南通大学

专业技术五级及以下岗位申报表

申报人姓名：徐一鸣

申报岗位等级：专业技术五级

所在一级学科：控制科学

现聘岗位等级：专业技术七级

填表时间：2019年5月4日

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6. 所在一级学科参照 2018 年 4 月国务院学位委员会、教育部印发的《学位授予和人才培养学科目录》填写。

申报人承诺：

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申报人签名：徐一峰

2019 年 5 月 5 日

一、 基本情况

姓名	徐一鸣	性别	男	民族	汉族	籍贯	南通
出生年月	1981 年 5 月	政治面貌	中共党员		来校工作年月	2011 年 8 月	
健康状况	良好	联系电话	18751310789		邮箱	yimingx@ntu.edu.cn	
所在一级学科	控制科学				申报专业技术岗位等级	五级	
现聘专业技术职务及聘任时间（转评专业技术职务分行填写）	副教授 2014 年 7 月						
是否遵纪守法，具有良好的品行和职业道德，具有良好的学术声誉、学术道德和合作精神	是						

二、 年度考核情况

任现职以来，各年度综合考核是否均为合格及以上			是
近三年年度考核情况	2016 年	2017 年	2018 年
	优秀 √	合格 √	合格 √

三、教学工作情况

1.任现职以来，年度教学质量考核优秀次数（注明年份）			2 次 2014、2016
2.近三年教学质量考核情况	2016 年	2017 年	2018 年
	优秀	良好	良好

四、任现职以来业绩

1. 教师荣誉（申报条件附表条款 1）

获得时间	称号名称	授予部门
2015	南通大学优秀共产党员	南通大学
2016	南通大学优秀教学质量奖	南通大学

2.人才称号（申报条件附表条款 2）

获得时间	称号名称	授予部门
2016	江苏省双创博士-科技副总	江苏省科学技术厅

3.团队建设（申报条件附表条款 3）

获得时间	团队名称	本人角色	批准部门
2018	江苏省“六大人才”高峰团队-微电网智能调度与控制关键技术研发与应用（顾菊平）	核心成员	江苏省委组织部、江苏省人力资源和社会保障厅
2018	江苏省“青蓝工程”优秀教学团队-电气工程及其自动化专业教学团队（华亮）	核心成员	江苏省教育厅

4.教学平台、公共服务平台负责人（申报条件附表条款 4）

获得时间	平台名称	本人角色	批准部门

5.专业建设负责人（申报条件附表条款 5）

获得时间	专业建设名称	本人角色	批准部门

6.学科、科研平台负责人（申报条件附表条款 6）

获得时间	平台名称	本人角色	批准部门

7.教学成果奖（申报条件附表条款 7）

获得时间	奖项级别	奖项等级	本人排名	评奖部门
2017	江苏省教学成果奖一等奖	省一等奖	9	江苏省教育厅
2018	中国交通教育学会优秀教学成果奖	市厅级一等奖	2	中国交通教育学会
2017	南通大学教学成果奖一等奖	校一等奖	1	南通大学

8.自然科研成果奖（申报条件附表条款 8）

获得时间	奖项名称	奖项等级	本人排名	评奖部门
2016	中国有色金属工业科学技术奖二等奖	省部级二等奖	4	中国有色金属工业协会
2017	南通市第十届自然科学优秀学术论文奖	市厅级二等奖	2	南通市人民政府

9.专利奖（申报条件附表条款 9）

获得时间	奖项名称	奖项等级	本人排名	评奖部门

10.指导学生（申报条件附表条款 10）

获得时间	奖项名称	奖项等级	本人排名	评奖部门

11.科研项目（申报条件附表条款 11）

起止时间	项目名称	立项单位	项目级别	本人角色
2016.10-2018.09	南通市科技应用研究计划-多旋翼微型飞行器视觉跟踪协同机理及方法研究	南通市科技局	市厅级	主持人
2014.08-2016.12	江苏省高校自然科学研究面上项目-无人机小型多轴光电系统关键技术研究	江苏省教育厅	市厅级	主持人

12.教学项目（申报条件附表条款 12 内容）

起止时间	项目名称	立项单位	项目级别	本人角色
2018.05-2020.05	基于云课程的测控技术与仪器课程群教学改革与实践	江苏省教育科学研究院现代教育技术研究所	市厅级	主持人

13.论文、论著、专利类（申报条件附表条款 13）

论文题目	发表刊物（卷/期）	本人角色	期刊级别（或分区）
Design and recognition of monocular visual artificial sign based on arc angle information coding[C]	2018 33nd Youth Academic Annual Conference of Chinese Association of Automation, pp. 722-727, May 18-12, Nanjing, China	第一	EI 会议 (EI: 20183105631757)
变厚度复合材料板低速冲击能量监测	振动与冲击, 2018, 37(10): 247-254.	通信作者	EI 期刊 (EI:20183705791829)

