2020 International Conference on Artificial Intelligence and Computer Engineering（ICAICE 2020）

October 23-25, 2020

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Conference Schedule

Time: October 23-25, 2020
Location: Beijing Bupt Hotel(北京北邮科技酒店）

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Oct. 23	13:00-17:00	Registration	Lobby
	18:00-20:00	**Dinner**	**Chinese Restaurant (中餐厅) 2nd Floor**
Oct. 24 Morning	09:00-09:10	Opening Address	Meeting room 6 (第六会议室) 4th Floor
	09:00-10:30	Keynote Speeches	
	10:30-10:45	Tea Break/Group Photo	
	10:45-12:05	Keynote Speeches	
	12:00-14:00	**Lunch**	**Chinese Restaurant (中餐厅) 2nd Floor**
Oct. 24 Afternoon	14:00-15:20	Keynote Speeches	Meeting room 6 (第六会议室) 4th Floor
	15:20-15:35	Tea Break	
	15:20-18:00	Oral & Poster Presentations	
	18:00-20:00	**Dinner**	**Chinese Restaurant (中餐厅) 2nd Floor**

Conference Agenda

Session I：Keynote Speeches

Session Chair:

Conference Room 6, 4th Floor **09:00-12:00, Saturday Morning, October 24, 2020**

Time	Title	Speaker	Affiliation
09:00-09:10	Welcome & Opening Remark	Prof. Xiaoguang Zhou	Automation School, Beijing University of Posts and Telecommunications
09:10-09:50	AI and Edge Computing for Smart City Eco-System	Prof. Weijia Jia	BNU-UIC Institute of Aritificial Intelligence and Futuer Networks, Beijing Normal University (Zhuhai)，China
09:50-10:30	Internet of Blockchains with Federated Learning and Generalized Stochastic Polling Game	Prof. Wanyang Dai	Nanjing University, China
10:30-10:45	**Photography & Tea Break**		
10:45-11:25	Improving Robustness and Time Efficiency with Weight Function in Occlusion Face Recognition	Prof. Wenfeng Wang	Shanghai Institute of Technology, China
11:25-12:05	Medical image segmentation based on sparse representation and deep learning	Prof. Zuoyong Li	Minjiang University

Session II: Keynote Speeches & Presentations

Chair：

Conference Room 6, 4th Floor **14:00-18:00, Saturday Afternoon, October 24, 2020**

Time	Title	Speaker	Affiliation
14:00-14:40	TBD	Prof. Philippe Fournier-Viger	Harbin Institute of Technology (Shenzhen) (China)
14:40-15:30	Knowledge Engineering Paradigms in Smart Education: Methodologies, Applications and Challenges	Prof. Abdel-Badeeh M. Salem	Ain Shams University, Cairo, Egypt
Oral 1-1	Learning Richer Features in Deep CNN for Object Detection	Yi Li	ZheJiang Normal University
Oral 1-2	High Precision Detection Technology of Infrared Wall Cracks Based on Improved Single Shot Multibox Detector	Ying Liu	Beijing University of Posts and Telecommunications
Oral 1-3	A Survey of AutomaticText Summarization Technology Based on Deep Learning	Mengli Zhang	State Key Laboratory of Mathematical Engineering and Advanced Computing
Oral 1-4	Adaptive High Maneuvers Flight Control via Improved Dynamic Surface Control Technique	Haoming Feng	Airforce Engineering University, Xi'an, China
Oral 1-5	An Online Inteligient Control Law Design of Jet Turbine Engine	Kai Liu	Dalian University of Technology

Oral 1-6	Predicting Programming Behavior in OSS Communities: A Case Study of NLP-based Approach	Manyan Huo	National University of Defense Technology
Oral 1-7	Efficient 3D Neural Networks with Support Vector Machine for Hippocampus Segmentation	Yue Chen	Beijing Institute of Technology
Oral 1-8	Study on the Digitalization Method of Intelligent Emergency Plan of Power System	Zehao Zhang	Global Energy Interconnection Research Institute co.,Ltd
Oral 1-9	Robotic Path Planning Strategy Based on Improved Artificial Potential Field	Haoyang Li	University of Manchester
Oral 1-10	An Optimal Algorithm Design of RSSI Indoor Location based on Neural Network	Dongdong Zhou	Guilin University of Technology
Oral 1-11	Real-time Face Tracking in Surveillance Videos on Chips for Valuable Face Capturing	Qian Zhao	Tsinghua University
Oral 1-12	Towards MLOps: A Case Study of ML Pipeline Platform	Yue Zhou	National University of Defense Technology
Oral 1-13	Intrusion detection system based on QBSO-FS	Xiangxin Cheng	North China Electric Power University

Poster 1-14	Construction of Knowledge Graph of HIV-associated Neurocognitive Disorders Syndrome based on Deep Learning	Di Sun	Beijing University of Posts and Telecommunications
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Poster 1-19	Port ship Detection Based on Visual Saliency model and Center Dark Channel Prior	Wenbin Gong	Naval University of Engineering
Poster 1-20	Recommendation of Online Educational Resources Based on Neural Network	Danyang Shen	Beijing University of Posts and Telecommunications
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Poster 1-22	Federated Learning Algorithm Based on Knowledge Distillation	Donglin Jiang	University of Nottingham

