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## EDITORIAL

# IEEE ACCESS SPECIAL SECTION EDITORIAL: URBAN COMPUTING AND INTELLIGENCE

Urban computing utilizes unobtrusive and ubiquitous sensing technologies, advanced data management and analytics models, and novel visualization methods to create win-win solutions which intelligently improve people's lives, urban environments, and city operation systems. With the help of cloud computing, the Internet of Things, device-to-device (D2D) communication, artificial intelligence (AI), big data, and urban computing and intelligence will bridge the gap of ubiquitous sensing, intelligent computing, cooperative communication, and mass data management technologies, to create novel solutions that improve urban environments, human life quality, and smart city systems. Thus, urban computing and intelligence has recently attracted significant attention from industry and academia for building smart cities.

It is obvious that urban computing and intelligence will enable and promote a large class of applications, and has emerged with a great potential to change our lives and improve user experience. As the urban size increases, total costs and resource consumption, performance will decrease and the security of the systems will face serious threats. Recent advances in artificial intelligence (AI), cloud/fog/edge computing, big data, and novel communication techniques show that urban computing and intelligence still struggles with fundamental, long-standing problems. How to enhance distributed computing and processing performance with distributed machine learning (ML), common sense, intelligent interaction, data security, and novel applications is worth exploring.

This Special Section aims to report high-quality research on recent advances toward the realization of artificial intelligence models, intelligent networking, heterogeneous data analytics, urban sensing and energy management, and so on, to cope with challenges in the real world. This Special Section has provided a platform for researchers and practitioners from both academia and industry in the area of urban computing and intelligence.

In the article "CAD: Command-level anomaly detection for vehicle-road collaborative charging network," by Li *et al.*, the authors discuss charging piles installed on roadside parking spaces and smart poles on the roadside of the internet electric vehicles. A command-level anomaly detection (CAD) method is proposed for a vehicle-road collaborative

charging network, which analyzes the protocol for the specification format and business command characteristics.

The article "Knowledge reused outlier detection," by Yu *et al.*, considers transferring knowledge from the labeled source data to facilitate unsupervised outlier detection on a target data set. To fully make use of the source knowledge, the categorical utility function is employed to regularize the partitions of the target data to be consistent with the source data labels. Four real-world datasets and eight outlier detection methods are evaluated to show the effectiveness of the proposed scheme.

In the article "AHE detection with a hybrid intelligence model in smart healthcare," by Xiao *et al.*, a novel methodology combining with deep network and multiple-gene expression programming is presented to predict acute hypotensive episodes (AHE) automatically, which improves the efficiency of prevention and lightens the burden of diagnosis for ICU doctors. The experimental data are obtained from multi-intelligent monitoring in intensive care.

In the article "Two-sided matching for triangular intuitionistic fuzzy numbers in smart environmental protection," by Yue *et al.*, the two-sided matching problem with triangular intuitionistic fuzzy numbers (TIFNs) is investigated. A similarity measure between generalized triangular fuzzy numbers (TFNs) is presented. A novel similarity measure between TIFNs is extended, where the maximum membership degrees and minimum non-membership degrees, areas, and perimeters are considered. A matching example in smart environmental protection is provided to illustrate the advantages of the proposed method.

The article "A survey of big data analytics for smart forestry," by Zou *et al.*, explores forestry big data analysis and processing problem, which reviews the history of the emergence and development of forestry big data, and summarizes the opportunities brought to the forestry by big data technology. One of the most important tasks of forestry big data is to organize the massive data reasonably and effectively and to calculate quickly. A five-layer architecture model of forestry big data is proposed with data storage, query, analysis, and application. Finally, the challenges of forestry big data are analyzed, and the trend of future development has prospected from three aspects.

The article “Towards attack and defense views of rational delegation of computation,” by Tian *et al.*, studies the rational delegation of computation and the security attack–defense from attack and defense. Combining with the concept of average mutual information in information theory, this article presents the attack and defense model for rationally delegating the computation, which converts the attack or defense of rationally delegated computation into communication problems in information theory, and constructs the attack channel and defense channel for the client and the calculator, respectively. The numerical analysis of experiments demonstrates that the optimal strategy of attack and defense is the strategy when the game between client and calculator reaches the equilibrium point.