Vehicle Recognition Method Based on Color Invariant SIFT Features	2018 37th Chinese Control Conference, pp. 9578-9583 July 25-27, Wuhan, China, 2018.	第一	EI 会议 (EI: 20184606054773)
An optimized Vibe target detection algorithm based on gray distribution and Minkowski distance.	2017 32nd Youth Academic Annual Conference of Chinese Association of Automation, pp. 66-71. June, 30, 2017, Hefei, China.	第一	EI 会议 (EI: 20173204024195)
基于 N-LBP 纹理与色度信息的 CamShift 跟踪算法	计算机科学, 42(6): 313-316, 2015	第二	二级期刊
An Image Stabilization Algorithm on Corner Detection and Feature Block Matching.	4th International Conference on Audio, Language and Image Processing, pp. 190-194, July 7-9, Shanghai, China, 2014	第二	EI 会议 (EI: 20150700518041)
基于去均值归一化互相关方法的复合材料板低速冲击定位	传感技术学报, 29(12): 1810-1814, 2016.	通信作者	二级期刊
基于光纤传感网络的变截面复合材料低速冲击定位	传感技术学报, 27(12):1632-1636, 2014	通信作者	二级期刊

专著名称	出版社	字数（本人撰写字数）	出版时间	折算论文篇数

发明专利授权名称（转让情况）	本人角色	授权时间（转让时间）	折算论文篇数
基于 DSP 的相关跟踪方法及专用装置	第一	2014.09.10	

合计论文篇数（含折算）：__8__篇
自然科学论文__8__篇（其中中科院 JCR 三区及以上论文__0__篇；人文社科论文__0__篇;期刊级别按附表条件表述，如 SCI、EI、三区；CSSCI、SSCI、《高等学校文科学术文摘》转载等；ESI 学科排名前 1%或学科潜力值超过 0.5%的主要贡献者情况说明：__

14.课程资源建设（申报条件附表条款 14）

获得时间	课程资源建设名称	本人角色	批准部门

15.标准制定（申报条件附表条款 15）

颁布时间	制定标准名称	本人角色	标准颁布主体

五、符合申报岗位条件情况

对照《南通大学电气工程学院 2019 年基础岗位新增聘用办法》，本人认为符合条件为：

聘任__副高__（副高、中级）专业技术职务满__5__年，具备附表__1__中所列的第__8__、__7__、___、___、___项条件，以及附表__6__中所列的第__7__、__8__、__13__、___、___项条件。

六、学院意见

经评审，　　同志拟聘为专业技术　　级岗位。

电气工程学院岗位聘用工作小组组长签字：

年　月　日

姓　　名　**徐一鸣**

性　　别　**男**

出生年月　**1981.05**

工作单位　**南通大学**

编　　号　**14011171**

经　**江苏省高校教师**

高级专业技术资格评审委员会于

2014年 7月24日评审，　**徐一鸣**

已具备**副教授**　　资格。

发证机关：

二〇一四年　七月廿四日

荣誉证书

徐一鸣、顾菊平、羌予践、茅靖峰、堵俊、吴晓、张新松、周根荣、张蔚、吴晓新 同志的 面向国际工程教育专业认证的电气专业人才培养模式改革 成果获得2017年南通大学教学成果奖 一等奖 。

特发此证。

南通大学

二〇一七年三月

证 书

顾菊平、徐一鸣、堵俊、华亮、吴晓、茅靖峰 同志：

参评成果《地方综合性大学交通电气类集成创新人才培养的研究与实践》，在2015-2017年度交通教育科学优秀成果评选中获 **一等奖**。特发此证，以资鼓励。

证书编号：**20171046**

二〇一七年十二月二十九日

中国有色金属工业科学技术奖

证 书

为表彰中国有色金属工业科学技术奖获得者，特颁发此证书。

项目名称：高效节能风机用高性能铝合金叶轮成套制造技术及装备

奖励等级：二等奖

获 奖 者：徐一鸣

2016 年 1 月 5 日

证书号：中色协科[2016]5-2015109-R04

南通市人民政府
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索引号：014207264/2017-9569 分类：科技、教育\教育 通知
发布机构：南通市人民政府办公室 文号：通政发〔2017〕67号
成文日期：2017-12-19 发布日期：2017-12-19 有效性：
名称：市政府关于公布南通市第十届自然科学优秀学术论文的通知

市政府关于公布南通市第十届自然科学优秀学术论文的通知

来源：南通市人民政府办公室 发布时间：2017-12-19 字体：[大 中 小]