Poster 1-23	Neural Signal to Sentence Translator	Wei Huang	University of Electronic Science and Technology of China
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Poster 1-25	Research on Pedestrian Detection System based on Tripartite Fusion of "HOG+SVM+Median filter"	Xiaoyong Huang	Guilin University of Technology
Poster 1-26	Fault Detection and Prediction Method of Satellite Senor In-orbit Data Based on SVM	Yusong Huang	Institute of Telecommunication and Navigation Satellite, CAST
Poster 1-27	Edge based Prevention System for Crowd Overcrowding	Shanjin Yu	Zhejiang Lab, Hangzhou, China

Keynote Speeches

Keynote Speech I: AI and Edge Computing for Smart City Eco-System

Speaker: Prof. Weijia Jia, BNU-UIC Institute of Aritificial Intelligence and Futuer Networks, Beijing Normal University (Zhuhai), China
Time: 09:10-09:50, Saturday Morning, October 24,2020
Venue： Conference Room 6, 4th Floor

Abstract
In this talk, I will present the key techniques of AI and edge computing applied to the smart city. It starts with the AI fundamental technology for building up the knowledhe graph through entity/retation extractions; and then discuss the efficient resource allocation algorithms for edge computing using representation and reinforcement learning techniques. We consider the integrations of AI-Edge-IoT will be the fundamental blocks for the estabilishment of the smart city eco-systems.

Keynote Speech 2: Internet of Blockchains with Federated Learning and Generalized Stochastic Polling Game

Speaker: Prof. Wanyang Dai, Nanjing University, China
Time: 09:50-10:30, Saturday Morning, October 24,2020
Venue： Conference Room 6, 4th Floor

Abstract
We present the evolution of the currently deploying industrial Internet through Internet of (quantum) blockchains (IoB). Users' data can be handled at quantum-cloud service centers via federated learning, edge computing, and 5G/6G since this information can be either symmetric or asymmetric, and even cannot be exchanged each other. Our IoB can interact with general structured things (e.g., supply chain and health-care systems) having online trading and payment capability via stable digital currency and can handle vector-valued data streams requiring synchronized quantum services. Thus, an artificial intelligent decision policy called generalized stochastic polling policy is proposed by a mixed zero-sum and non-zero-sum resource-competition based game pricing policy. The effectiveness of this policy is justified by diffusion modeling with approximation theory and numerical implementations.

Keynote Speech 3: Improving Robustness and Time Efficiency with Weight Function in Occlusion Face Recognition

Speaker: Prof. Wenfeng Wang, Shanghai Institute of Technology, China
Time: 10:45-11:25, Saturday Morning, October 24,2020
Venue： Conference Room 6, 4th Floor

Abstract
The need for occlusion face recognition in daily life, professional fields like criminal investigation and the recent epidemic is increasing, so it is still a hot issue in the current research and many researchers are pursuing the technical excellence for the face recognition of random occlusion. In the previous research, RRC model is proposed for the excellent performance in the occlusion face recognition and the IR 3 C algorithm is adopted to solve this model. Among them, the weight function in this algorithm plays a big role, which will directly affect the recognition rate and running time of the experiment. In this paper, three weight functions: Inverse trigonometric function, Hyperbolic tangent function and Log function are proposed for the purpose of improving the robustness and time efficiency of IR 3 C algorithm. Applying these functions on the comparable types and levels of random occlusion and then comparing them with the previous research, the experimental results indicate that the inverse trigonometric function is superior to other functions with better recognition rates and shorter running time.

Keynote Speech 4: Medical image segmentation based on sparse representation and deep learning

Speaker: Prof. Zuoyong Li, Minjiang University, China
Time: 11:25-12:05, Saturday Morning, October 24, 2020
Venue： Conference Room 6, 4th Floor

Abstract
TBD

Keynote Speech 5: TBD

Speaker: Prof. Philippe Fournier-Viger, Harbin Institute of Technology (Shenzhen) (China)
Time: 14:00-14:40, Saturday Afternoon, October 24, 2020
Venue： Conference Room 6, 4th Floor

Abstract
TBD

Invited Speech 6: Knowledge Engineering Paradigms in Smart Education: Methodologies, Applications and Challenges

Speaker: Prof. Abdel-Badeeh M. Salem, Ain Shams University, Cairo, Egypt
Time: 14:40-15:20, Saturday Afternoon, October 24, 2020
Venue： Conference Room 6, 4th Floor

Abstract
Knowledge Graph is a large scale semantic network consisting of entities and concepts as well as the semantic relationships among them, using Web-based knowledge representation languages such as RDF, RDF Schema, or OWL (Web Ontology Language). Such knowledge graphs are used in the construction of many knowledge-based applications in various application domains. In medicine, knowledge graph technology has been widely used for extracting information from patient records, personalized medicine which supports for co-morbidity analysis, data integration on drugs and their interactions, and many others. In this talk, we will present various technology of knowledge graphs, which include how we can construct knowledge graphs from heterogeneous knowledge and data resources. We will show several typical applications of disease-specific knowledge graphs such as Knowledge Graphs of Depression.