In the article “A decision tree-based road recognition approach using roadside fixed 3D LiDAR sensors,” by Zheng *et al.*, a decision tree-based road recognition algorithm is proposed using road side fixed light detection and ranging (LiDAR) sensors in the road traffic monitoring system (RTMS). A minimum circumscribed rectangle algorithm is employed to obtain accurate road boundaries. The experiment results show the effectiveness of the proposed method.

The article “Anomaly detection approach for urban sensing based on credibility and time-series analysis optimization model,” by Zhang and Li, proposes an anomaly detection method for urban sensing based on sequential data and credibility. First, based on Bayesian methods, a reputation model is established for the selection of credible sample points. Second, the pivot quantity is defined by using the median of the credible sample, and the confidence interval can be estimated to quantify the deviation degree of the sensor data. Finally, an anomaly data identification and source verification approach is proposed to distinguish errors and events accurately.

In the article “An sand plug of fracturing intelligent early warning model embedded in remote monitoring system,” by Liang *et al.*, an early-warning method of the sand plug of fracturing is proposed based on data mining. An early warning model of double logarithmic curve sand plug of fracturing is established, and the time series analysis algorithm is used to predict the oil pressure. Then, the general regression neural network (GRNN) algorithm is designed to optimize the prediction results of the time domain analysis.

In the article “A fast algorithm for community detection of network systems in smart city,” by Liu and Xie, a novel algorithm is designed to detect the community structure of network systems based on the biogeography-based optimization (BBO) algorithm and the Newman, Moore, and Watts (NMW) small-world network. With the help of small-world network information sharing, the convergence speed of the BBO algorithm has been greatly improved. Numeric simulations are also employed to demonstrate the accuracy and robustness of the proposed algorithm.

The article “A travelling salesman problem with carbon emission reduction in the last mile delivery,” by Jiang *et al.*, proposes a traveling salesman problem with carbon emission

reduction in last-mile delivery, which reduces the total costs and carbon emissions of last-mile delivery by deciding on the allocation of parcel lockers while scheduling delivery routes. In addition, the customer self-collection intention is considered and translated into self-collection costs. An iterated local search (ILS) algorithm is proposed, and four new local search operators are designed to improve customer allocation.

The article “Prediction of network traffic of smart cities based on DE-BP neural network,” by Pan *et al.*, proposes a differential evolution back propagation (DE-BP) neural network traffic prediction model for smart cities, which takes the impact factor of network traffic as the input layer, the network traffic as the output layer, and trains the DE-BP network with the past traffic data so as to obtain the mapping relationship between the impact factor and the network traffic and get the predicted value of the network traffic.

In the article “Intelligent human–computer interaction based on surface EMG gesture recognition,” by Qi *et al.*, linear discriminant analysis (LDA) and extreme learning machine (ELM) are implemented in a hand gesture recognition system, which is able to reduce the redundant information in sEMG signals and improve recognition efficiency and accuracy. The characteristic map slope (CMS) is extracted by using the feature re-extraction method because CMS can strengthen the relationship of features cross time domain and enhance the feasibility of cross-time identification.

The article “A stacked multi-granularity convolution denoising auto-encoder,” by Yang *et al.*, proposes an unsupervised image feature extraction method that is referred to as a stacked multigranularity convolution denoising auto-encoder (SMGCDAE). The algorithm is based on a convolutional neural network (CNN) with multigranularity kernel, which considers issues with image unicity by extracting a diverse category of high-level features. In addition, the denoising auto-encoder ensures stability and improves the classification accuracy by extracting more robust features.

The article “Comparative analysis of machine learning techniques for predicting air quality in smart cities,” by Ameer *et al.*, performs pollution prediction using four advanced regression techniques and presents a comparative study to determine the best model for accurately predicting air quality with reference to data size and processing time. Furthermore, the processing time of each technique through standalone learning and through fitting the hyperparameter tuning on Apache Spark has also been calculated to find the best-fit model in terms of processing time and lowest error rate.

