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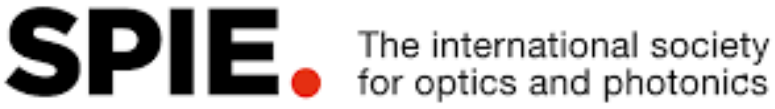

[All hours in this conference program refer to China Time (GMT+8)]

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Meeting Number: 874 1954 0260
Passcode: 461267

Saturday, 27 May 2023

Session Chair: Lipo Wang, Nanyang Technological University, Singapore

9:00 – 9:05 am

Welcome Speech

Qian He

Professor, University of Electronic Science and Technology of China, China

Qian He received her Ph.D. in signal and information processing with honor in 2010 from University of Electronic Science and Technology of China (UESTC), China, and has been a full Professor at UESTC since 2015. From 2007 to 2011, she was a visiting scholar and postdoctoral research associate with Electrical and Computer Engineering Department, Lehigh University, USA. Her research interests include statistical signal processing, artificial intelligence, and their applications in radar, communications, and medical/healthcare systems.

Dr. He was on the Editorial Boards of IEEE Signal Processing Letters, Journal of Radars, Journal of Communications and Information Sciences, Advances in Energy and Power Engineering, and was a member of the IEEE Signal Processing Society (SPS) Sensor Array and Multichannel technical committee, member of the IEEE SPS Promoting Diversity in Signal Processing organizing committee, and the Chair of the IEEE SPS Chengdu Chapter. She is a member of Sigma Xi, senior member of IEEE, senior member of the Chinese Institute of Electronics, member of the IEEE SPS Young Professionals committee and the Chair of the Engagement and Career Training subcommittee, and a member of the SPS Signal Processing Theory and Methods technical committee.

9:05 – 9:50 am

Keynote Lecture

Ajay Kumar

Professor, The Hong Kong Polytechnic University, China
President, IEEE Biometrics Council (2021-2022)
IEEE Fellow, IAPR Fellow

Ajay Kumar (Fellow, IEEE) received the Ph.D. degree from The University of Hong Kong, Hong Kong, in 2001. He was an Assistant Professor with the Department of Electrical Engineering, IIT Delhi, Delhi, India, from 2005 to 2007. He is currently working as a Professor with the Department of Computing, The Hong Kong Polytechnic University. He holds seven U.S. patents. He has authored a book on Contactless 3D Fingerprint Identification. His current research interest includes biometrics with an emphasis on hand biometrics, vascular biometrics, iris, and knuckle biometrics. He was on the Editorial Board of the IEEE Transactions on Information Forensics and Security from 2010 to 2013. He has served on the IEEE Biometrics Council as the Vice President for publications from 2011 to 2015 and President from 2021 to 2022. He also served on the program committees for several international conferences and workshops in the field of his research interest.

Breaking Barriers in Biometrics: Crafting Powerful Deep Neural Networks for Precise Synthesis of Massive-Scale Datasets

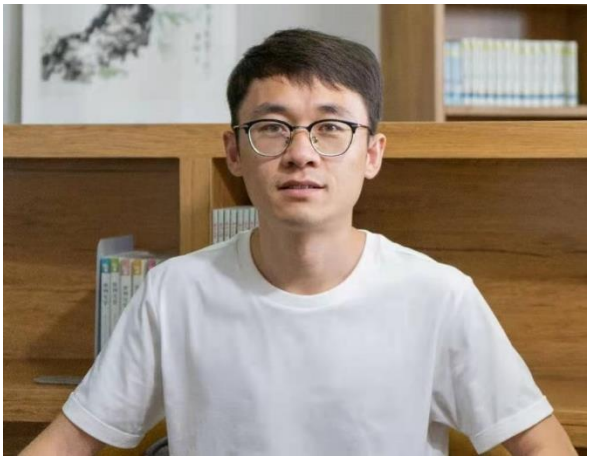
Abstract – Deep neural network models are the cornerstone of cutting-edge AI algorithms for the biometrics-based identification of humans. However, training these models to achieve accuracy requires large, high-quality biometric databases. Unfortunately, recent privacy regulations such as GDPR have limited the acquisition and sharing of such databases, hindering biometric technology advancement. Fortunately, generative adversarial network (GAN) methods have proven effective in synthesizing biometric image databases. In this talk, we will discuss the limitations of current GAN-based models and introduce our own framework, which can synthesize large-scale biometric image datasets with unparalleled accuracy. Our framework specifically targets the generation of the intricate face and contactless fingerprint images, and we will share the most advanced results during the presentation.