各县（市）、区人民政府，市经济技术开发区管委会，苏通科技产业园区管委会，通州湾示范区管委会，市各有关部门和单位：

近年来，全市上下深入贯彻习近平总书记关于科技创新工作的重要指示精神，紧紧围绕“科技兴市”战略，注重发挥科技人员的积极性和创造性，鼓励科技人员进行理论创新和实践创新，取得了较好成绩。2015~2016年度，全市科技人员结合南通实际，撰写并在省级以上刊物发表了一大批自然科学和工程技术科学领域的学术论文，为推进科技创新工程作出了积极贡献。经南通市自然科学学术论文评审委员会认真评审，并向社会公示，共评出第十届自然科学优秀学术论文120篇，现予公布。

希望各地、各部门、各单位和全市广大科技工作者深刻认识实现创新驱动的时代责任，奋力投身科技创新创业，为建设“强富美高”新南通贡献智慧和力量。

附件：南通市第十届自然科学优秀学术论文获奖名单

南通市人民政府

2017年12月19日

附件

南通市第十届自然科学优秀学术论文获奖名单（共120篇）

一等奖（共12篇）

1、Dispatching strategies for coordinating environmental awareness and risk perception in wind power integrated system

金晶亮（南通大学）、周德群、 周 鹏

2、Properties of Fluoride-Doped β-PbO2 Electrodes and their Electrocatalytic Activities in Degradation of Acid Orange II

乔启成（南通科技职业学院）、王立章、石 健

3、A hierarchical-coevolutionary-MapReduce-based knowledge reduction algorithm with robust ensemble Pareto equilibrium

丁卫平（南通大学）、王杰华、 王建东

4、基于自适应强度数矩阵直方图均衡化的彩色医学图像增强

顾菊平（南通大学）、华 亮、吴 晓

5、Modification of wool by air plasma and enzymes as a cleaner and environmentally friendly process（用清洁化环境友好的空气等离子和生物酶对羊毛进行改性）

张瑞萍（南通大学）

6、啮合算法及结构参数对谐波传动的影响

罗 霄（南通理工学院）、沙 春

7、Identification of genetic differentiation between waxy and common maize by SNP genotyping

郝德荣（江苏沿江地区农业科学研究所），张振良，程玉静

8、CXCL13 drives spinal astrocyte activation and neuropathic pain via CXCR5

姜保春（南通大学）、曹德利、张 欣

9、Population-representative Incidence of Acute-On-Chronic Liver Failure:A Prospective Cross-Sectional Study

秦 刚（南通市第三人民医院）、邵建国、朱永昌

10、Body Image Disturbances Have Impact on the Sexual Problems in Chinese Systemic Lupus Erythematosus Patients（身体形象障碍对中国系统性红斑狼疮患者性问题的影响）

沈碧玉（南通市第一人民医院）

11、Transplantation of RADA16-BDNF peptide scaffold with human umbilical cord mesenchymal stem cells forced with CXCR4 and activated astrocytes for repair of traumatic brain injury

施 炜（南通大学附属医院）、徐希德

12、Long-term survival trends of gastric cancer patients from 1972 to 2011 in Qidong

陈永胜（启东市人民医院）、陈建国、朱 健

二等奖（共24篇）

1、不同处理方式对大豆秸秆发酵品质和营养成分的影响

顾拥建（江苏沿江地区农业科学研究所）、占今舜、沙文锋

2、地塞米松对人肝癌细胞系SMMC-7721凋亡的影响

沙向红（南通师范高等专科学校）、臧巧巧、谭湘陵

3、Recursion-Transform method to a non-regular m×n cobweb with an arbitrary longitude

谭志中（南通大学）

4、Optimizing degradation of Reactive Yellow 176 by dielectric barrier discharge plasma combined with TiO2 nano-particles prepared using response surface methodology

沈拥军（南通大学）、韩 硕、徐祺辉

5、Application of a mercapto- terminated binuclear Cu (II) complex Modified Au electrode to improve the sensitivity and selectivity for Dopamine detection

姜国民（南通大学）、顾学芳、江国庆

6、纳米CeO2及甲醇改性有机硅烷钝化膜的耐蚀性

顾剑锋（南通职业大学）、肖 轶、周代义

7、深厚冲积层钢筋混凝土外层井壁结构模糊随机有限元可靠性及灵敏度分析

姚亚锋（南通职业大学）

8、基于四元数不变矩的振动谱彩色图像识别的机械故障诊断

华 亮（南通大学）、羌予践、顾菊平

9、基于去均值归一化互相关方法的复合材料板低速冲击定位

陆 观（南通大学）、徐一鸣、邱自学

10、基于AMI的汽车仪表座熔接痕缺陷改善研究

顾 海（南通理工学院）、孙健华、袁国定

11、Computerized design, generation and simulation of meshing and contact of hyperboloidal-type normal circular-arc gears

