer 的石质文物表面粗糙度定量评价模型 ..... 陈雅鑫,周 强,刘 鑫,王 莹,刘鹏欢,朱建锋,罗宏杰(494)

基于双延迟深度确定性策略梯度算法的多智能体计算卸载研究 ..... 王 菁,杨 柯,但文诗,严灵毓,唐 星(502)

基于知识蒸馏与类间关系的异构性缓解方法 ..... 何 洋,彭伟民(510)

#### 系统应用开发

基于多尺度时频融合与复合注意力机制的航空发动机剩余使用寿命预测 ..... 李龚珣,叶 青(517)

基于动态协同预测器的分布式随机离散事件系统的可靠故障预测 ..... 刘富春,陈泽灏,刘建圻(528)

文本流中路线图在线抽取模型 ..... 刘俊岭,杨梦迪,孙焕良,许景科(534)

基于多维度特征融合与边语义增强的代码漏洞检测方法 ..... 张 帅,魏 乐(544)

#### 网络与通信技术

无人机辅助的车载自组织网络中自适应双模式路由协议 ..... 姜 生,陈敬萱,汤敏丽,夏大文,柴 群,周全兴(552)

基于强化学习的无线通信网络智能干扰策略方法 ..... 杨翔宇,高贞贞,苗伟建(559)

#### 信息安全技术

基于 Takens-Transformer 与 GCN 的 DDoS 攻击检测 ..... 邓钰洋,芦天亮,李知皓,孟昊阳,李锦儒(567)

基于定理证明的 UML 多视图模型良构一致性验证方法 ..... 吴润方,杜 晔,黎妹红(577)

一种雾计算辅助的工业物联网四方高效认证协议 ..... 王 雄,张泽昊,胡子宸,李伟麟,王文博(588)

面向 SDN 流表多模态感知与 DRL 协同防御 DDoS 方法 ..... 徐泽鹏,舒兆港,陈淑武,涂 强,庄 涛(596)

#### 图形图像技术

基于 ViT 变换双流架构的人脸图像鉴别算法 ..... 范龙鑫,王一丁(604)

空间特征和高频特征融合的轻量级人脸伪造检测 ..... 杜利莎,杨高明,苏树智,刘惠临(610)

多模态融合与球面采样的层级式位姿估计 ..... 李 欣,况立群,赵 融,韩慧妍,杨晓文(617)

一种增密 3D 高斯的室内实景三维重建方法 ..... 黄道红,刘春玲,石 磊(626)

基于改进 TransUnet 的多模块协同脑肿瘤 MRI 分割方法 ..... 谌海云,向浩睿,邓洲垚(633)

#### 信息集萃

下期要目 ..... (543)

期刊基本参数:CN51-1196/TP \* 1984 \* m \* A4 \* 320 \* zh \* P \* ¥60.00 \* 3840 \* 38 \* 2026-02 \* n

本期责任编辑 黄 莉,何 俐,王海洋

# Application Research of Computers

## Vol. 43 No. 2 Feb. 2026

### Contents

#### Survey

- Review of methodological and technical advances in rule engines ..... Zhu Jiasheng, Rui Xiaoping, Tang Heng, *et al.* (321)  
Survey of few-shot image classification based on deep learning ..... Chen Jingyu, Wu Jiaying, Luo Jia, *et al.* (332)

#### Special Topics in Multimodal Learning

- Multimodal sentiment analysis model based on unified alignment and multi-stage fusion ..... Feng Guang, Liu Xinting, Lin Yibao, *et al.* (342)  
Global-local interaction with contrastive learning for multimodal emotion recognition in conversations ..... Niu Yan, Yue Ying, Li Jun (353)  
Multimodal emotion recognition in conversation based on hypergraph learning and pairwise cross-modal fusion .....  
..... Li Shangwang, Miao Yuqing, Liu Tonglai, *et al.* (361)  
Emotion recognition algorithm fusing multi-level features of speech ..... Hu Yunxin, Yuan Ye, Liu Na, *et al.* (369)  
Multi-scale dual attention and multimodal fusion for ECG classification ..... Zhang Lina, Wang Boyi, Zhang Chenyu, *et al.* (377)  
Structured text-driven few-shot domain-specific image detection method ..... Liu Lei, Yuan Yonghong, He Haipeng, *et al.* (385)