9:50 – 10:35am

Keynote Lecture

Guoqing Wang

Professor, University of Electronic Science and Technology of China (UESTC)



Prof. Guoqing Wang received his Ph.D. degree in Jan 2021 from the University of New South Wales (UNSW). From April 2021, Dr. Wang joined the School of Computer Science and Engineering, University of Electronic Science and Technology of China (UESTC) as a Professor. His current research interests include Computer Vision and Unmanned System. He has authored two books and more than 50 top-tier papers in these areas over various venues including IJCV, IEEE TIP, IEEE TIFS, ICCV, ACM MM, etc. He served as the Program Chair of 2022 International Symposium on Connected and Autonomous Vehicles (SoCAV 2022), the Session and Area Chairs for ACM MM 2021 and ICME 2022, and the regular (Senior) TPC of CVPR, ICCV, ECCV, ACM MM, AAAI, IJCAI. He also serves as the guest editor of several international journals. He is the recipient of the Dean's Award for Outstanding PhD Theses (2021), UNSW/CSIRO Full Postgraduate Scholarships (2017-2021) and ICCV Student Travel Grant (2019). Prof. Wang hosts/participates numbers of national major projects, including the Scientific Innovation 2030 Major Project for New Generation of AI, the National Natural Science Foundation of China, Australian National R&D project, etc.

Unbiased Representation Learning Networks for Robust Perception in Rainy Days

Abstract – Adverse weather (e.g. fog, rain, snow etc.) create visibility problems for the sensors that power automated systems. Many outdoor applications such as autonomous cars are required to operate smoothly in the frequent scenarios of bad weather. While rapid progress is being made in this direction with the data-driven deep learning algorithms, some key issues remained such as the inconsistency between restored visual quality and the inadequate benefit for perception tasks in adverse weather condition. The aim of this talk is to identify the key reasons by introducing a restoration network dissection tool, with which some phenomenon is illustrated motivating a series of structured representation learning frameworks for producing much better results. Effectiveness are verified by deploying the proposed frameworks into a self-made autonomous car, and also future directions regarding this topic is also illustrated motivated by the conclusion from real-world testing.

Oral Presentations

10:35 – 11:05am

Paper Title
Application Specific Convolutional Neural Networks for Brain Tumor Detection

Abstract
The research on CNN applications for medical image processing has been progressing rapidly. There are, however, always some hurdles in the development. The limitation in training samples is one of them, and restriction in computation resources can be another. In this paper, we present a design approach of application specific CNN (ASCNN), allowing to minimize the computational complexity of CNN systems without lowering the performance. This approach is to full-custom design CNNs for specific applications, such as brain tumor detection, so that each part of a CNN can be optimized to suit the input data and the task assigned to it. The convolution kernels and layers are made just-sufficient, nothing excessive. In this way, the randomness and the redundancy in computation can be minimized, the dependency on training samples decreased, the information density in data flow increased, the computation efficiency/quality and performance reliability improved. Three ASCNN systems for brain tumor detection are also presented as design examples. The results of the performance evaluation demonstrate that each of them delivers a high-quality detection with a computation volume of one-digit percentage, or less, of that needed by other CNN systems recently reported in reputed journals in the research area. Hence, ASCNN approach is effective to achieve high process quality at low computation cost. It can also lower the barrier of resource requirement of CNN systems to make them more implementable and applicable for general public.

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10:55 – 11:15am

Paper Title
Learning Rate Range Test for the Vision Transformer

Abstract
The solutions obtained by training the deep neural network are highly dependent on the parameters including the learning rate. Therefore, finding the appropriate settings for training deep neural networks is very important. In particular, it is necessary to find the better settings for SOTA models of Vision Transformer(ViT), whose structure is different from ordinal models. In this paper, we focus on the learning rate to find a better value using the Learning Rate Range Test (LRRT). Through our experiments, we found that the appropriate LR is located where the decrease in loss value stops in the LRRT. In addition, we discuss about the effects of the number of epochs and the LR warm up.

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11:15 – 11:35am

Paper Title

3D point cloud target detection based on pseudo segmentation for autonomous driving

Abstract

Object detection plays an important role in autonomous driving. In the past decades, many object detection methods relied on 2D images, losing spatial information due to projecting 3D space into 2D space. Recently, Lidar has become a popular sensor for 3D point cloud target detection. This paper proposes a new RCNN detection framework based on pseudo segmentation (PS-RCNN). This model is designed to achieve accurate and efficient detection on point cloud by transmitting feature information reversely. The information transmission is supervised by the semantic segmentation task. In order to reduce the difficulty in labeling, a novel algorithm is designed to generate segmentation pseudo-labels. Experimental results conducted on KITTI Dataset and Waymo Open Dataset demonstrate that our model outperforms its counterparts for detecting small objects with a balance between accuracy and efficiency.