陈厚军（南通大学）、张小萍、蔡 雄

12、后张无粘结混合装配式框架节点抗震性能试验研究

张 晨（南通大学）、周宇凌、蔡小宁

13、南通民间虎头鞋手艺的传承与发展研究

刘春辉（江苏工程职业技术学院）

14、乳熟期玉米糊化热力学性质的分析

An Image Stabilization Algorithm on Corner Detection and Feature Block Matching

Xu Yiming, Gu Jinping, Zhu Hairong, Chen Feng
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***Abstract*—Moving objects may cause local motion interference and have negative effects for the performance of digital image stabilization. The paper presents a novel method based on corner detection and feature block matching with Hausdorff distance. SUSAN operator is used for corner extraction in large scale feature blocks of uniform distribution. The similarity of the two corner sets of feature blocks between two frames is calculated by introducing weighted corner response function into partial mean Hausdorff distance, and the local motion vectors can be obtained. The final effective motion vectors are determined by checking consistency. The experimental results show that the proposed algorithm can stabilize image sequences with heavy local motion interference, and the average PSNR increases 21.03 dB after stabilization.**

Keywords—digital image stabilization; corner detection; hausdorff distance; local motion interference

I. INTRODUCTION

The visual quality of the output image sequences of camera systems for moving platforms or field surveillance systems are often degraded by unwanted camera shakes [1, 2]. In order to improve the system performance, motion compensation is used to eliminate the impact and stabilize the image sequences. Motion compensation system can be divided into mechanical image stabilization (MIS), optical image stabilization (OIS) and digital image stabilization (DIS). DIS uses digital image processing techniques to eliminate the image dithering and does not require additional mechanical or optical devices, hence has the advantages of low power consumption and small volume. Therefore, DIS has been an important trend for the development of modern image stabilization technology [3].

At present, digital image stabilization algorithms mainly include projection algorithm (PA) [4], block matching algorithm (BMA) [5], polar coordinate transform algorithm (PCTA) [6], feature tracking algorithm (FTA) [7], etc. FTA has a good stability and performs well both under translational motion and rotational motion. Most FTAs are based on feature block matching algorithm which has a premise of block motion consistency [8]. When feature block contains moving targets, the premise may be invalid and causes wrong local motion vectors which will bring error into global motion vector estimation. In other words, moving objects in digital images may cause interference to image stabilization. However, in most cases, moving objects are quite common such as in traffic monitoring system.

Aiming at this problem, an image stabilization method is proposed in this paper. By creating corner sets in distributed feature blocks and calculating Hausdorff distance (HD) between these sets, reliable local motion vectors can be obtained to estimate the final global motion vector. The algorithm creates corner sets from large scale feature blocks in uniform distribution by using SUSAN operator, and modifies partial mean HD (PMHD) by introducing the difference of corner response function (CRF) between two frames into PMHD formula. The adjusted formula weakens the influence of unwanted corners form moving objects in feature blocks and improves the corner sets matching accuracy under partial occlusion. The experimental results show that the proposed image stabilization algorithm performs well under heavy local motion influence.

II. PRINCIPLE OF PROPOSED IMAGE STABILIZATION ALGORITHM

A. Principle of Digital Image Stabilization

At present, the digital image stabilization system is mainly composed of three parts: motion estimation, motion smoothness and motion compensation. When an image sequence is degraded by random camera shakes, firstly, the motion estimation estimates the global motion parameters of the adjacent two frames, then the motion smoothness removes the vectors of moving targets and obtains a global motion vector, the motion compensation gives a corresponding motion compensation vector, and a stabilized output image sequence is given.

B. Stabilization Method on Corner Detection and Feature Block Matching

The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

The proposed algorithm is based on the thought of feature block matching, but uses corner set matching algorithm in large scale feature blocks to replace conventional block matching

The Low Velocity Impact Localization Based on Optic Fiber Sensing Network for Varied Cross-Section Composites*

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Abstract: In order to localize the impact injuries inside complex composite structure, a low velocity impact monitoring system for varied cross-section composite structure based on fiber Bragg grating (FBG) sensor network was established. The paper used FBG sensors to measure the strain field of the structure, collected and analyzed impact response signals of varied cross-section composite laminated plate under constant temperature. The spectrum signatures of impact signals were extracted by empirical mode decomposition (EMD) method and modeled by auto-regressive (AR) algorithm. The Mahalanobis distance between template signals and signals to be measured was calculated to localize the impact position. The experimental results show that the proposed method is feasible for impact localization of varied cross-section composite structure and the maximum relative error is 4.22%.

Key words: optic fiber grating sensor; low velocity impact localization; empirical mode decomposition; auto-regressive; varied cross-section composite

EEACC: 1180; 1180B **doi**: 10.3969/j.issn.1004-1699.2014.12.009

基于光纤传感网络的变截面复合材料低速冲击定位*

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摘 要: 为了检测复杂复合材料结构的冲击内部损伤位置, 构建了基于光纤传感网络的变截面复合材料板低速冲击监测系统. 采用可检测结构应变场的光纤光栅传感器, 在恒温下监测并分析了变截面复合材料层板的冲击响应信号, 利用经验模态分解方法提取冲击信号频谱特征, 通过自回归模型对频谱特征量建模, 最后利用待测信号与样本信号之间的马氏距离判定冲击信号位置. 实验结果表明基于光纤光栅传感网络、经验模态分解和自回归模型的变截面复合材料板低速冲击定位方法可行, 且最大相对误差为4.22%.