The article “A survey of energy management in interconnected multi-microgrids,” by Zou *et al.*, provides an overview of the current energy management systems (EMS) in interconnected multi-microgrids (IMMGs), focusing on the IMMG structure, EMS objectives, timescales, and scheduling optimization structure. A review of the distributed optimization algorithms in IMMGs is also presented.

In the article “A large-scale urban vehicular network framework for IoT in smart cities,” by Li *et al.*, an urban

vehicle network called location-based urban vehicle network (LUV) is proposed to perform non-realtime data gathering tasks in smart cities. Unlike most work on in-vehicle networks, the empirical research on the real-life 8900 private cars trace data in Changsha, China, compelled the authors to focus on parked vehicles and parking places, rather than on moving cars and urban roads. The location-based mechanism not only provides more reliable and predictable wireless connections but also dramatically simplifies the system topology.

The article “Discovery strategy and method for remanufacturing service demand using situational semantic network,” by Wang *et al.*, presents an edge computing-based dynamic demand discovery and acquisition strategy. A potential demand discovery method based on a situational semantic network also is proposed. Finally, an application example is performed to verify the correctness and practicability of the remanufacturing service demand discovery strategy.

In the article “A distributed intelligent Hungarian algorithm for workload balance in sensor-cloud systems based on urban fog computing,” by Liang *et al.*, a distributed intelligent algorithm based on the Hungarian method is proposed. First, each fog node collects the information connected with its neighboring fog nodes that are located within its transmission range. Then, a new genetic algorithm is designed to find an approximate optimization solution. Finally, each fog node decides if it should forward parts of its workload to other fog nodes so that the workloads of all fog nodes are balanced.

In the article “Optimizing node localization in wireless sensor networks based on received signal strength indicator,” by Wang, an equal-arc trilateral localization algorithm based on received signal strength indicator (RSSI) is proposed from the perspective of increasing measurement precision and bettering beacon nodes layout, which adopts Kalman filter to filter the data collected from the best communication range; thus, the disturbance problem of RSSI value can be tackled easily. An equal-arc triangular beacon node layout model is established to ensure that the motion tracks of unknown nodes are always situated within an optimal communication distance to improve the measurement precision.

The article “Towards disaster resilient smart cities: Can Internet of Things and big data analytics be the game changers?” by Shah *et al.*, proposes and discusses the novel reference architecture and philosophy of disaster-resilient smart cities (DRSC) through the integration of the Internet of Things (IoT) and big data analytics (BDA) technologies. The proposed architecture offers a generic solution for disaster management activities in smart city incentives. A combination of the Hadoop Ecosystem and Spark are reviewed to develop an efficient DRSC environment that supports both real-time and offline analysis. Moreover, the key challenges faced are identified and briefly discussed.

The article “A cascade learning approach for automated detection of locomotive speed sensor using imbalanced data in ITS,” by Li *et al.*, presents an approach for the automatic detection of the locomotive speed sensor equipment.

A cascade learning framework is proposed, which includes two learning stages: target localization and speed sensor detection, to reduce the complexity of the research object and solve the imbalance of samples. The experimental results demonstrate that the proposed approach is effective and robust with respect to changes in speed sensor patterns for robust equipment identification.

The article “Enhanced bacterial foraging optimization based on progressive exploitation toward local optimum and adaptive raid,” by Wang *et al.*, proposes an improved foraging optimization algorithm, bacterial foraging optimization (BFO), using the strategies of progressive exploitation approximating local optimum and adaptive raid (BFO-DX). The strategy of progressive exploration approximating local optimum (PELO) is introduced into BFO to enhance its ability of exploitation in a local space, which enables the algorithm to find the global optima better. The strategy of the adaptive raid for the leader (ARL) is adopted to boost the speed of convergence by strengthening its exploration capacity.

In the article “A dual-band microwave filter design for modern wireless communication systems,” by Xu *et al.*, a dual-band microwave filter is designed and fabricated based on the theory of Mie-resonance extraordinary transmission. By adding two dielectric cuboids of different sizes into the two apertures, two pass bands appear in the frequency range of 10.0–12.0 GHz, which provides a way for designing a tunable dual-band microwave bandpass filter.

