Federated Data: Toward New Generation of Credible and Trustable Artificial Intelligence

WELCOME to the third issue of IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS (TCSS) this year.

Let us first share some exciting news. Thanks for the outstanding leadership and great effort of my predecessor, Prof. Fei-Yue Wang in the last four years. IEEE TCSS has made a great breakthrough in the influence, the number of submissions and published papers, and the total amount of pages published per year, and in April 2021, IEEE TCSS was added to the ISI Web of Science Sources Citation Index Expanded (SCIE) database, which can be regarded as an important milestone for IEEE TCSS moving toward the top international journal in the field of computational social systems. With increasing submissions in the volume, we plan to speed up the publishing frequency from bimonthly to monthly in the near future. We shall look forward to further improving IEEE TCSS's impact factor, ranking, and influence in the research community.

I am also grateful to report that, as of April 6, 2021, the *Citescore* of TCSS has leapfrogged to 6.0, a new high, which indicates the high quality and relevance of IEEE TCSS in the field of social computing and computational social systems research. Many thanks to all for your great effort and support.

After the usual introduction of our 21 regular articles, I would like to discuss the topic of federated data, which is proposed based on federated learning. As an important part of federated ecology, federated data works in a decentralized manner. It can not only protect the data security and privacy issues but also helps to build credible intelligence.

I. SCANNING THE ISSUE

1. "Seed Investment Bounds for Viral Marketing Under Generalized Diffusion and Selection Guidance" by *Arash Ghayoori and Rakesh Nagi*

This article provides a pessimistic expectation of the outcome of an investment decision in viral marketing to help capture some desired percentage of the market share with the desired level of confidence. A generalized diffusion model is introduced for social networks and is also analyzed under the assumption of having a distance-dependent random graph model as the underlying social network structure. Through this analysis, a lower bound was derived, and its accuracy is examined using simulation over both random and real-world networks. The results showed that the bound seems to be tight when dealing with random networks and real-world networks with a relatively low Kullback–Leibler divergence from the underlying Poisson degree distribution.

2. "An Ensemble of Heterogeneous Incremental Classifiers for Assisted Reproductive Technology Outcome Prediction" by *K. Ranjini, A. Suruliandi, and S. P. Raja*

This article proposes a dynamic model for assisted reproductive technology (ART) outcome prediction and validated it with several datasets and test options. The model is built by an ensemble of two incremental classifiers, namely the instance-based (IB1) learner and averaged one-dependence estimators (A1DEs) updatable learner through voting. The performance of the proposed model is checked with other ensemble models and ART datasets to find that the former shows promise in the ART outcome prediction.

3. "The Pandemic Holiday Blip in New York City" by *Maximilian Vierlboeck, Roshanak Rose Nilchiani, and Christine M. Edwards*

This article describes the development and framework of a simulation model to model and evaluate the progress of the COVID-19 pandemic. The model dynamically simulates the development and time-varying behavior of various key parameters of the pandemic and can simulate single events and scenarios that occur outside the development of conventional epidemics. It has the potential to reduce fear and uncertainty about the basic necessities and pillars of daily life at a time when many people are questioning the pandemic.

4. "A Spatiotemporal Recurrent Neural Network for Prediction of Atmospheric PM2.5: A Case Study of Beijing" by *Bo Liu, Shuo Yan, Jianqiang Li, Yong Li, Jianlei Lang, and Guangzhi Qu*

This article proposes a geographic self-organizing map (GeoSOM) spatiotemporal gated recurrent unit (GRU) model, which clusters all monitoring stations into several clusters according to geographic coordinates and time-series characteristics. For each cluster, the author builds a GRU model and uses the weight of the Gaussian vector to weight different models to predict the target sequence. The experimental results on actual air quality data in Beijing demonstrate the superiority of the proposed method.

5. "A Hybrid Probabilistic Multiobjective Evolutionary Algorithm for Commercial Recommendation Systems" by *Guoshuai Wei, Quanwang Wu, and MengChu Zhou*

This article establishes a commercial recommendation system (RS) model, including three indexes of accuracy, commodity profit, and novelty. Combining the accuracy of the product with the profit of the product, the objective function of the total expected profit is defined, which is used to improve

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the total profit of the RS supplier. Then, a hybrid probabilistic multiobjective evolutionary algorithm (HP-MOEA) is proposed to optimize the total expected profit and novelty. Through experiments, the HP-MOEA algorithm is compared with the most advanced recommendation algorithm at present, and the results show that this algorithm is superior to the same algorithm in terms of hypervolume and runtime.