Presented Papers

1-1
Title: Learning Richer Features in Deep CNN for Object Detection
Authors: Yi Li
Affiliation: Zhejiang Normal University

Abstract
Recently developed object detectors employ a Deep Convolutional Neural Network (DCNN)by adding the number of feature layers with a pyramidal shape. Owing the occurrence of Feature Pyramid Network (FPN), the representation of the DCNN's ability was largely improved. Although these object detectors with feature pyramid achieve encouraging results, they have some limitations that didn't fully explore richer information in the deep layers, which is essential for the Object Detection task. In this work, we propose Multi-Level Spatial Pyramid Pooling module to construct more effective feature network for detecting objects of different scales. It is an integration of three pooling schemes of different kernel sizes. Besides, we design novel backbone based Darknet as our feature extractor. First, we fuse multi-level features extracted by new backbone followed by FPN style as the basic features. Then we feed the fused feature to the module to generate richer semantic feature maps at different scales. Finally, we gather up the richer feature maps in the former step for the detectors. To evaluate the effectiveness of the proposed method, experiments are conducted on two major benchmarks, which is PASCAL VOC 2007 and MS COCO dataset, and demonstrates that the ML-SPP module achieve comparable results with high efficiency.

1-2
Title: High Precision Detection Technology of Infrared Wall Cracks Based on Improved Single Shot Multibox Detector
Authors: Ying Liu
Affiliation: Beijing University of Posts and Telecommunications

Abstract
Building wall cracks seriously reduce the safety and stability of building structure. Aiming at the problems of slow speed, high cost and lack of objectivity of traditional crack detection technology, an infrared wall crack detection algorithm based on improved single shot multibox detector (SSD) is proposed in this paper. The algorithm combines infrared thermal imaging technology and improved SSD network to detect cracks in the infrared image of building wall model. The infrared thermal imaging technology can detect the cracks under the building coating or wallpaper. The improved SSD network optimizes the size and distribution of the prior box, and improves the recall rate of the network. The experimental data results show that the algorithm is effective and the detection accuracy is more than 98%, which has a certain practical value.

1-3
Title: A Survey of Automatic Text Summarization Technology Based on Deep Learning
Authors: Mengli Zhang

Affiliation: State Key Laboratory of Mathematical Engineering and Advanced Computing

Abstract

With the rapid development of the Internet, the amount of network text data is increasing day by day. It is increasingly becoming a challenge to quickly mine useful information from massive amounts of text data. The emergence of automatic summarization technology provides new ideas and methods for solving this problem. Compared with extractive summarization model, abstractive summarization model more closely resembles the process of human summarization, giving it important research significance. In recent years, with the development of deep learning methods, text summarization technology based on deep learning has made unprecedented breakthroughs. Based on the current mainstream sequence-to-sequence framework, we summarize the state-of-the-art abstractive summarization models, compare the advantages of different models and applicable scenarios, and provide a clear context for researchers in related fields. Furthermore, we also make statistics on the Chinese and English datasets. Finally, we put forward some thoughts on the common problems in the field of automatic text summarization.

1-4

Title: Adaptive High Maneuvers Flight Control via Improved Dynamic Surface Control Technique

Authors: Haoming Feng

Affiliation: Airforce Engineering University, Xi'an, China

Abstract

In this paper, an adaptive control method based on improved dynamic surface control (DSC) technique is proposed for a class of high maneuver flight control problems with input saturation and dead zone input. By designing adaptive disturbance compensation terms, the influences caused by external disturbances, modeling errors and uncertainties such as aerodynamic parameters have been suppressed effectively, which has a strong anti-jamming capacity. Because of the application of the improved dynamic surface technique, the control method not only reduces the computational burden of the control design, but also guarantees the global uniformly ultimately boundedness (GUUB) of all the signals in the closed-loop system.

1-5

Title: An Online Inteligient Control Law Design of Jet Turbine Engine

Authors: Kai Liu

Affiliation: Dalian University of Technology

Abstract

In order to solve the on-line optimization problem of variable cycle engine, a control law of variable cycle engine based on depth Q network is proposed, the minimum fuel consumption of variable cycle engine in cruise phase is achieved by reinforcement learning algorithm. In this paper, the control law of the variable
cycle engine in the cruise phase is constructed based on the reinforcement learning algorithm, the pressure ratio can be adjusted online to change the engine working point, which helps to reduce the fuel consumption. The numerical simulation results show that the specific fuel consumption of subsonic cruise after adjustment can be dramatically reduced. The performance optimization algorithm can realize the self-regulation of engine control

law and achieve the lowest fuel consumption with the existence of the engine performance deviation.

1-6

Title: Predicting Programming Behavior in OSS Communities: A Case Study of NLP-based Approach

Authors: Manyan Huo

Affiliation: National University of Defence Technology

Abstract

Prediction of developers' programming behaviors is an effective way to improve their development efficiency and optimize the organization of project modules and files. However, little research exists investigating on this direction. In order to address this knowledge gap, we proposed a NLP-based approach to predict the programming behaviors in OSS (Open Source Software) communities. The proposed approach i) embeds the historical programming behavior data of a project into a multi-dimensional vector space to capture the potential laws in the data, ii) forms an eigenvector matrix reflecting the semantic relationship of the development behavior data, and iii) predicts the next programming behavior of a specific developer based on the eigenvector matrix. Our experiments on five OSS projects show that the prediction accuracy rate of the proposed prediction approach can reach up to about 50%, indicating that it can summarize the development behavior data law and effectively predict the programming behavior of developers. Our work can provide valuable assistance for developers' programming and projects' maintenance in practice.