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Break

2:00 – 2:20 pm

Paper Title

A Trajectory Simplification Algorithm Based on Motion Trend and Variable Speed Characteristic

Abstract

The large amount of trajectory data generated by GPS positioning system brings great challenges to trajectory data mining, but trajectory compression can reduce the corresponding calculation and storage costs. This paper proposes a trajectory simplification algorithm based on motion trend and variable speed characteristic (MTVS). In MTVS, firstly, the feature points with obvious motion trend are selected by the motion trend threshold. Secondly the feature points with variable speed characteristic are extracted according to the speed and acceleration changes of the trajectory points. Finally, the original trajectory is segmented by the feature points and the sub-trajectory is compressed separately and merged. The experimental results based on GeoLife trajectory data set show that this algorithm performs well in terms of running time, compression rate and average error.

Authors

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2:20 – 2:40 pm

Paper Title

Face Mask Recognition During KYC Generation from a Live Photo Detection Methodology

Abstract

Post Pandemic world of Covid-19 has set human race to a transitioned frequency. Through this transitional period the world needs to serve itself with much needed technology and services. The need of time is now to build the system compatible to the crisis we face together that ensures a risk-free safe environment. New regulations and measures have been established in order to provide safety that includes regular wear of face mask. It is necessary to strictly execute this new rule in public places that helps reducing the spread of virus. Along the mask, a mask detector system comes hand in hand playing a vital role. On official image recording sectors the mask detection is a requirement to ensure the identity of a personnel. This surveillance method enables the alert system to remove the mask while taking any photograph for documentation that demands clear photographic identity. In this paper, we have briefly discussed this approach of face mask detection system while capturing a photo using deep learning algorithms.

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2:40 – 3:00 pm

Break

3:00 – 3:20 pm

Paper Title

DOA ESTIMATION IN A DISTRIBUTED OPTIMIZATION FRAMEWORK: A SPARSE APPROACH BASED ON CONSENSUS ADMM IMPLEMENTATION

Abstract

Traditional direction-of-arrival (DOA) estimation methods use a single processor to deal with the array data. In recent years, the increasing of the scale of sensor arrays brings heavy workload for single processor. Distributed optimization based on multiple local processors has become one of the current research hotspots due to the advantage of parallel computing. In this paper, we proposed a distributed DOA estimation method for massive large-scale arrays. First, we provide the signal model and the distributed optimization problem based on sparse representation in a distributed framework. Then, the optimization problem is solved by the alternating direction multiplier method (ADMM), where the overall structure of array is not changed. Compared with the centralized method, our distributed method can greatly reduce the computational complexity while ensuring the estimation accuracy under the large aperture array. Simulation results are provided to show the superiorities of our method.

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3:20 – 3:40 pm

Paper Title

Computer Vision based Crystallization Monitoring in Automated Laboratories

Abstract

Research into new functional materials has been ongoing on for many years. The successes are based on a classic trial-and-error method. In the years that followed, various methods such as computer-aided calculations and high-throughput screening were added. Since the beginning of the 21st century, immense progress has been made in the field of artificial intelligence, which has since found its way into a wide variety of specialist disciplines and everyday life. With the advent of artificial intelligence in the research of new materials, there is hope for new results and savings in time and money. The approach presented here serves to monitor crystallization processes. Crystallization processes are used to evaporate new compositions of substances dissolved in a solvent. Evaporation produces crystals, which are then used for further investigations into the material properties. However, the crystallization process is very time-consuming and highly dependent on the solution and the environmental parameters. As a result, the timing of the process is difficult to predict and very lengthy. Therefore, this paper presents a method combines two areas, computer vision and artificial intelligence, and thus offers the possibility to monitor a crystallization process. The significant points, the start and end point, are detected, and the course of the crystallization process over time is also recorded. For this purpose, a pre-trained ResNet34 network is used, which has been trained on the characteristics of crystals through transfer learning, and a visual analyzer unit for in-situ sample acquisition. With this precise measurement setup, crystallization processes can be monitored and subsequently automated. This can save time and money and accelerate research into new materials.