关键词: 光纤光栅传感器; 低速冲击定位; 经验模态分解; 自回归模型; 变截面复合材料

中图分类号: TP212 **文献标识码**: A **文章编号**: 1004-1699(2014)12-1632-05

复合材料在各个领域的使用越来越广泛, 而复合材料结构的动态监测及维护也成为了国内外学者的研究重点[1-2]. 由于复合材料受低速冲击后易产生外表面不易察觉的结构内部损伤, 因此监测复合材料结构的动态信号十分重要. 实时监测复杂结构冲击位置能为结构损伤预警提供一定的依据并极大减少成本投入[3-5].

目前应用于结构动态监测的传感器种类很多, 光纤 Bragg 光栅(FBG: Fiber Bragg Grating)传感器以其体积小、质量轻、抗干扰、耐腐蚀、绝缘好、可分布

*项目来源: 国家自然科学基金项目(51275258); 交通运输部应用基础研究项目(2011329811180); 江苏省教育厅三上项目(14KJB580009); 江苏省高三后科研计划项目(1301016B); 南通市科技应用研究计划项目(BK2011015); 南通大学自然科学研究专项项目(13ZJ003)

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基于N-LBP纹理与色度信息的Camshift跟踪算法

徐一鸣 [illegible] 顾耀平
[illegible]

摘 要 [illegible]

关键词 [illegible]

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Camshift Tracking Algorithm Based on N-LBP Texture and Hue Information

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Abstract [illegible]

Keywords [illegible]

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The Low Velocity Impact Localization Based on Mean-Residual Normalized Cross-Correlation for Composite Plate

LU Guan, XU Yiming, QIU Zixue, LIANG Dakai

[illegible]

Abstract: In order to localize the low velocity impacts (LVI) for composite structure without prior information, an impact localization method based on mean residual normalized cross correlation was proposed. The paper adopted normalized cross correlation method to normalize all impact sample signals and undetermined signals firstly. After that, the complex cross-correlation values were calculated and the localization reference area was determined. Finally, the impact location was estimated by using cross-correlation results between sample signals and undetermined signals. The experimental results show that the proposed method can evaluate the LVI positions for composite plate accurately, the maximal error is 34.76 mm and the standard error is 11.07 mm.

Key words: optic fiber Bragg grating; impact localization; mean-residual normalized cross-correlation; composite plate
EEACC: 7200　　doi: 10.3969/j.issn.1004-1699.2016.12.001

基于去均值归一化互相关方法的复合材料板低速冲击定位

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3. 南京航空航天大学[illegible] 210016)

摘　要：[illegible] 34.76 mm，[illegible] 11.07 mm。

关键词：[illegible]
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An optimized Vibe target detection algorithm based on gray distribution and Minkowski distance

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Abstract: Aiming at the ghost problem in Vibe algorithm, a fast optimization method based on gray histogram and Minkowski distance was proposed. Firstly, the pixels identified as foreground were labeled and the foreground blocks were connected by morphological processing. Then, the histogram of the current foreground block and the corresponding region of the specified frame were counted respectively. Finally, the similarity between the two gray-scale distributions was measured by Minkowski distance, and compared with the dynamic threshold to determine ghost area. In the target detection experiment, the algorithm could remove the ghosts in the Vibe, restrain the jitter disturbances in the background and reduce the false detection rate of the algorithm while preserving the fastness and real-time performance of the traditional Vibe algorithm, and the algorithm processing speed was between the original Vibe algorithm and mixed Gaussian method, the running time of each frame was 26ms. The experimental results show that this method is feasible for hardware system with real-time requirement.

Key Words: target detection; Visual Background extraction(Vibe); ghost; gray distribution; Minkowski distance

1 INTRODUCTION

Target detection is a method to extract the target of interest from a video sequence. It involves image processing, pattern recognition and other theories. It is widely used in intelligent transportation, aerospace, military and other fields. Target detection is one of the important prerequisites for the study of a series of problems, such as recognition and tracking[1], but there are many interference factors in the actual environment, such as camera jitter, illumination mutation and wind disturbance, which will greatly affect the target detection accuracy.