The article “Utilizing artificial neural network in GPS-equipped probe vehicles data-based travel time estimation,” by Xu *et al.*, presents a machine learning enabled travel time estimation method based on the GPS-equipped probe vehicles data, which considers the spatial-temporal relevancy while solving the travel time allocation problem. The travel time of a target segment might be associated with its previous travel times and/or the traffic states of nearby relevant segments. An artificial neural network (ANN) algorithm is conducted to infer the travel time distribution among the traveled segments within one path.

The article “Consensus of multi-agent systems with piecewise continuous time-varying topology,” by Yuan and Han, studies the consensus of multi-agent systems with piecewise continuous time-varying topology. The agents are assumed to have identical first-order linear dynamics, which their underlying communication topology is piecewise continuous time-varying. In the case of undirected time-varying communication topology, the consensus of the multi-agent system depends on the connectivity of its limit topology, and the states of all agents converge to the mean of their initial states.

The article “Particle filter-based prediction for anomaly detection in automatic surveillance,” by Gao *et al.*, proposes a particle filter-based algorithm to extract feature series from videos when abnormal events occur, which consists of feature series generation and particle filter tracking. To represent the features of a video, an L2-norm extractor is designed based on the optical flow. Then, the particle filter keeps track of these

feature series. The occurrence of abnormal events will cause the shift of feature series and a large error in PF tracking.

In the article “A new message authentication scheme for multiple devices in intelligent connected vehicles based on edge computing,” by Zhong *et al.*, a message authentication scheme is proposed for multiple mobile devices in intelligent connected vehicles based on edge computing. The task of processing data in the vehicle is migrated to mobile devices, and tasks are executed utilizing the computing resources of multiple mobile devices in the edge computing model. The results of performance analysis indicate the proposed scheme has high efficiency and applicability in practical intelligent connected vehicles system.

The article “Potential of urban land use by autonomous vehicles: Analyzing land use potential in Seoul capital area of Korea,” by Kang and Kim, simulates land use changes at a point in time when autonomous vehicles are widespread, which seeks to suggest specific models of land use change when autonomous vehicles are dominant through the cellular automata method. Simulations based on the scenarios presented in this article by Heinrichs show some representative results.

The article “Effect of event-based sensing on IoT node power efficiency. Case study: Air quality monitoring in smart cities,” by Santos *et al.*, analyzes how event-based sampling techniques can address two challenges in smart cities. In order to quantify the energy savings, the increase achieved in the average lifetime of sensor node batteries is evaluated. The data provided by Smart City tools in the city of Santander (Spain) are selected to conduct a case study of the main pollutants that determine city air quality.

The article “Improvement of maximum variance weight partitioning particle filter in urban computing and intelligence,” by Huang *et al.*, proposes an optimized particle filter using the maximum variance weight segmentation resampling algorithm to overcome the shortcomings of the resampling algorithm in the traditional particle filter. Experimental results show that the proposed scheme outperforms in terms of computational consumption and the accuracy of particle tracking.

The article “Research on intelligence computing models of fine-grained opinion mining in online reviews,” by Yu *et al.*, presents a fine-grained topic sentiment unification (FG-TSU) model based on the improvement of LDA (Latent Dirichlet Allocation) model, to obtain evaluation information about the various aspects of products or services. The sliding window is introduced to lower co-occurrence information from document to sentence level and to implement fine-grained extraction of local topics. The indicator variables are used to distinguish aspects and opinions.

In the article “Learning bias-free representation for large-scale person re-identification,” by Xu and Zhu, the authors propose that the misalignment scenarios in person re-identification (re-ID) can be divided into three basic types. To address these specific misalignment problems, three subnetworks are designed to correct the corresponding

misalignments and discuss the performance gains. Moreover, by integrating all subnetworks into one unified structure, a bias-free representation learning method is proposed. Systematic visualizations and comparisons are conducted to demonstrate the effectiveness of the proposed method.

The article “Improved online sequential extreme learning machine: A new intelligent evaluation method for AZ-style algorithms,” by Li *et al.*, proposes an improved online sequential extreme learning machine (IOS-ELM) to evaluate chess board positions for AlphaZero style (AZ-style) algorithms, which considers Gomoku as the application object and uses IOS-ELM as the evaluation method for AZ-style's board positions to discuss the loss in the training process and hyperparameters affecting performance in detail.