Authors

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3:40 – 4:00 pm

Paper Title

Multi-Sensor Fusion for the Security Surveillance of Public Areas

Abstract

Increasing security awareness in the public sector are leading to a more and more widespread use of surveillance applications. Although the available technologies like video processing are already well advanced, they still suffer from high false alarm rates when used under realistic conditions. We present a method for sensor fusion based on probability density maps and a rule engine. The system was tested in a public area using the combination of audio localization, audio classification and video detection using 79 simulated scenarios and 44 hours of sample data recorded over a period of several

weeks. The false positive rate decreased by 60% and the event localization rate increased by 25% with the fusion approach compared to the detection performance of individual techniques.

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4:00 – 4:20 pm

Paper Title

Gold and Bitcoin Trading Strategies: a Comprehensive Model for Optimal Investment Returns

Abstract

While bitcoin has been a hot topic in the investment world due to its rising value, gold remains a popular investment option. To create a value prediction model for the best investment strategy, we utilized Long ShortTerm Memory (LSTM) and found that it had a higher fitting effect than other two models, grey prediction and time series. The accuracy rate is 88.7%, the loss rate is 0.135%. We test different batch sizes to ensure the accuracy of prediction and established an appropriate algorithm to calculate the best investment strategy for each day. To test the accuracy of the model, we use four methods, including testing the accuracy of the risk factor in the model, observing the growth of total asset value, calculating the error rate of the investment process, and performing robustness analysis under low investment costs. We also perform sensitivity analysis to determine the impact of transaction costs on the strategy and results. The results show that the fluctuation in bitcoin transaction costs is more significant and can affect the frequency of trading activities, ultimately affecting the final profit.

Authors

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4:20 – 4:40 pm

Paper Title

Reducing Ringing Artefact in Fresnel Digital Holography Using Compressed Sensing

Abstract

Compressed sensing is a signal processing technique used for signal reconstruction with significantly smaller number of samples than the requirements of the Nyquist-Shannon theorem. In this work, we simulate a lenseless digital holographic system. We investigate the ringing-like artefact introduced by truncation by the camera aperture. We present the results of using the orthogonal matching pursuit based compressed sensing algorithms to combat this ringing-like artefact. We demonstrate that compressed sensing achieves remarkable reconstructions and suppresses ringing well, but only up to a point in terms of the size of the aperture. This research could help the advancement of compressive digital holography.

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Poster Papers

https://www.icisc-conf.org/icisc-2023-posters

If you have questions for a poster, please contact the authors by email.

Paper Title
Highly reliable on-board Computer software design and verification for space radiation

Abstract
In this paper, the on-board computer software and its reliability design of a micro-satellite are analyzed. The micro-satellite on-board computer adopts the dual-computer redundancy method, and uses the dual-computer communication to realize the system operation state recovery and hold when the host and standby computer switch, and some reliability design of the computer hardware in the space environment is realized and completed by the software. The space flight test proves that the micro-satellite on-board computer software is safe and reliable. This paper introduces the main features of the micro-satellite's On-board Data Handling software and the reliability design technology adopted, which reflects the micro-satellite's On-Board Data Handling software's main design technology in terms of reliability

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Paper Title
Research on Methods of Entity Resolution in Dataspaces

Abstract
Dataspace is a new way of data integration. Entity resolution identifies two records that point to the same entity in the real world. In this paper, a record graph is constructed by using the records in the data set. The redundant comparisons are removed by pruning the record graph, and the records is divided into blocks according to the pruned graph. The subsequent entity resolution work is only carried out in blocks. When the entity is parsed in the block, the method of attribute mapping and expression representing attribute value is used to further divide the data to ensure the accuracy of parsing. Methods experiments were carried out on real data sets.

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Paper Title

CYBER THREAT DETECTION, SECURING AND STORING CONFIDENTIAL FILES IN BYOD

Abstract

As the demand for Bring Your Own Device (BYOD) service enablement grows, it becomes an important element of the business. Because of the increased business agility, essential infrastructure is becoming more important. Employee productivity and happiness as a metric different way of working surroundings but harmful access to vital infrastructure from an unauthorized source. The use of BYOD has increased the number of cyber-attacks. As a result, it has become a major cybersecurity issue for most businesses. As a result, the corporate ecosystem fragments. There are numerous options. In recent years, new technologies and techniques for reducing pollution have been created. This section has been subjected to cyber attacks, which has resulted in the resolution of a number of concerns. However, due to new assault strategies and tools, work has resumed.is a condition that must be met on a regular basis. The majority of the company issuing a certificate-based authentication system that is secure to enable a bring-your-own-device (BYOD) environment However, the certificate-based system There are a slew of issues with the authentication system that need to be addressed. A security flaw that allows unauthorized access.