Moving object detection can be divided into three types: optical flow method, frame difference method and background subtraction method[2]. Background subtraction is the mainstream of moving object detection algorithm. The basic idea is to detect the motion region by the difference operation between the current image and the background image in the video sequence image[3]. In 2011, Barnich Olivier et al. first proposed a Vibe background subtraction algorithm with the advantage of small computation and fast speed[4]. Recently, several studies have been carried out around the Vibe algorithm. For example, Li et al. proposed a new Vibe detection method based on KGC graph cut theory[5]. KGC region analysis under the constraint of target edge contour could extract the target exactly and completely, and suppress the generation of target shadow. The above method was mainly around the shadow removal, inhibition of ghosting without much consideration. Wang Hui et al. proposed an adaptive Vibe target detection algorithm[6]. It calculated the threshold of ghost shadow segmentation, to maintain a high, more stable detection rate by Otsu algorithm, but the foreground points needed to be judged again, so the computational complexity of the algorithm increased. Yu et al. proposed the EVibe algorithm for ghosting problem, and expanded the range of sample selection, and updated the neighborhood by interlaced update method[7]. The method had higher accuracy and recognition rate, but the algorithm structure was more complex. Luan Yuan-yang proposed an improved Vibe method to determine the ghost region by logical operation with small amount of frames to be detected[8]. The results were good, but because of twice use of Vibe algorithm, the real-time performance was affected.

This paper mainly studies the ghosting problem and achieves the effective judgment of ghosting in the case of minimizing the real-time performance of Vibe algorithm. The Euclidean distance formula is used in Vibe algorithm to determine the foreground target, the foreground points are constructed as foreground blocks by morphological processing, and the gray distribution of the foreground blocks and the corresponding regions of the specified frames are respectively statistically calculated. Then the Minkowski distance values are calculated, , and compared with the dynamic threshold to determine the ghost region. Experiments show that the optimized algorithm can effectively suppress the ghost, and meet the real - time and accuracy of the system. Compared with the literature [8], this

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Vehicle Recognition Method Based on Color Invariant SIFT Features

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Abstract: Both aiming at the problems of the color information lack for SIFT features and the interference of color on vehicle identification, a vehicle identification method based on color invariant SIFT features is proposed. Firstly, the color edge regions of the images are calculated by using the RGB information, and the SIFT color invariant feature description vectors are generated in conjunction with the gray information. While ensuring the integrity of the vehicle color features, the method can effectively suppress the false matching caused by the redundant feature points. Then the nearest neighbor matching method is used to find the matching pairs, and the vehicle identification is finished by the discrimination degree weighting strategy. In the vehicle matching experiment with the same type and different colors, the matching number of the algorithm is less affected by the change of the color, and the stability of image matching is enhanced. The vehicle recognition experiment based on 25 kinds of vehicle model database shows that the method can eliminate the interference of the color features on the vehicle identification, and the total recognition accuracy of the method is improved to 88.2%~91.2%.

Key Words: Color Invariant Features, Scale-invariant Feature Transform, Vehicle Recognition, Color Edge Detection, Discrimination Degree Weighting

1 Introduction

In recent years, vehicle information detection and recognition technology based on computer vision has been developed rapidly, where vehicle type recognition technology plays a powerful auxiliary role in traffic management and safety monitoring. At present, most surveillance systems use color video, and rich vehicle colors also provide a large amount of available information for vehicle type identification. However, when the traditional SIFT algorithm processes color images, color images are often converted into grayscale images and then the features are extracted and matched. Discarding color information and using only the grayscale information of the image may cause mismatches and interfere with the subsequent vehicle type identification process. Therefore, based on the SIFT algorithm to remove the interference of the color on the vehicle type identification is the focus of this article.

In 2004, LOWE proposed Scale Invariant Feature Transform(SIFT), which is invariant to rotation, scale scaling and brightness variation. It is also robust to change of perspective, affine transformation and noise, so it is widely used in image feature matching [1]. In 2008, BAY et al proposed Speeded Up Robust Features(SURF). Although it inherits the advantages of the SIFT algorithm, it often gets fewer matches. When there are fewer image feature points, the matching real-time error is larger [2]. NU Yanlu et al [3] proposed a SIFT image matching algorithm combining color invariance and shape context. The color information was integrated on the basis of the traditional SIFT algorithm. The shape context histogram based on each contour point was replaced by the shape context histogram based on the center of gravity point, and the two cascaded to form a new eigenvectors, which effectively improved the matching accuracy. In the literature[4], Wang Fan et al considered the problem of ignoring the color information in the local features of the image, and proposed a scale-invariant feature transform method that integrated the global color information. The global shape information and color invariant information were added to the original SIFT frame by establishing the concentric coordinate system. What's more, the Euclidean distance was used as the matching cost function to reduce the false matching rate and enhance the matching stability and robustness. The algorithms proposed in [3-4] could effectively improve the matching accuracy of images in the presence of a large number of similar shaped regions, but none of them discussed the interference of color features on the image matching.