The article “The asynchronous training algorithm based on sampling and mean fusion for distributed RNN,” by Niu *et al.*, proposes an asynchronous training algorithm based on sampling and mean fusion for distributed recurrent neural network (RNN). In distributed RNN, multiple distributed neuron nodes and an interaction node work together to implement the training. The synchronization overhead is reduced by a unique asynchronous sampling strategy amongst the distributed neuron nodes. In order to make up for the accuracy loss caused by the asynchronous parameter update, a mean fusion algorithm is proposed. Experimental verification is performed on two language modeling benchmark datasets.

The article “A self-adaptive process mining algorithm based on information entropy to deal with uncertain data,” by Li *et al.*, presents an algorithm framework for adaptively removing uncertain data to improve correlation measures in heuristic mining to build a correlation matrix based on an improved frequency matrix. Combined with the maximum entropy principle, a self-adaptive method to determine the threshold is given, which is used to remove the uncertain data relationship in the logs.

The article “Investigation of the relationships and effects of urban transformation parameters for risky structures: A rapid assessment model,” by Akyol and Gulbandilar, investigates the causal relationships between the parameters used in risk assessment of the individual masonry structures undergoing transformation, which expresses the cause-effect relationship between two variables and shows that the independent variable has a direct or indirect effect on the dependent variable. The results of statistical analysis and theory should be considered concurrently in building a causal relationship model.

The article “Wideband power spectrum estimation based on sub-Nyquist sampling in cognitive radio networks,” by Zhao *et al.*, proposes a sub-Nyquist sampling system based on the analog to information converter (AIC), which is constructed by multiple parallel channels with banks of low pass filters. To estimate the power spectrum, a new power spectrum of samples with a finite length called the circular power spectrum (CPS) is defined, which can clearly reflect the power of the signal varying with frequency and is also with the same length as the equivalent digital samples.

The article “Trustworthiness of context-aware urban pollution data in mobile crowd sensing,” by Zappatore *et al.*, focuses on the development of an algorithm that exploits context awareness to improve the reliability of mobile crowd sensing (MCS) collected data. Contextualizing monitored data with those coming from phone-embedded sensors and from time/space proximity can improve data trustworthiness. It has been validated against some real use cases for noise pollution and promises to improve the trustworthiness of end users’ generated data.

The article “A novel online dynamic temporal context neural network framework for the prediction of road traffic flow,” by Bartlett *et al.*, investigates different magnitudes of temporal patterns, such as short-term and long-term, through the use of different temporal data segments to understand how contextual temporal data can improve prediction. Furthermore, to learn temporal patterns dynamically, an online dynamic temporal context neural network framework is proposed, which uses different temporal data segments as input features. During online learning, the updating scheme dynamically determines how useful a temporal data segment is for prediction, and weights it accordingly for use in the regression model.

The article “An AI approach to collecting and analyzing human interactions with urban environments,” by Ferrara *et al.*, introduces a method whereby the objective sensor data is analyzed in real-time to scope down the test matrix of the subjective questionnaires. In turn, subjective responses are parsed through AI models to extract further objective information. The outcome is an interactive data analysis framework for urban environments. In the pilot study, each new entry (objective or subjective) is parsed through the AI engine to determine which action maximizes the information gain.

In the article “Intelligent data delivery approach for smart cities using road side units,” by Kulandaivel *et al.*, a technology-based routing structure is proposed. Road side units (RSUs) allow planners to deploy the application without unfamiliar tools for data process and gathering. Data forwarding, acquisition, and diffusion are simplified by RSU. K-nearest neighbor is used for finding the nearest neighbor nodes, and it is optimized using the whale optimization algorithm (WOA).

The article “Photovoltaic modules monitoring based on WSN with improved time synchronization,” by Sun *et al.*, proposes a time synchronization protocol with Gaussian delay model (TSP-GDM) to avoid clock skew in wireless sensor networks (WSN) for large-scale photovoltaic modules monitoring. Interdependence of local time stamps is established between network nodes according to a linear clock model. Local exchange and share of local time stamps in nodes are achieved by means of wireless transmission. The synchronization accuracy of the proposed method is verified with simulations.