Authors

- **Umesh Madushanth** (SLIIT) < it19053042@my.sliit.lk>

Paper Title

License plate recognition using Machine Learning

Abstract

Car owners altering license plates using different typefaces and designs violate the law that strictly forbids such behaviour. Traffic police officers claim that changing the license plates makes it impossible to read the registration numbers due to an increase in fatal street collisions and car thefts. They worry that it may be difficult to track down vehicles used in hit-and-run incidents. It is challenging to impose further limitations on any algorithm used to identify and recognise license plates in a developing nation like Bangladesh. This work has the primary objective of designing a reliable detection and recognition system for transitional, standard car license plates, which are frequently seen in developing countries. Increase the effectiveness of reading license plates drawn or printed in various styles and typefaces employing cutting-edge technology, including machine learning (ML) models. For this study, You Only Look Once (YOLOv3) is used to utilising the most recent version of the object detection method. The raw image is pre-processed to increase its quality and then divided into appropriate-sized grid cells to determine where the license plate should be placed. After that, the data is post-processed, and the accuracy of the proposed model is evaluted using industry-recognised standards. A sizeable image dataset was used to be tested using this proposed methodology. The presented system is expected to be essential for vehicle monitoring, parking fee collection, lowering traffic accidents, and identifying unregistered vehicles. The results demonstrate that the suggested method achieves 97.1% mAP, 95.3% precision and 96.8% in plate detection

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Paper Title

Research on Multi-Target Vehicle Detection and Tracking Based on Yolo

Abstract

Vehicle detection and monitoring are gaining importance in traffic management. However, detection is still a n issue as vehicles vary in size, which directly affects vehicle counting accuracy. The proposed vehicle detection and counting method first extracts the road surface of the expressway in the image and divides it into distant regions. The newly developed segmentation strategy in the proposed vehicle identification and counting system first extracts The t rail's state i n the picture furthermore separates it as far as the near areas. This method is important for improving vehicle detection. The above location is then sent to his YOLOv5m network to determine the vehicle type and location. Finally, we validate the proposed methodology using multiple traffic monitoring recordings f rom different environments. Also, the vehicle detection performance has increased to 99.39% of m ap compared to Yolov5 Basic. The research has practical consequences for the management and control of vehicle objects in traffic situations.

Authors

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Paper Title

Research on visual navigation based on remote sensing image

Abstract

At present, the positioning and navigation system covers global positioning and navigation system (GPS) and inertial navigation system, but GPS navigation and inertial navigation have their own shortcomings. Visual navigation can perceive and provide rich dynamic environment information, and can realize accurate and reliable positioning and navigation in more complex environments. In this paper, a remote sensing image feature matching algorithm suitable for image navigation and positioning is constructed. Aiming at the problems of difficult and time-consuming matching of remote sensing images obtained by aircraft sensors, the key points of fast feature are extracted, the main and secondary features are selected according to the standard, the direction intensity histogram is calculated by using the relative distance, azimuth and relationship intensity, and the descriptor is constructed through the calculation results. Cosine similarity is used as the similarity measure of directional intensity histogram to match the features in the two images to achieve feature matching. In the filtering error matching stage, the error matching on the hypothesis set is removed by calculating the good matching with high embedding ratio, and the matching result with high accuracy is obtained. Based on this algorithm, a navigation prototype system based on remote sensing image is designed and implemented to provide a visualization platform.

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Paper Title

Diabetic Retinopathy Classification through fundus images using deep learning

Abstract

One of the most common eye diseases in the people aged between 20-74 years is Diabetic Retinopathy (DR). DR is an eye complication where the patient loses his vision due to an increase in glucose levels in the blood. DR is most prominent in the patients who are diagnosed with diabetic mellitus. Over one-third of the diabetic mellitus patients are diagnosed with DR. For diagnosing DR, the patient has to visit an ophthalmologist for dilated eye examination. However, everyone cannot have this facility. Hence, there is a need for a simple automated software for diagnosing the five stages of DR efficiently. In this paper, a simple model is developed using the Kaggle APTOS Blindness Detection dataset which is publicly available. In the pre-processing step the images are enhanced and the deep learning model ResNet152 architecture is used for the classification step. After training the ReseNet152 model yielded a training and validation loss of 0.073 and 0.107 respectively and validation accuracy of 0.984. Further, a simple Graphical User Interface is developed using tkinter framework in python standard library which classifies the given input fundus image as one of the five stages of DR.

Keywords—Diabetic Retinopathy, Deep Learning, ResNet152, Training Loss, Validation Loss, Validation accuracy, Graphical User Interface.