This paper presents a vehicle identification method based on color invariant SIFT features for the vehicle frontal images of the same size. In order to solve the interference problem of color on vehicle image matching, the color edge detection based on RGB space is firstly integrated into the vehicle frontal image to make the extracted vehicle features more complete. The color invariant SIFT feature descriptor is generated by combining the gray information to avoid the interference of different colors to SIFT feature matching and improve the stability and robustness of image matching. Finally, the discrimination degree weighting strategy is constructed according to the matching pairs to realize the vehicle type recognition.

2 SIFT Feature Extraction and Matching

The detection of the extreme points of SIFT operator is based on the difference of Gaussian (DOG) scale space. The implementation is to convolute the image with Gaussian kernel function with different scale factors and then subtract the Gaussian image [5]. Image I in the DOG scale space of dimension σ is defined as:

$$D(x,y,\sigma) = (G(x,y,k\sigma) - G(x,y,\sigma)) * I(x,y) = L(x,y,k\sigma) - L(x,y,\sigma) \quad (2)$$

$$G(x,y,\sigma) = \frac{1}{2\pi\sigma^2} e^{-(x^2+y^2)/2\sigma^2} \quad (3)$$

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Design and recognition of monocular visual artificial landmark based on arc angle information coding

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ABSTRACT: According to the requirements of monocular vision positioning of mobile robots in structured environment, a method of artificial landmark design, detection and recognition is proposed to adapt to the large field angle and invariance of rotation. An extensible artificial landmark based on arc-angle information coding is designed, the landmark detection and extraction are realized by structure contour detection, the extracted landmark image is corrected by Hough transform and inverse perspective transformation. After the image filtering and enhancement, the improved circle fitting algorithm is proposed to complete the ring detection and segmentation, and finally the arc angle is calculated by the vector method to identify the landmark and realize the decoding. The experimental results show that compared with the classical QR code method, when using the same imaging system, the landmark design and detection and recognition method proposed in this paper can realize the detection and recognition at longer distances and realize the accurate identification within the range of 0-60 degrees, and has strong anti-noise ability.

KEYWORDS: artificial landmark recognition, contour detection, Hough transform, inverse perspective transform, circle fitting

1 INTRODUCTION

With the continuous development of computer technology and advanced sensor technology, mobile robot navigation technology has become more and more mature. In the mobile robot navigation system, the robot's accurate self-positioning is the most important issue in the whole system. The visual positioning method is the preferred technology for mobile robot positioning in the structured environment because of its advantages such as abundant information, simple system structure and controllable cost. Vision-based robot positioning technology is gradually maturing, the relevant positioning methods is also gradually increasing.

Hao Xiangyang et al. designed a dot-like coded mark consisting of 5 locating points and 1-3 coding points by using 5 letters and 20 numbers, and then realized indoor visual navigation by detecting and identifying marks[1]. Zhou Haoyin and others proposed a new indoor positioning method based on artificial signposts, which used the feature points arranged in a radial arrangement, calculated the position of the camera and identified the marks by using the same inner points of different marks and the positions of the outer points[2]. Tkachenko et al. used the center deviation of each module to improve the mobile identification after preprocessing the QR code. This method has been used for classification and standard QR code identification[3]. Ren Hailin et al. proposed a sub-pixel-based QR code positioning method. Firstly, the position detection pattern was set to a large tolerance for initial positioning, and then a small tolerance was set for accurate positioning. For the pixel with accurate positioning failure, the transition pixel was decomposed and then fine-tuned with the same tolerance so as to solve the problem of low positioning rate of QR code images with large amount of information and low resolution[4]. Gorenzy et al. stuck the QR code on the ceiling, requiring the distance between the camera and the QR code to be fixed so as to detect and recognize the QR code and realize the self-positioning of the mobile robot[5]. Among the above methods for locating mobile robots based on artificial landmark, one of them is a method for locating artificial marks based on numbers and letters, but such marks have the disadvantages of less amount of information, insufficient expansibility and limited anti-interference capability. Another is based on the QR code detection and recognition. The artificial landmark based on the QR code can carry larger amount of information, and can realize the precise positioning and recognition under the complicated background. However, due to its rich feature details, there are shortcomings such as the shorter distance of identification and the smaller field of view angle range.

In this paper, aiming at the problems of large field angle change, field of view rotation and large imaging distance change in the visual location of artificial landmark for mobile robots, an artificial landmark based on arc angle information coding is designed and a new recognition method for the landmark is proposed. Through the contour detection of the structure, the landmark detection and extraction are realized. Then the Hough transform and perspective transformation are used to correct the landmark image, the image quality is improved by Gaussian smoothing and fuzzy domain enhancement algorithm, the improved circular fitting algorithm is used to detect and segment the internal ring. By using the vector method, the center angle corresponding to the arc is calculated, and the landmark recognition and decoding are realized according to the information of each standard ring.

