GUEST EDITORIAL

Editorial for the special issue on "Research on methods of multimodal information fusion in emotion recognition"

Kaijian Xia[1] · Tao Hu[2] · Wen Si[3]

Emotion recognition is a significant branch of affective computing and a research direction highlighted in the field of artificial intelligence, human-computer interaction, and pattern recognition, etc. Emotion recognition, one of multi-disciplinary research subjects related to computer science, mathematics, physiology, and psychology, is still faced with a series of problems to be solved, especially the problems about feature extraction, dimension reduction, recognition algorithms, and multimodal information fusion. Speech and facial expression are two important external channels used in many studies in emotion recognition, but both of these channels cannot represent the real and inner emotional experience. A large number of studies have reported that satisfactory performance of emotion recognition can be achieved by physiological signals under laboratory conditions. However, there are inevitably inherent flaws of single-modality emotion recognition in the aspect of recognition accuracy and stability. To compensate for the defect of single modalities, multimodal emotion recognition has emerged and obtained great attention. Recently, multimodal information fusion used in emotion recognition is still in an exploring stage with immature methods and techniques, thus the exploration in this field should be further deeply and thoroughly.

The aim of this special issue is to capture recent research and seek contributions of high-quality papers in this field. Under the support of related worldwide researchers, 47 papers have been received. Based on the review comments from peer reviewers, 25 papers have been selected out for the special issue and authors have revised their paper according to the comments before the final acceptance. The 25 paper which cover broad topics are introduced briefly as follows.

The paper "Emotional computing based on cross-modal fusion and edge network data incentive" presented an emotional computing algorithm based on cross-modal fusion and edge network data incentive.

The paper "Hot news mining and public opinion guidance analysis based on sentiment computing in network social media" proposed the dictionary supervised emotion computing model, which can be applied in hot news mining and public opinion guidance analysis based on sentiment computing in network social media.

In the paper "Multimodal emotion recognition algorithm based on edge network emotion element compensation and data fusion", studied the multi-modal emotion recognition algorithm based on emotion element compensation in the background of streaming media communication in edge network.

In the paper "Optimal path planning for two-wheeled self-balancing vehicle pendulum robot based on quantum-behaved particle swarm optimization algorithm", an optimal path planning of two-wheel self-balancing pendulum robot is proposed based on the self-balance of free-floating two-wheel self-balancing pendulum robot system.

In the paper "Network text sentiment analysis method combining LDA text representation and GRU-CNN", a text sentiment analysis method combining Latent Dirichlet Allocation (LDA) text representation and convolutional neural network (CNN) is proposed.

In this paper, "Multi-source heterogeneous data fusion based on perceptual semantics in narrow-band Internet of Things", a multi-source heterogeneous data fusion based on perceptual semantics in NB-IoT is proposed in this paper. The experiment has shown that our proposed algorithm has faster convergence rate, higher stability, and its judgment to fusion results are more suitable to actual conditions.

The paper "A multiobjective evolutionary algorithm based on surrogate individual selection mechanism", proposed a

✉ Kaijian Xia
Lb17060008@cumt.edu.cn

1 School of Information and Control Engineering, China University of Mining and Technology, Xuzhou, China

2 Kent State University, Kent, OH, USA

3 College of Engineering, University of South Florida, Tampa, FL, USA

surrogate individual selection mechanism for multiobjective evolutionary algorithm based on decomposition.

The paper "Super node selection algorithm combining reputation and capability model in P2P streaming media network", a selection method combining node reputation and service capability is proposed. Simulation results show that this method can effectively improve network throughput and service performance.

The paper "An approach to eliminating end effects of EMD through mirror extension coupled with support vector machine method", proposed a new approach to the performance improvement of end effect elimination in EMD method through the data extension on the basis of traditional mirror extension technique coupled with the function regression method of support vector machine (SVM).

In the paper "A fuzzy control model based on BP neural network arithmetic for optimal control of smart city facilities", designed a fully networked fuzzy controller based on BP neural network arithmetic, so that the realization process of fuzzy reasoning is networked and clear.

This paper "GPU-based parallel optimization for real-time scale-invariant feature transform in binocular visual registration", in order to be effective for image matching process in near real-time, the Compute Unified Device Architecture (CUDA) application programming interface of a graphics processing unit (GPU) is incorporated to speed up or improve the SIFT method. Experimental results show that the proposed GPU-based SIFT framework is suitable for image application in real time. It can improve the image matching process both in time and accuracy compared with conventional SIFT method.