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Paper Title

Low-Complexity Moving Object Detection Algorithm in Dynamic Background

Abstract

The scale of the monitoring system is becoming larger and larger. In order to perform intelligent video processing in surveillance systems, we need to detect moving object in image sequence. Some methods in the literature can achieve a valid detection result, but usually they have high computational complexity. In the outdoor scenes, the background is usually dynamic, and the dynamic background makes it difficult to detect moving object. In order to solve these problems, we propose a new method with low computational complexity using mass center coordinate to expand the mask image. The

proposed method can remove the interference of dynamic background in the detection. Experiment results show that our method can mask the dynamic background more completely while ensuring fast computation and consuming less hardware resources. The method can be used in massive video intelligent processing.

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Paper Title

Adolescent Dysmorphic Disorder Model Research based on Machine Learning

Abstract

Nowadays, dysmorphic disorder among contemporary adolescents has attracted more and more attention from people of all social circles. The purpose of this study is to provide a useful self-evaluation model of adolescent image for assessing adolescents' dysmorphic disorder situations. 249 teenagers participated in this study and various machine learning algorithms have been developed and utilized for building the self-evaluation model, such as the K-Nearest Neighbor algorithm, Naïve Bayes algorithm, and Principal Component Analysis algorithm. The best self-evaluation model developed in this project gave the highest accuracy of 76.92% on the testing set. For predicting the trend of dysmorphic disorder among contemporary Chinese adolescents, ordinary least squares linear regression model has been created, and then the percentages of different age stages to carry out major plastic surgery in 2022, 2023, and 2024 have been predicted.

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Paper Title

global temporal pyramid for human abnormal action recognition

Abstract

With the development of monitoring technology and the improvement of people's security awareness, intelligent human abnormal action recognition technology in the field of action recognition is increasingly high. In most cases, abnormal human action may have little difference in appearance compared with normal behavior, so the control of visual rhythm information becomes an important factor affecting action recognition, but people often focus on the appearance information of the action and ignore the rhythm information. In this paper, we introduce the temporal pyramid module to process the visual tempos information, meanwhile, the traditional LSTM local history information transfer method is very easy to lose the context information, which is not conducive to the grasp of global information and thus will greatly affect the processing effect of the temporal pyramid. This paper introduces a non-local neural network module to enhance the network's ability to grasp global information and the model's long-range modeling capability, which is used to supplement the temporal pyramid module. Finally, this paper uses the mainstream anomaly dataset UCF-Crime to test the network performance, and the improved network model recognition accuracy AUC reaches 0.82, which is better than other state-of-the-art methods.

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Paper Title

Prediction of Cardiovascular disease based on Image Segmentation of CT Scans

Abstract

Machine learning is often considered an advanced technology that only highly trained experts can access. This prevents many doctors and biologists from using this tool in their research. This article aims to dispel that outdated notion. Heart failure (HF) has been shown to be one of the most common causes of death, so accurate and timely prediction of the risks of heart failure is necessary and of utmost importance. Cardiovascular diseases are a broad category of several diseases that affect the heart and blood vessels. Early predictive methods for cardiovascular disease helped make decisions about changes in at-risk patients that reduced risks. The healthcare industry contains a lot of medical data, so machine learning algorithms are needed to predict heart disease. We propose using U-net and deep learning to segment cardiac CT scan images
to check the area of the heart that may cause/ is causing problems in the foreseeable future/currently. A comparative analysis was made of selected publications that were published in the years 2016 to 2022.

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Paper Title

Large-field gesture tracking and recognition for augmented reality interaction

Abstract

In recent years, with the continuous development of computer vision and artificial intelligence technology, gesture recognition is widely used in many fields, such as virtual reality, augmented reality and so on. However, the traditional binocular camera architecture is limited by its limited field of view Angle and depth perception range. Fisheye camera is gradually applied in gesture recognition field because of its advantage of larger field of view Angle. Fisheye cameras offer a wider field of vision than previous binocular cameras, allowing for a greater range of gesture recognition. This gives fisheye cameras a distinct advantage in situations that require a wide field of view. However, because the imaging mode of fisheye camera is different from traditional camera, the image of fisheye camera has a certain degree of distortion, which makes the calculation of gesture recognition more complicated.Our goal is to design a distortion correction processing strategy suitable for fisheye cameras in order to extend the range of gesture recognition and achieve large field of view gesture recognition. Combined with binocular technology, we can use the acquired hand depth information to enrich the means of interaction. By taking advantage of the large viewing Angle of the fisheye camera to expand the range of gesture recognition, make it more extensive and accurate. This will help improve the real-time and precision of gesture recognition, which has important implications for artificial intelligence, virtual reality and augmented reality.