1-7

Title: Efficient 3D Neural Networks with Support Vector Machine for Hippocampus Segmentation

Authors: Yue Chen

Affiliation: Beijing Institute of Technology

Abstract

Accurate segmentation of the hippocampal and its subfields from the brain magnetic resonance imaging (MRI), which is a prerequisite for volume measurement, plays a significant role in the clinical diagnosis and treatment of many neurodegenerative diseases. It is of great significance for the precise segmentation of the hippocampus and its sub-regions.

In this paper, we proposed a hippocampal subfields segmentation approach based on support vector machine (SVM) combined 3D convolutional neural network (3D CNN) and generative adversarial network (GAN). In the 3D CNN-SVM model, the representative features processed by the 3D CNN are input into the SVM. SVM is trained with the features to achieve the voxel classification of the image, and the segmentation results are obtained. In the 3D GAN-SVM model, we use the generator to segment and use the 3D CNN-SVM network we proposed as the discriminator.

The experiments has performed on the dataset obtained from Center for Imaging of Neurodegenerative Diseases (CIND) in San Francisco, USA. The segmentation dice similarity coefficients (DSCs) of the 3D CNN-SVM for CA1, CA2, DG, CA3, Head, Tail, SUB, ERC and PHG in hippocampal subfields are respectively 0.930, 0.926, 0.977, 0.967, 0.931, 0.905, 0.981, 0.870 and 0.911. It demonstrates that combining 3D CNN and SVM achieves a significant improvement in the accuracy of all the hippocampal subfields, and outperforms the existing methods based on the CNN. The DSCs of 3D GAN-SVM are higher, which are respectively 0.989, 0.965, 0.986,

0.977, 0.975, 0.993, 0.818, 0.985 and 0.994. The effect of the GAN-SVM model is also significantly better than that of pure GAN, and the segmentation accuracy has reached the best level on this dataset.
Neural network can extract representative features, but it mainly relies on extracting features from a large number of accurately labeled datasets. Most medical datasets are small and difficult to obtain. SVM is more suitable for classification of small datasets, so we combine SVM and neural network to effectively improve the segmentation accuracy of hippocampus in brain MRI images.

1-8

Title: Study on the Digitalization Method of Intelligent Emergency Plan of Power System

Authors: Zehao Zhang
Affiliation: Global Energy Interconnection Research Institute co.,Ltd

Abstract

This paper puts forward a formalized method of emergency plan based on ontology, sums up the main concepts such as system, event, rule, measure, constraint and resource, and analyzes the logical relationship among concepts. A digital intelligent emergency plan storage scheme based on relational database model is proposed. In this paper, full-text search, data search and knowledge search are comprehensively used to adapt to the information needs and characteristics of different users' query plans. Finally, an example of emergency plan made by a power supply company is given to illustrate the effectiveness of the method.

1-9

Title: Robotic Path Planning Strategy Based on Improved Artificial Potential Field

Authors: Haoyang Li
Affiliation: University of Manchester

Abstract

The artificial potential field (APF) algorithm, proposed by Khatib, is frequently utilized in the pathfinding and obstacle avoidance projection of moveable robots with known destination. Aiming at the confinements of the traditional APF technique, which are defined as local minimum and unreachable problem respectively, based on the thread of disturbing the mechanical model of force balance to break the equilibrium state, the following improved algorithm is proposed. By sensing the variation of the distance between the robot and the target in certain time unit, the algorithm can quantitate the tendency of robot to be trapped in the mechanical equilibrium state in the artificial potential field. An optimization and improvement of the repulsive force pointing angle and the gravitational field function has been done so that the robot can take the initiative to detach from the state of mechanical equilibrium induced by obstacles. In the MATLAB simulation, the algorithm demonstrates its efficiency and universality compared with traditional algorithm.

1-10

Title: An Optimal Algorithm Design of RSSI Indoor Location based on Neural Network

Authors: Dongdong Zhou
Affiliation: Guilin University of Technology

Abstract
The RSSI positioning method is affected by complex environment, multipath effect and other factors, resulting in poor positioning accuracy and artificial interference in the selection of positioning model parameters. An optimal RSSI indoor location algorithm based on neural network is designed. Data elimination and Kalman filter are used to preprocess the RSSI value, and the RSSI value between the unknown node and the reference node is used as the input of the neural network, and the position coordinate of the unknown node is used as the output of the network to build the model. In this paper, BBPSO algorithm is used to optimize the smooth parameters of the network, and the root mean square error of the predicted coordinates and the actual coordinates of the positioning nodes are selected to build the fitness function, and GRNN neural network is used to build the precise positioning model of the network to achieve the prediction of the coordinates of the unknown nodes. The experimental results show that the optimized GRNN algorithm has higher positioning accuracy in node positioning. The positioning error of the optimized GRNN algorithm is less than 1 meter, and the average positioning error of 12 positioning nodes is 0.4436m. RSSI indoor positioning algorithm based on optimized neural network has high positioning accuracy and good stability, which has certain application value.