The article “Energy-efficient joint resource allocation algorithms for MEC-enabled emotional computing in urban

communities,” by Yang *et al.*, considers a mobile edge computing (MEC) system, where the MEC server first collects data from emotion sensors and then computes the emotion of each user. In order to improve the energy efficiency of the system, resource allocation algorithms are proposed to minimize the total energy consumption of the MEC server and sensors by jointly optimizing the computing resources allocation and the data transmitting time.

The article “Research on target object recognition based on transfer-learning convolutional SAE in intelligent urban construction,” by Xie *et al.*, attempts to apply the deep neural network composed of sparse autoencoders based unsupervised feature learning to identify the various types of target objects. In order to improve the recognition speed, a feature weights selection method based on a correlation analysis is further proposed for the purpose of reducing the amount of global features.

The article “Multi-attribute crowdsourcing task assignment with stability and satisfactory,” by Xing *et al.*, proposes an intelligent multi-attribute crowdsourcing task assignment with stability and satisfactory (TASS), which can exploit the multi-attributes to solve the stability of the transaction, and adopt the game theory to maximize the satisfaction of both sides during the task assignment. The experimental results show that TASS is better than the state-of-the-art task assignment works in terms of truthfulness, individual rationality, stable and satisfactory assignment, and balanced budget.

The article “A SVM multi-class image classification method based on DE and KNN in smart city management,” by Shu and Cai, optimizes the structure of the support vector machine (SVM) classification tree with differential evolution (DE) and designs the corresponding DE algorithm to effectively solve the problem of image classification of complex background cases in smart city management systems. In the training process of SVM classification tree, it obtains an optimal two-class classification scheme in every node by means of DE. It initially separates the classes that are easily separated and then the less easy ones, and finally adaptively generates the best classification tree.

In the article “Pre-trained bidirectional temporal representation for crowd flows prediction in regular region,” by Duan *et al.*, crowd flows prediction in regular gridded regions are studied and a model called pre-trained bidirectional temporal representation (PBTR) is proposed based on a transformer encoder capable of modeling very long-term temporal dependency automatically, which can be combined with any other spatial component. Furthermore, crowd flows prediction based on PBTR (CPPBTR) is proposed to form a transformer-based encoder–decoder framework.

The article “Research on staged pricing model and simulation of intelligent urban transportation,” by Liu *et al.*, constructs a pricing model for scientifically setting the bus price for different customers in different stages by considering the personalized characteristics of passengers, their route path, and waiting time. Simulation results show that the devised

pricing model for the public bus could help the company increase profits and keep customers.

The article “An SDNFV-based DDoS defense technology for smart cities,” by Xu *et al.*, proposes a DDoS attack defense strategy based on traffic classification (DDTC) to improve the DDoS defense capability and enhance the security of data management in SDN-enabled smart cities. Software-defined network function virtualization (SDNFV) architecture and traffic classification strategy are adopted to improve the flexibility and reduce the load of SDN against DDoS attacks.

The article “An adaptive unsupervised learning framework for monocular depth estimation,” by Yang *et al.*, proposes an unsupervised method to infer scene structure. The model is trained with consecutive stereo images as input, while only a single image is required at test time. An adaptive loss function is presented to tackle the regions which are non-overlapping between consecutive images. Moreover, by exploiting the pixels’ discontinuity in the edge region and the continuity in the non-edge region of a depth image, a depth smoothness loss is introduced to improve the accuracy of the model.

The article “A privacy security risk analysis method for medical big data in urban computing,” by Jiang *et al.*, analyzes the risk of security and privacy leakage in the collection, transmission, storage, use, and sharing of medical big data, and establishes a medical big data security and privacy leakage risk indicator system with four primary indicators and 35 secondary indicators. In addition, the weight of each indicator is calculated by an entropy weight method.