#### Algorithm Research & Explore

- Cooperative search algorithm based on hierarchical pheromone for UAV swarm ..... Li Xudong, Chen Junsheng, Liu Hengchuan (393)  
Synergistic path planning for shipborne multi-UAV systems based on fusion algorithm of deep learning and dynamic ant colony .....  
..... Huang Zijian, Wang Xiuhong, Yuan Xuefeng (403)  
Multi-strategy collaborative expansion adaptive step-size CDBA-RRT\* robot path planning algorithm ..... Han Longgang, Sheng Zhou, Xu Hao (411)  
Q-learning-based expert weight optimization for multi-tiered consensus feedback decision-making ..... Du Xiuli, Cheng Weilong, Gao Xing, *et al.* (420)  
Knowledge tracing based on heterogeneous graph and session graph ..... Zhang Zihao, Wang Song, Su Xinyi, *et al.* (427)  
Progressive information fusion for emotional dialogue generation based on BART ..... Tang Zehui, Miao Yuqing, Liu Tonglai, *et al.* (435)  
Hybrid recommendation algorithm based on LSH clustering and dual-channel AutoEncoder-collaborative filtering ..... Mei Shaowei, Zhang Shenghai (443)  
Attribute reduction of multi-fuzzy  $\beta$  covering rough sets ..... Chen Zhanwei, Li Juan, Zhao Xinyuan (452)  
Business process anomaly detection method based on siamese Transformer ..... Pan Kexu, Fang Na (463)  
Pedestrian trajectory prediction algorithm based on matrix memory long short-term memory network ..... She Xiangyang, Wang Yilong (472)  
Multi-source fusion and causal inference methods for sports injury early warning ..... Wei Xiaoxiao, Liu Feng, Guo Hong (479)

Method of linguistic sustainable group decision-making based on time series enhancement and human-machine collaboration .....	Zhang Qirong, Wang Biao(486)
Quantitative evaluation model for surface roughness of stone cultural relics based on multi-scale convolution and local-to-global Transformer .....	Chen Yixin, Zhou Qiang, Liu Xin, <i>et al.</i> (494)
Research on multi-agent computing offloading based on dual delay deep deterministic policy gradient algorithm .....	Wang Jing, Yang Ke, Dan Wenshi, <i>et al.</i> (502)
Heterogeneity mitigation method based on knowledge distillation and inter-class relationship .....	He Yang, Peng Weimin(510)

### **System Development & Application**

Aero-engine remaining useful life prediction based on multi-scale time-frequency fusion and composite attention mechanism ...	Li Gongxun, Ye Qing(517)
Reliable fault prediction of decentralized stochastic discrete event systems based on dynamic copredictor .....	Liu Fuchun, Chen Zehao, Liu Jianqi(528)
Online roadmap extraction model in text streams .....	Liu Junling, Yang Mengdi, Sun Huanliang, <i>et al.</i> (534)
Code vulnerability detection method based on multi-dimensional feature fusion and edge semantic augmentation .....	Zhang Shuai, Wei Le(544)

### **Technology of Network & Communication**

Adaptive dual-mode routing protocol for UAV-assisted vehicular Ad hoc networks .....	Jiang Sheng, Chen Jingxuan, Tang Minli, <i>et al.</i> (552)
Methods on intelligent jamming-strategy making based on reinforcement learning for wireless communication networks .....	Yang Xiangyu, Gao Zhenzhen, Miao Weijian(559)

### **Technology of Information Security**

DDoS attack detection model based on Takens-Transformer and GCN .....	Deng Yuyang, Lu Tianliang, Li Zhihao, <i>et al.</i> (567)
Well-structured consistency verification method for UML multi-view models based on theorem proof .....	Wu Runfang, Du Ye, Li Meihong(577)
Efficient four-party authentication scheme for IIoT enabled by fog computing .....	Wang Xiong, Zhang Zehao, Hu Zichen, <i>et al.</i> (588)
SDN flow table multi-modal perception and DRL collaborative defense against DDoS method .....	Xu Zepeng, Shu Zhaogang, Chen Shuwu, <i>et al.</i> (596)

### **Technology of Graphic & Image**

Dual-stream face forgery detection algorithm based on improved ViT .....	Fan Longxin, Wang Yiding(604)
Lightweight face forgery detection by fusion of spatial and high-frequency features .....	Du Lisha, Yang Gaoming, Su Shuzhi, <i>et al.</i> (610)
Hierarchical pose estimation with multimodal fusion and spherical sampling .....	Li Xin, Kuang Liqun, Zhao Rong, <i>et al.</i> (617)
Enhanced 3D Gaussian density method for 3D reconstruction in indoor real-scene .....	Huang Daohong, Liu Chunling, Shi Lei(626)
Multi-module collaborative brain tumor MRI segmentation method based on improved TransUnet .....	Shen Haiyun, Xiang Haorui, Deng Zhouyao(633)