1-11
Title: Real-time Face Tracking in Surveillance Videos on Chips for Valuable Face Capturing
Authors: Qian Zhao
Affiliation: Tsinghua University

Abstract
Face capturing is a task to capture and store the “best” face of each person passing by the monitor. To some extent, it is similar to face tracking, but uses a different criterion and requires a valuable (i.e., high-quality and recognizable) face selection procedure. Face capturing systems play a critical role in public security. When deployed on edge devices, it is capable of reducing redundant storage in data center and speeding up retrieval of a certain person. However, high computation complexity and high repetition rate caused by ID switch errors are major challenges. In this paper, we propose a novel solution to constructing a real-time low-repetition face capturing system on chips. First, we propose a two-stage association algorithm for memory-efficient and accurate face tracking. Second, we propose a fast and reliable face quality estimation algorithm for valuable face selection. Our pipeline runs at over 20fps on Hisiv 3559A SoC with a single NNIE device for neural network inference, while achieving over 95% recall and less than 0.4 repetition rate in real world surveillance videos.

1-12
Title: Towards MLOps: A Case Study of ML Pipeline Platform
Authors: Yue Zhou
Affiliation: National University of Defense Technology

Abstract
The development and deployment of machine learning (ML) applications differ significantly from traditional applications in many ways, which have led to an increasing need for efficient and reliable production of ML

applications and supported infrastructures. Though platforms such as TensorFlow Extended (TFX), ModelOps, and Kubeflow have provided end-to-end lifecycle management for ML applications by orchestrating its phases into multistep ML pipelines, their performance is still uncertain. To address this, we built a functional ML platform with DevOps capability from existing continuous integration (CI) or continuous delivery (CD) tools and Kubeflow, constructed and ran ML pipelines to train models with different layers and hyperparameters while time and computing resources consumed were recorded. On this basis, we analyzed the time and resource consumption of each step in the ML pipeline, explored the consumption concerning the ML platform and computational models, and proposed potential performance bottlenecks such as GPU utilization. Our work provides a valuable reference for ML pipeline platform construction in practice.

1-13

Title: Intrusion detection system based on QBSO-FS

Authors: Xiangxin Cheng

Affiliation: North China Electric Power University

Abstract

In traditional internet systems, intrusion detection is an effective way to ensure network security. However, due to the problem of computing resources, complex intrusion detection models are not suitable for the massive heterogeneous network environment of the Internet of Things. Appropriate data sets and appropriate classification algorithms are the keys of intrusion detection systems in the Internet of Things era. This paper proposes an intrusion detection system based on QBSO-FS and machine learning. The system is used to screen network feature data in actual industrial environments, and can establish an intrusion detection model. Experiments show that using a subset of the original data after feature selection can effectively improve the classification accuracy of ordinary machine learning algorithms. After fusing the optimal feature subsets classified by multiple machine learning algorithms, the data set performs better than a subset of general feature selection algorithms on high-performance machine learning classification algorithms.

1-14

Title: Construction of Knowledge Graph of HIV-associated Neurocognitive Disorders Syndrome based on Deep Learning

Authors: Di Sun

Affiliation: Beijing University of Posts and Telecommunications

Abstract

If HIV-associated Neurocognitive Disorder (HAND)can be diagnosed and treated early, it may delay or reverse its pathological process and improve the survival rate of patients. At present, there is little statistical information about HAND, which is very disadvantageous to the prevention and treatment of HAND. Therefore, this paper synthetically uses deep learning models such as bidirectional LSTMs, conditional random fields and PCNN to carry out entity recognition and relationship extraction for text data, such as electronic medical record and medical community, to construct visual knowledge graph. Firstly, entity type and relation type are defined, and then multi-source data are fused, and then entity recognition of BIO annotated data sets is carried out by using the BERT-BiLSTM-CRF model. It is found that the effect of using the BERT pretraining model is better than

word2vec; then, the neural network PCNN-Attention based on sentence level selective attention mechanism is used. It is found that the precision rate, recall rate and F1 value of the model are better than PCNN-ONE and PCNN-AVE models. Finally, the entity and entity relationship are visualized by using Neo4j graph database. In this experiment, the HAND related knowledge graph was constructed and visualized, which is helpful to the popularization of HAND related medical knowledge and the diagnosis of doctors, and it is helpful to the early detection of ANI, and plays an important role in delaying the pathology.

1-15

Title: Neither Too Much nor Too Little: Leveraging Moderate Data in Pedestrian Trajectory Prediction

Authors: Meiming Wang

Affiliation: College of Computer National University of Defense Technology

Abstract

Pedestrian trajectory prediction is a crucial research issue in autonomous driving and mobile robots. However, accurate prediction of pedestrian trajectory is still challenging due to the uncertainty and complexity in real world. Neither data driven methods using too much historical data nor existing non-data driven methods using little historical information can perfectly tackle this problem. In this paper, we propose a geometry-based Arc-Fitting and Tangent-predicting model that leverages moderate historical trajectory information. We propose to use a simple arc model to fit the last few positions of the observed trajectory and to predict the future trajectory along the tangent direction passing through the last point. The proposed method is compared with various models on multiple pedestrian trajectory datasets. Our model achieves state-of-the-art performance in terms of the displacement error between predicted trajectory and the ground truth.