The article “CAR: The clean air routing algorithm for path navigation with minimal PM2.5 exposure on the move,” by Mahajan *et al.*, proposes a clean air routing (CAR) algorithm to build a health-optimal route recommendation system between the origin and the destination. The open-source PM2.5 concentration data for Taiwan is combined with the road network graph obtained through Open Street Maps. In addition, spatio-temporal interpolation of PM2.5 is performed to get the PM2.5 concentrations for the road network intersections. The algorithm can help people reduce their overall PM2.5 exposure by offering a healthier alternative route, which may be slightly longer than the shortest path in some cases.

The article “Multi-mode social network clustering via non-negative tri-matrix factorization with cluster indicator similarity regularization,” by Ni *et al.*, proposes a flexible and robust clustering framework, MRTA based on non-negative tri-matrix factorization. MRTA achieves more consistent clustering results based on cluster indicator of inner-mode and intra-mode relationships of multi-mode networks. It can simultaneously cluster multiple modes and provide a multi-mode clustering solution that is more robust to noise.

The article “Urban commerce distribution analysis based on street view and deep learning,” by Ye *et al.*, focuses on sensing the commercial spaces in cities, and adopts deep learning to process the raw data of street view images. The road network coordinate information from the open street

map (OSM) website is obtained. A two-level learning strategy is used rather than directly using a deep convolutional neural network for classification. The experimental results show the effectiveness of the proposed scheme.

The article “Urban functional area division based on cell tower classification,” by Wu *et al.*, adopts the user, time, and location information extracted from open information dynamic data (OIDD) to analyze and divide urban functional areas for the purpose of understanding the regional composition of the city. Latent Dirichlet Allocation (LDA) model and incorporate time and space information are used, which allows for the model’s high-level analysis capabilities to exploit potential urban area functions through human mobility patterns.

In the article “Flooding level classification by gait analysis of smartphone sensor data,” by Panchal *et al.*, a new technique to detect flooding level is introduced, which requires no additional equipment or consequent installation and maintenance costs. The gait characteristics in different flooding levels have been captured by smartphone sensors, which are then used to classify flooding levels.

The article “Modeling and simulation of robot inverse dynamics using LSTM-based deep learning algorithm for smart cities and factories,” by Liu *et al.*, summarizes the influence of the hyper-parameter setting on model performance and explores the applicability of the LSTM model to joint torque prediction of multiple degrees of freedom series manipulator. Furthermore, the feasibility of using only joint position as input data for torque prediction is verified.

The article “A novel heuristic artificial neural network model for urban computing,” by Na *et al.*, proposes a method that uses ant colony optimization (ACO) to train the parameters and structure of the neural network, which also can optimize weights and thresholds to solve its defects. The model is useful in the optimization of urban operation and management.

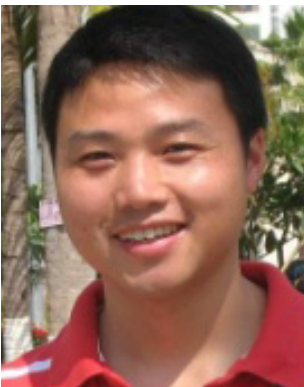
In the article “Research on urban land price assessment based on artificial neural network model,” by Cai *et al.*, an extraction method for land price features based on transfer learning is proposed in connection with defects such as the small total amount of residential land price data and unbalanced class distribution. Different land price assessment models are used to carry out a precision evaluation and explore the models and methods suitable for land price assessment. The extraction method for residential land price features is improved.

In the last article entitled “Why is short-time PM2.5 forecast difficult? The effects of sudden events,” by Liou *et al.*, the authors investigate the causes behind these sudden events. The PM2.5 data were obtained from monitoring devices deployed in Taichung as a part of the Airbox project. The data were fed into the current short-term forecast model to forecast air quality for the next hour. Event timing was detected by feeding the forecast result as an input to the sudden event detection model. With the application of hierarchy clustering,

the clustering result was analyzed to find the causes of sudden events.

In conclusion, we are thankful to all the research scholars who submitted their original articles to our Special Section. Along with this, we also appreciate the contributions and time spent by the respective reviewers for their constructive comments, recommendations, and suggestions. Furthermore, we also would like to acknowledge the cooperation of IEEE ACCESS editorial staff members, and the guidance from the Editor-in-Chief. Moreover, we hope that this Special Section on Urban Computing and Intelligence will contribute to the knowledge base and will benefit the research community at large.

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