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变厚度复合材料板低速冲击能量监测

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摘 要：为了监测变厚度复合材料层合板在使用过程中受到的低速冲击载荷，将光纤传感及信号处理技术相结合，建立了光纤布拉格光栅冲击能量监测系统。将光纤传感网络采集到的所有冲击样本信号进行WFMD分解；根据样本信号冲击能量特征值建立冲击样本信号能量特征集合；根据信号分解的第一阶分量确定厚度系数并修正能量特征集合，评估实际冲击能量。结果表明，基于WFMD分解的厚度系数修正方法能够评估低速冲击能量，其中低灵敏度的大厚度区域平均误差从15.19%明显减少为6.96%。提出的能量识别方法成功识别了1～3 J冲击能量，其中最大误差为15.67%，平均误差为5.5%。

关键词：光纤光栅传感器；变厚度复合材料板；低速冲击；冲击能量监测

中图分类号：TP212 文献标志码：A DOI：10.13465/j.cnki.jvs.2018.10.038

Low velocity impact energy monitoring for varing cross-section composite laminates

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Abstract: For monitoring the inner injuries by the low velocity impact (LVI) on varing cross-section composite laminates, a Fiber Bragg Grating (FBG) impact energy monitoring system based on the optical fiber sensing and signal processing technique was established. The spectrum signatures of all impact sample signals from the FBGs sensing network were extracted by using the Whitening Empirical Mode Decomposition (WEMD) method. Then, the energy feature sets were set up based on the impact energy characteristic values of all sample signals. Finally, the thickness coefficients were determined according to the first order component of the sample signals decomposition, the energy feature sets were revised correspondingly, and the actual impact energy was estimated. The experimental results prove that the thickness coefficient correction method based on WEMD can evaluate LVI energy more accurately, the mean error in low sensitivity large thickness areas was reduced to 6.96% from 15.19%. The proposed energy discrimination method can discriminate the energy between 1～3 J, with the maximum error 15.67% and mean error 5.5%.

Key words: opto-fiber Bragg grating; composite laminate with varing thickness; low velocity impact; impact energy monitoring

复合材料在航空、机械、医学等领域的应用日趋广泛。随之而来的问题就是复合材料在使用过程中的动态监测需求[1-4]。变厚度复合材料层合板的强度比一般复合材料板有所提高，但是动态载荷下的信号分析更为复杂。由于复合材料常常以层合板形式使用，因此结构受到的各种载荷可能会造成层合板的内部剥离、断裂、脱层等等，尤其是低速冲击所造成的内部损伤从外部不易察觉。传统的复合材料结构日常检测和维护虽然可以排除安全隐患，但会耗费大量的时间和成本，而实时监测变厚度复合材料层合板冲击信号可以对结构低速冲击损伤进行预警[5]。近年来，各国学者对复合材料变厚度结构进行了一些研究。李文亮

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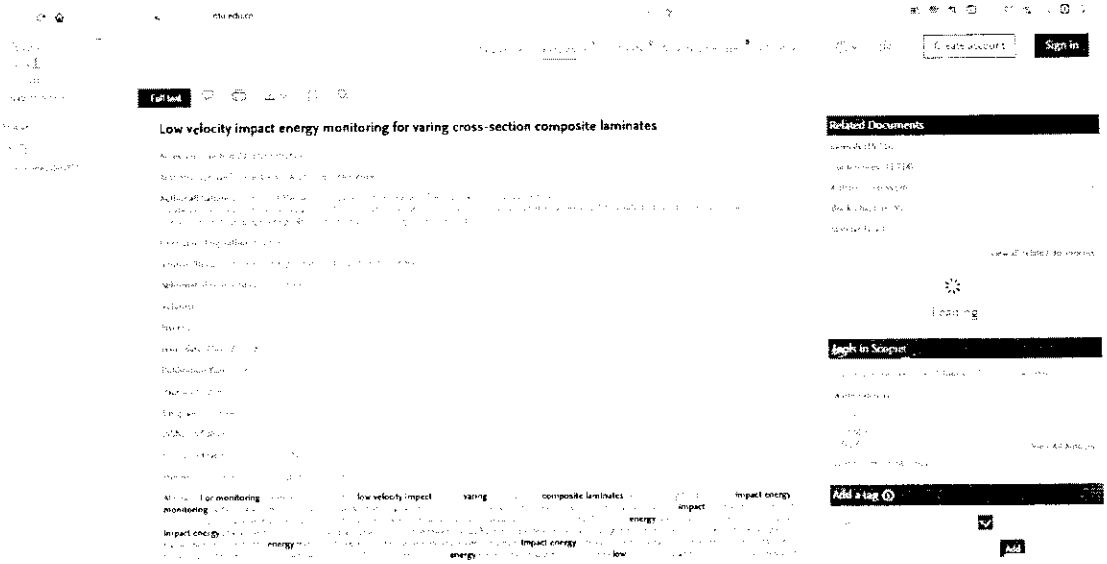
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