1-16

Title: Palmprint Classification Detection Algorithm Based on ModifiedCenterNet

Authors: Ying Yuan

Affiliation: Guizhou Police College

Abstract

Target detection is the most studied and widely used branch in the field of computer vision technology, mainly focusing on two issues: objection position and category information. CenterNet is one of the excellent performance methods in the one-stage target detection. In this paper, HRNet is used to replace DLA-DCN in the original network structure to detect palmprint delta and other palmprint features. The experimental results show that the average precision of the modified CenterNet in extracting palmprint delta area and other palmprint features is improved with different degree.

1-17

Title: The relationship model construction of dynamic color and visual attention based on mobile card layout

Authors: Zhe Zhao

Affiliation: Beijing University of Posts and Telecommunications

Abstract
With the rapid development of mobile application industry, the interaction between human and mobile application interface has become an indispensable part of daily life. Designers also strive to guide users' visual attention reasonably on the limited screen. This paper analyzes the design elements of dynamic color in the mobile terminal card layout, establishes the relationship model between dynamic color and visual attention in mobile end card layout, and explores the relationship between dynamic color and visual attention of users. Based on the analytic hierarchy process (AHP), this paper constructs an index system that affects users' visual attention. By designing the control group experiment, users can evaluate the importance of the index layer factors in pairs, and finally get the weight value of the influence of color, purity, lightness and speed of the design factors of dynamic color on the visual note. The model can provide a theoretical basis for the design of dynamic color of mobile card layout and a method for designers to calculate the visual attention degree of interface elements to users.

1-18
Title: A Feature Extraction Method Based on Few-shotLearning
Authors: Sa Liu
Affiliation: Xi’an Jiaotong University

Abstract
The current deep model networks are all proposed for tasks with large scale datasets. Therefore, this paper proposes some improvements for mining the most essential features of data in few-shot learning problem. Firstly, the multi-channel feature maps are important parts of the network model. Whether there is a dependency between the channels of the feature maps is what we are going to consider. On this basis, we propose to weight the feature maps of different channels to highlight the information that contributes better to the subsequent learning tasks and suppresses the more useless feature information. In addition, we present new feature maps that combine the location information of the shallow layers and the semantic information of the deeper layers in an example by fusing the feature maps of the same picture with different scales to generate a more expressive feature map of the example.

1-19
Title: Port ship Detection Based on Visual Saliency model and Center Dark Channel Prior
Authors: Wenbin Gong
Affiliation: Naval University of Engineering

Abstract
Aiming at the problem that the image texture is complex, the grayscale feature is very close to the wharf, and the accurate segmentation is very difficult in the process of port ship detection in high-resolution optical remote sensing image, a port ship detection method combining visual significance model and center dark channel priori is proposed. The watershed segmentation algorithm based on spectral intensity and image texture information achieves land and sea segmentation. The land area is masked to suppress the interference of complex land background. Extracting fitting line and smoothing port contour line. According to the characteristics of the straight shape of the port and the straight shape of both sides with the ship, the center line point of the line is

defined to locate the port, and the set of candidate areas of interest to the port is obtained. Combined with the visual model and the dark channel prior feature, the ship initial significance map and the central dark channel map were fused to complete the ship target detection. Finally, through the bow characteristics of the ship, the adjacent ship is separated to eliminate false alarm and improve the detection accuracy. Experiments show that the algorithm is robust, has a good detection effect, and its accuracy and recall rate are greatly improved.

1-20

Title: Recommendation of Online Educational Resources Based on Neural Network

Authors: Danyang Shen

Affiliation: Beijing University of Posts and Telecommunications

Abstract

In recent years, online education is developing rapidly. However, it is difficult for students to obtain suitable content from massive online educational resources. Therefore, it is of great significance to recommend personalized educational resources to students. How to effectively model the characteristics of students and educational resources, and to explore the deep relationship between them is one of the core challenges of the recommendation model. In this paper, we propose an educational resources recommendation model based on neural network. Based on the data of Spark Space, the online learning platform of Beijing University of Posts and Telecommunications, we first construct a knowledge concept maps according to the knowledge structure of the course. And then we combine the learning style scale and Bloom's taxonomy theory to construct the characteristic attributes of students and education resources. Finally, we use a multilayer perceptron network to make personalized recommendations to students. Experiments have proved that the recommendation model proposed achieves a great recommendation result.

1-21

Title: Design of Water Quality Monitoring System

Authors: Chenwei Feng

Affiliation: Xiamen University of Technology

Abstract

With the rapid development of social economy, excessive discharge of industrial sewage leads to water pollution, and it also affects the quality of domestic water. Therefore, it is necessary to monitor the water quality. A practical and convenient water quality monitoring system is designed in this paper, which is based on the MCU (Micro-programmed Control Unit) and Bluetooth technology. This design takes the Arduino development board based on ATMega328P chip as the core, and uses sensors to collect pH, turbidity, conductivity and water temperature. The measured data is sent to the smart phone via Bluetooth, and abnormal parameters are prompted. The test results show that the system can obtain the water quality parameters in time and accurately, and the overall operation of the system is stable, which is suitable for many occasions of water quality monitoring.