The paper "E-government recommendation algorithm based on probabilistic semantic cluster analysis in combination of improved collaborative filtering in big-data environment of government affairs", proposed a personalized e-government recommendation algorithm combining probabilistic semantic cluster analysis and collaborative filtering.

In the paper "Gesture recognition algorithm based on image information fusion in virtual reality", a gesture recognition algorithm based on image information fusion in virtual reality is proposed. The results show that the proposed multi-sensor information fusion model in the interactive virtual environment achieves the highest recognition success rate of 96.17% and is better than several comparison machine learning methods in recognition time.

In the paper "Feature recognition of motor imaging EEG signals based on deep learning", designs the acquisition experiment of EEG signals. After removing the anomalous samples, the wavelet-reconstruction method is used to extract the specific frequency band of the motion imaging EEG signal. According to the characteristics of motor imagery EEG signals, the feature recognition algorithm of convolutional neural networks is discussed.

In the paper "Dynamic social privacy protection based on graph mode partition in complex social network", dynamic social privacy protection based on graph pattern partitioning is designed to satisfy differential privacy protection.

In the paper "A novel speech emotion recognition algorithm based on wavelet kernel sparse classifier in stacked deep auto-encoder model", a novel speech emotion recognition algorithm based on improved stacked kernel sparse deep model is proposed. The experimental results show that the proposed algorithm outperforms the existing state-of-the-art algorithms in speech emotion recognition.

In the paper "Facial expression recognition method based on deep convolutional neural network combined with improved LBP features", Aiming at the disadvantages of the traditional machine-based facial expression recognition method that eliminates the feature of manual selection, a feature extraction method based on deep convolutional neural network to learn expression features is proposed.

In the paper "A Security Risk Plan Search Assistant Decision Algorithm Using Deep Neural Network Combined with Two-stage Similarity Calculation", in view of the nonlinearity and uncertainty of safety accident risk assessment, firstly, based on the deep neural network, the training criterion of the network is changed, and the triplet convolutional neural network with the similarity measure as the cost function is proposed.

In the paper "Unsupervised emotion recognition algorithm based on improved deep belief model in combination with probabilistic linear discriminant analysis", a novel linear discriminant deep belief network is proposed. Firstly, the traditional linear discriminant analysis method is improved, and a new type of inter-class dispersion matrix is designed to solve the rank limitation problem in the traditional Linear Discriminant Analysis Method (LDA). Then, the weight matrix between the last hidden layer and the classification layer of the deep belief network is initialized by the improved linear discriminant analysis method, so that the network is more suitable for the classification task.

In the paper "Fog Computing Perception Mechanism Based on Throughput Rate Constraint in Intelligent Internet of Things", a fog computing perception mechanism based on throughput rate constraint is proposed. According to the results of theoretical analysis and simulation, the model has the characteristics of reliable node perception data and flexible expansion, and can effectively improve the reliability of the data source of the Internet of Things.

In the paper "Fault diagnosis of multi-state gas monitoring network based on fuzzy Bayesian net", a fuzzy Bayesian network (BN) is used to deal with the polymorphic fault tree.

The paper "Research on reliability of Internet of Things RFID based on improved random hash protocol and cooperative game in low-carbon supply chain environment", proposes an improved random hash protocol and assistant game-based RFID credibility of Internet of Things.

The paper "Regularized Extreme Learning Machine-based Intelligent Adaptive Control for Uncertain Nonlinear Systems in Networked Control Systems", proposed an improved networked control method based on regularized extreme learning machine for a class of nonlinear systems.

The paper "A Human Pose Estimation Algorithm Based on the Integration of Improved Convolutional Neural Networks and Multi-level Graph Structure Constrained Model", introduces a novel convolutional feature for the task of human pose estimation, which is a framework of fusing a convolutional neural network into a multilevel graph structure model so as to improve the pose estimation results from body part detection and human spatial structure.

The paper "Data collection scheme with minimum cost and location of emotional recognition edge devices", designs an adaptive Kth average device clustering algorithm for migration perception, and define a sub-modulus weight function, which minimizes the sum of the weights of the subsets covered by a cover to achieve high-precision device positioning.

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