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Paper Title

The evaluation and optimization of port efficiency

Abstract
This paper mainly aims at the evaluation and optimization of port efficiency, reasonably sets the key performance indicators of personnel, technology and process, and builds the AHP model, the fuzzy comprehensive evaluation model, the cost efficiency balance optimization model and the effectiveness evaluation model of port efficiency based on the ideas of AHP, fuzzy mathematics and mathematical programming. To solve the problem of evaluation and optimization. Building the model and implementing the model with concrete and visible data helps us solve our problems.
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Paper Title
Development of thickness measurement software for aircraft absorbing coatings based on magnetic force measurement
Abstract
In this paper, a magnetic-force based thickness measurement model was established based on the physical properties of radar absorbing coatings that are easy to be magnetized and the experimental data obtained from the standard samples with titanium alloy substrate coatings. The experimental data obtained from the thickness measurement experiment of the standard samples with titanium alloy substrate coatings were fitted by using least squares method. A thickness measurement sensor was developed based on the STM32 microcontroller, which solved the problem that the traditional wireless design was unable to balance transmission distance, anti-interference, and power consumption. On this basis, thickness measurement software was developed based on WinCE 6.0 and measurement experiments were done. The experimental results showed that this magnetic-force based thick measurement system had the advantages of simple structure and high software reliability.
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Paper Title
GPU-based parallel optimization strategy for Barrett's algorithm
Abstract
With the development of computer science, hardware devices have emerged, which greatly enhance the efficiency of computing and data processing. GPU, as a highly parallelized computing chip, can be used in areas such as personal needs and scientific computing.Additionally, advances in cryptography enable data to have more effective security; and there are some computational bottlenecks in cryptographic algorithms during practical use. The use of GPUs to accelerate cryptographic algorithms is one of the hot topics of research in the industry and academia today.
RSA algorithm is the most widely used asymmetric cryptography public-private key system, which guarantees the security of the public-private key generated by the algorithm through the difficulty of large number decomposition. In the actual encryption and decryption process of RSA, substantial large number power modulo operations are involved, which seriously affects the computing efficiency of RSA and a set of optimization strategies are urgently needed to shorten the computing time of RSA.
In RSA algorithm, there is parallel optimization space for modulo operation. In this paper, the structural optimization of the algorithm is realized based on Montgomery algorithm, and the algorithm's arithmetic

optimization is realized by using Barrett reduction algorithm to achieve the algorithm-level tuning. And the optimization algorithm is deployed on the GPU side through CUDA architecture.
By comparing with the large number library GMP running on the CPU, the algorithm optimization and parallelization deployment in this paper achieves significant speedup in the RSA encryption and decryption operations. In this paper, the performance analysis reveals that there is room for further optimization in terms of program structure and memory usage.

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Paper Title

Implementation of Edge Detection

Abstract

Edge is a set of connected pixels which lie on the boundary between two regions which differ in grey value. The pixels on the edge are called the edge points. Edge detection plays a very important role in the analysis of different characteristics and properties of the image. When an edge is detected with the help of an Edge detection system, the unnecessary details are removed, while only the important structural information is retained. There are various Edge Detection Algorithms and Techniques available such as Robert, Prewitt, Sobel, Marr-Hildrith, Canny etc. which are used in the processing of images. This paper reviews all these gradient techniques and gives a brief analysis of all the Techniques. MATLAB is used as the software tool for the purpose of conversion of a RGB image to Grayscale and then produces a text file which contains all the pixel values of the image. The Xilinx ISE is used for the purpose of synthesis and configuring. Verilog HDL is used to design the whole system. The Hardware Description Language Code is implemented and synthesized on the Spartan 3E FPGA board.

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Paper Title

Merging Public Opinion Information and Stock Numerical Data for Stock Trend Prediction Based on Deep Learning

Abstract

Unlike other stock markets participants, the participants in China mainland are composed of individual investors, which account for 82% of the trading volume of the stock market. The decision-making basis of individual investors is mainly public opinion and recent stock prices. Therefore, the public opinion on professional stock social sites has an important impact on the decision of individual investors, which in turn affects the trend of the stock market. However, the previous stock market forecasting methods mostly ignored the influence of public opinion information on the market. For this reason, this paper proposes a novel framework to predict the stock trend by using both public opinion and stock numerical data. The original contributions of this paper include stock commentary word embedding model based on the stock comment text data crawled from https://xueqiu.com through two-stage training and LSTM-CNN layered model based on the improved self-attention mechanism. Two main experiments are conducted: the first experiment extract stock commentary word embedding, and the second experiment

forecasts the stock price trends of Shanghai and Shenzhen A-share market. Results show that: 1)LSTM-CNN layered model is better than previous methods; 2)The combination of public opinion information and numerical data can improve the performance of the model; 3)Stock commentary word embedding model is better than pre-training word embedding model; 4) The longer the data span, the better the stock forecasting model will perform.