1-22

Title: Federated Learning Algorithm Based on Knowledge Distillation

Authors: Donglin Jiang
Affiliation: University of Nottingham

Abstract
Federated learning is a new scheme of distributed machine learning, which enables a large number of edge computing devices to jointly learn a shared model without private data sharing. Federated learning allows nodes to synchronize only the locally trained models instead of their own private data, which provides a guarantee for privacy and security. However, due to the challenges of heterogeneity in federated learning, which are: (1) heterogeneous model architecture among devices; (2) statistical heterogeneity in real federated dataset, which do not obey independent-identical-distribution, resulting in poor performance of traditional federated learning algorithms. To solve the problems above, this paper proposes FedDistill, a new distributed training method based on knowledge distillation. By introducing personalized model on each device, the personalized model aims to improve the local performance even in a situation that global model fails to adapt to the local dataset, thereby improving the ability and robustness of the global model. The improvement of the performance of local device benefits from the effect of knowledge distillation, which can guide the improvement of global model by knowledge transfer between heterogeneous networks. Experiments show that FedDistill can significantly improve the accuracy of classification tasks and meet the needs of heterogeneous users.

1-23
Title: Neural Signal to Sentence Translator
Authors: Wei Huang
Affiliation: University of Electronic Science and Technology of China

Abstract
The technology of transforming neural activity into language could be revolutionary for those who cannot speak because of brain damage and organic injuries. How to decode the semantic information from human brain activity is also an important part of understanding how the brain represents semantics. Several previous neuroimaging studies have decoded the rough semantic information (such as single category or multiple categories) from brain activity but few have achieved up to the level of language, for example, phrases or sentences. Here, we used functional magnetic resonance imaging to measure human brain activity evoked by natural images. A progressive transfer semantic decoding model was proposed to establish mapping from the visual response signals from brain activities to text describing the natural images in order to abstract the detailed semantic information. Our results show that the similarity between the decoded sentence and the original sentence reaches about 0.77. In addition, the comparison of the decoding performance of different levels of visual cortex shows that visual cortex plays a primary role in semantic decoding and the decoding accuracy of the higher visual cortex is higher than that of the lower visual cortex. Moreover, to explore what periods of visual perception response signals help to decode semantic sentences, we further compared the weights at various moments after viewing natural images. These findings helps explore the neural mechanism of representing language and advance the clinical feasibility of using speech neuroprosthetic technology to assist aphasics to communicate with what they see.

1-24

Title: State-of-the-Art survey of deep learning based sketch retrieval
Authors: Ziheng Ji
Affiliation: Nanjing University of Finance and Economics

Abstract
Sketch based image retrieval (SBIR) is an important research issue in computer vision, which is a flexible and convenient way to retrieve target images. How to minimize the difference between the sketch domain and the image domain is the key to the SBIR method. Deep learning methods have used in image processing research widely, which break through the limitations of traditional methods, which extract high-dimensional features from a large amount of data and have been proved to effectively solve the cross-domain modeling issues. The research focuses on the deep learning-based sketch retrieval method and reviews the related research work, in the aspects of deep feature extraction model, coarse-grained and fine-grained retrieval based on deep learning, category generalization. Finally, the challenges and future research directions of sketch retrieval are summarized and prospected.

1-25
Title: Research on Pedestrian Detection System based on Tripartite Fusion of "HOG+SVM+Median filter"
Authors: Xiaoyong Huang
Affiliation: Guilin University of Technology

Abstract
Aiming at the problem of low accuracy of traditional pedestrian detection methods in a complex monitoring environment, based on the histogram of oriented gradient (HOG) and support vector machine (SVM) pedestrian detection algorithms, incorporating median filter (MF), a pedestrian detection model based on tripartite fusion (PDMTF) is proposed. The model first uses the median filter algorithm to denoise the image, effectively reducing the impact of noise on the HOG feature descriptor. Then, uses the extracted pedestrian features to train the SVM classifier. In addition, in order to optimize the SVM classifier, the model conducts a secondary training on the misidentified pedestrian area. The final experimental results show that the pedestrian false detection rate of the PDMTF model is only 7%, which has a good pedestrian recognition rate in complex environment.

1-26
Title: Fault Detection and Prediction Method of Satellite Senor In-orbit Data Based on SVM
Authors: Yusong Huang
Affiliation: Institute of Telecommunication and Navigation Satellite, CAST

Abstract
Satellite sensor is one of the most important devices for spacecraft flight control, which is used to gather the in-orbit flight control data. The timeliness and accuracy of the sensor fault detection determined the success or failure of the mission. The traditional data monitoring strategy is triggering the alarm by setting the upper and lower threshold value of the telemetry data. This paper tries to achieve a fault detection and prediction method of satellite sensor through the process of classifier training using the normal and abnormal in-orbit simulated data based on SVM. During the training and detection of the sample data, multi-parameter has been adopted,

the two-class classification and the one-class classification algorithm has been compared. According to the results, the method based on SVM was demonstrated effectively.

