

Guest Editorial Preface

Special Issue on Advanced Learning Techniques for Human and Technology Interaction

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Along with fast development of Internet/Cloud/Mobile computing, social network, data mining, etc., the interaction of technology and humans has become ubiquitous and is evolving to new ways. But the theories that would allow us to understand the challenges of the new communication modalities and interfaces are still to be developed. In this special issue, we try to give a new view on these developments, focusing on the learning techniques between interaction of technology and humans. Concretely, this special issue includes intelligent mobile application based on third-party cloud, advanced brain computer interface technology on Common Spatial Patterns algorithm and Wavelet Packet Analysis algorithm for EEG feature extraction, formation transformation based on Leader-Follower algorithm for human behavior-based control, bidirectional GRU-CRF and CNN network model for Chinese word segmentation learning, and learning framework for target detection and human face recognition. The papers in this special issue are arranged as follows:

Ye et al. in the first paper: *Talking Avatar: An Intelligent Mobile Application Based on Third-Party Cloud Services* propose a learning architecture based on third-party cloud services named Talking Avatar, which is a typical intelligent mobile application. Firstly, the authors propose a cloud service based multi-level layered software framework, which consists of user interface layer, business logic layer and data layer. Secondly, human face synthesis, speech conversion and social sharing schemes are introduced to integrate third-party cloud services. Experimental results on Android platforms indicate that the proposed Talking Avatar can serve efficiently in terms of memory consumption as well as average response time. In addition, stronger functions are provided compared with existing methods.

The second paper by Wang et al.: *Learning Advanced Brain Computer Interface Technology: Comparing CSP Algorithm and WPA Algorithm for EEG Feature Extraction*, presents an analysis of feature extraction methods including Common Spatial Patterns (CSP) and Wavelet Packet Analysis (WPA) for learning advanced brain computer interface technology. For the EEG data provided by Graz University, the accuracy rate of feature extraction using CSP algorithm is 85.5%, and the accuracy rate of feature extraction using wavelet packet analysis is 92%. Then, the paper analyses the EEG data collected by Emotiv epoc+ system. The classification accuracy of wavelet packet extracted features can still be maintained at more than 80%, while the classification accuracy of CSP extracted feature is decreased obviously. Experimental results show that the method of wavelet packet analysis towards competition data and Emotiv epoc+ system data can both get a satisfactory outcome.

In the third paper, *Formation Transformation Based on Leader-Follower Algorithm*, Duan et al. design a method based on the leader-follower algorithm for transformation among the formations. The introduction of the greedy algorithm, behavior-based control and virtual structure help realising the region division and the calculation of the distribution of the leaders and followers in target formation. Collision detection and collision avoidance are proposed to solve path conflicts with error free feedback and effectively maintain the stability of motion. The modeling of transformation is simulated by the shape from a line to a wedged, in which the formation is adjusted by the distance difference obtained by feedback. The experimental results show that it is feasible and effective to implement the formation conversion and formation control, and the system possesses a better robustness and stability.

Yu et al. in the fourth paper, *Learning Chinese Word Segmentation Based on Bidirectional GRU-CRF and CNN Network Model*, focuses on Chinese word segmentation based on advanced deep learning framework. The paper presents a CNN-Bidirectional GRU CRF neural network model, which truly realizes end-to-end processing and applies to the neural network model by the five-tag set method, bias-variable weight greedy strategy and supplements by Goldstein-Armijo guidelines. Besides, this model, with simple structure, is easy to be operated. And, it can automatically learn features, reduces large amounts of tasks on specific knowledge in the form of handcrafted features and data pre-processing, makes use of context information effectively. They set an experiment with two data corpuses for Chinese word segmentation to evaluate the system. The experiment verified the new model can obtain better Chinese word segmentation results and greatly reduce training time.

The fifth paper: *A learning framework for target detection and human face recognition in real time*, by Huang et al. discuss the topic of learning framework for target detection and human face recognition. Inspired by the functioning, mechanism and efficiency of the visual nerve system of human beings, a revolutionary detection and reorganization method named YOLO is presented to provide an accurate, stable and fast arithmetic for a variety of targets, be it target detection for unmanned vehicle, car license recognition and optimization for surveillance. The traditional method for object detection is to reuse the classifier to implement detection; in contrast, the method named YOLOV2 approaches this problem by considering it in the mathematical area as a regression of spatially discrete bordered areas and relative class probability. In the paper, the authors provide a new method to further improve the performance of YOLOV2 by utilizing the accurate, stable and fast properties of YOLOV2 and editing the original code of YOLOV2 to eliminate the inaccuracy of tiny object detection, and implement this method on an embedded system.

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