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Paper Title

Improved k-means-based FAKM Clustering Method for Scientific and Technical Literature

Abstract

Research on rapid clustering technology based on bibliographic information of scientific and technical literature aims to efficiently realize the correlation analysis of scientific and technical literature, laying the foundation for discovering hot spots and trends in the research field, conducting interdisciplinary and cross-border research, and accurately recommending scientific and technical literature. Focusing on the analysis of clustering algorithms, we proposed an improved k-means-based Firefly Algorithm k-means (FAKM) clustering method, which effectively solved the problem of randomly selecting the initial center points of class cluster when using k-means algorithm for clustering in the clustering stage, which leads to local optimum, low accuracy and large gap between the division of class clusters and the real situation of clustering results. The use of FAKM clustering algorithm resulted in better clustering performance, high accuracy, and fewer iterations. The experimental results showed that the method achieved a silhouette coefficient of 0.54 and adjust mutual information of 0.69 on the same scientific and technical literature data set, which proved the good performance of the method.

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Paper Title

Lightweight Facial Emotion Recognition Network Based on Inception V3

Abstract

[Objective]Facial emotion recognition is mainly used in psychological medicine, driving monitoring, human-computer interaction and so an. In recent years, Convolutional Neural Network is a common method for facial emotion recognition. With the extensive and in-depth application, the performance requirement of facial emotion recognition is increasing day by day. Augmenting the depth and width of the network is more direct method to improve the recognition performance, but it will cause the parameters and computation to increase rapidly and lead to a long training time. In order to solve this problem, a lightweight face emotion recognition network based on Inception V3 is proposed. The Shortcoming of long training time due to too many parameters in original Inception V3 is improved. [Method(detailed)] The network consists of two convolutional layers, two asymmetric Inception modules, two pooling layers and two fully connected layers combined with Dropout. The total parameters of proposed model is 70% of Inception V3. The FFA-NET filter image is used to enhance the image and the Gaussian noise is used to balance the dataset. The accuracy of the model is improved by dynamic attenuation learning rate of the loss value in validation set. [Result] RAF-DB, CK+ and JAFFE data sets are used to train the model. The training time of a single image is less than 16ms. The average recognition accuracy on testing set is 77.89% and 91.82% respectively.

[Conclusion]Compared with the algorithms with superior performance in face emotion recognition in recent years, the accuracy has been improved and the training time is shorter, which can be better applied to various scenarios.

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Paper Title

Wireless and Sensors Network Security Threads and Count Measures

Abstract

Wireless sensor network is domain-specific wireless system composed of various nodes called sensor nodes. The purpose of the nodes is to collect physical and environmental data parameters such as sound, pressure and temperature, and relay the data across the network through a central node. The goal is to get the data from the sensors in a secure manner. Data flow in wireless sensor networks is threatened by a variety of attack types, including Sybil, Wormhole, Sinkhole, and others. In order to accomplish privacy, integrity, availability, confidentiality number of protocols and techniques have been developed. In this paper we will provide a systematic review that spot the light on the common threats and the countermeasures proposed by the previous studies.

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Paper Title

Research on a Personalized Classifier of Health Status Based on Pulse Signal

Abstract

At present, the workload of mental workers in society is getting heavier and heavier, and it is necessary to assess their health status. Compared with other physiological signals, the pulse is easy to obtain and non-invasive. In this paper, through pulse signal detection, pulse data preprocessing and feature extraction, 12 sets of feature values are selected. Then based on these feature data, using support vector machine algorithm modeling, for different testers to build different personalized human physiological state discrimination system. The experimental results show that the classification accuracy rate reaches 91.17%, which proves that the selected feature value has a strong correlation with the physiological state, and the classifier is effective.

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Paper Title

A high-resolution image dehazing GAN model in icing meteorological environment

Abstract

In this paper, we propose a high-resolution GAN model for image dehazing in icing meteorological environment, which strictly follows a physics-driven scattering strategy. First of all, the utilization of sub-pixel convolution realizes the model to remove image artifacts and generate high-resolution images. Secondly, we use Patch-GAN in the discriminator to drive the generator to generate a haze-free image by capturing the details and local information of the image. Furthermore, to restore the texture information of the foggy image and reduce color distortion, the model is jointly trained by multiple loss functions. Experiments show the proposed method achieves advanced performance for image dehazing in icing weather environment.

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