1-27
Title: Edge based Prevention System for Crowd Overcrowding
Authors: Shanjin Yu
Affiliation: Zhejiang Lab, HangZhou, China

Abstract
At present, it has become more and more important to prevent crowd overcrowding, especially under the current situation of the coronavirus. In order to process this situation, the governments of world take a lot of manpower and material resources to prevent the crowd overcrowding. Now, there is no effective method to prevent crowd overcrowding in real-time. As the emergence of edge computing, creating a prevention system between edge computing and cloud computing becomes a possibility. This paper introduces a crowd congestion prevention system based on edge, which combines object detection and cluster analysis, and presents the analysis results to the alarm system in the cloud.

Instructions for Presentations

Oral Presentation

1. Timing: a maximum of 15 minutes total, including speaking time and discussion. Please make sure your presentation is well timed. Please keep in mind that the program is full and that the speaker after you would like their allocated time available to them.
2. You can use CD or USB flash drive (memory stick), make sure you scanned viruses in your own computer. Each speaker is required to meet her/his session chair in the corresponding session rooms 10 minutes before the session starts and copy the slide file(PPT or PDF) to the computer.
3. It is suggested that you email a copy of your presentation to your personal inbox as a backup. If for some reason the files can't be accessed from your flash drive, you will be able to download them to the computer from your email.
4. Please note that each session room will be equipped with a LCD projector, screen, point device, microphone, and a laptop with general presentation software such as Microsoft PowerPoint and Adobe Reader. Please make sure that your files are compatible and readable with our operation system by using commonly used fronts and symbols. If you plan to use your own computer, please try the connection and make sure it works before your presentation.
5. Movies: If your PowerPoint files contain movies please make sure that they are well formatted and connected to the main files.

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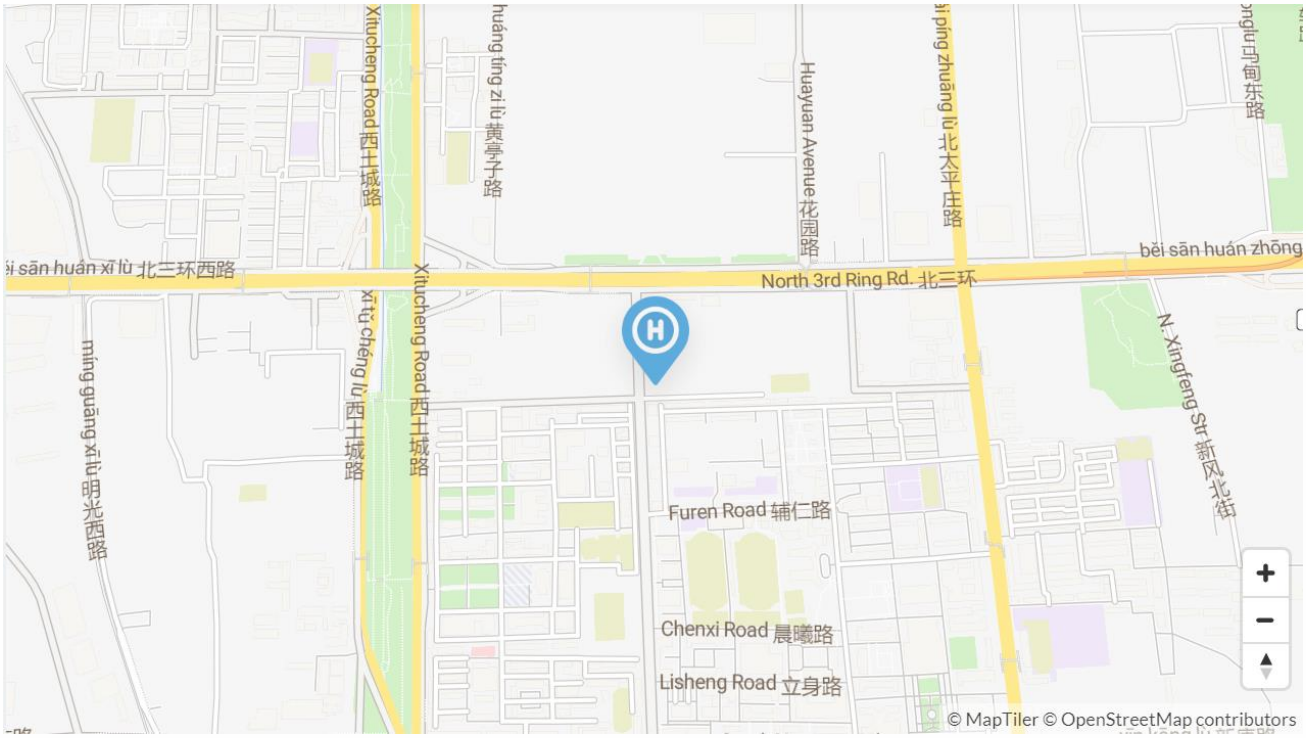

Contact US

Conference Secretary: Mrs. Vivian(王老师)
E-mail: icaice2020@163.com
Tel: +86 19139737380 (Wechat)
QQ: 2644824662

Vivian Wang Wechat AEIC Official Wechat