6. "Steganalysis of Digital Images Using Deep Fractal Network" by *Brijesh Singh, Arijit Sur, and Pinaki Mitra*

This article proposes a new steganographic analysis scheme SFNet (steganalysis with fractal architecture). The proposed SFNet is an end-to-end network, which does not involve any preprocessing filters to expose stegography noise, but directly trains the embedded image. The fractal architecture of SFNet allows the network to maintain a balance between depth and width, resulting in more accurate detection performance. The SFNet was tested with easy to detect and hard-to-detect steganography algorithms, and compared with the most advanced steganalyzers. The results show that the SFNet is superior to the existing steganographic analysis schemes.

7. "Identifying and Analyzing Cryptocurrency Manipulations in Social Media" by *Mehrnoosh Mirtaheri, Sami Abu-El-Haija, Fred Morstatter, Greg Ver Steeg, and Aram Galstyan*

This article proposes a multimodal approach to monitor potentially malicious activities in cryptocurrency trading by combining data from three distinct sources: real-time market data on cryptocurrency trading, Twitter data of cash tag mentions for cryptocurrencies, and telegram data that contains potential mentions of and instructions for pump and dump activities. The result shows that given financial and Twitter data pertaining to a particular coin, the method can detect, with reasonable accuracy, whether there is an unfolding attack on that coin on Telegram and whether or not the resulting pump operation will succeed in terms of meeting the anticipated price targets. It also analyzes the activities of users involved in pump operations and observes a prevalence of Twitter bots in cryptocurrency-related tweets in close proximity to the attack.

8. "Smoothing Adversarial Training for GNN" by *Jinyin Chen, Xiang Lin, Hui Xiong, Yangyang Wu, Haibin Zheng, and Qi Xuan*

This article proposes a novel smoothing adversarial training (SAT) method that utilizes adversarial training and smoothing strategies to improve the robustness of graph neural network (GNN) models. The method consists of three strategies, including adversarial training, distillation, and smoothing loss function and only focus on evasion attacks on graph structures. Considering two adversarial training strategies: Global-AT and Target-AT to enhance the defensive capability of the two-layer GCN model. The proposed distillation model consists of two modules: 1) the soft classification module for labeling the unlabeled modes set and 2) the soft labels of the data to train the classifier. In gradient smoothing, the distillation architecture can reduce the amplitude to make the gradient-based attacks ineffective. The result shows that the SAT performs good defensibility against different attack methods in each real-world dataset.

9. "WiONE: One-Shot Learning for Environment-Robust Device-Free User Authentication via Commodity Wi-Fi in Man–Machine System" by *Yu Gu, Huan Yan, Mianxiong Dong, Meng Wang, Xiang Zhang, Zhi Liu, and Fuji Ren*

The article proposes WiONE, a safe and privacy-preserving user authentication system leveraging the ubiquitous Wi-Fi infrastructure by exploring "how you behave," rather than "who you are" directly. It applies deep learning to user's physical behavior captured by Wi-Fi channel state information to identify legitimate users while rejecting spoofers. It also introduces a behavior enhancement model based on the Rician fading to highlight the behavior-induced information. The numerous comparative experiments demonstrate that WiONE can accurately authenticate users and detect spoofers.

10. "ReMEMBeR: Ranking Metric Embedding-Based Multicontextual Behavior Profiling for Online Banking Fraud Detection" by *Jipeng Cui, Chungang Yan, and Cheng Wang*

This article proposes a ranking metric embedding-based multicontextual behavior profiling (ReMEMBeR) model. In order to obtain a uniform treatment of heterogeneous attributes, they turn to an embedding-based method to learn both attribute embedding and individuals' behavior profiles within a common latent space simultaneously. To utilize the label information better, their model is designed to fit pseudo-users' correct preference ranking for pseudo-items. The proposed model can integrate the multi-contextual behavior patterns and allow transactions to be examined under different contexts. The experimental results show that the proposed model outperforms benchmarks on all metrics.

11. "Predicting Stance Polarity and Intensity in Cyber Argumentation With Deep Bidirectional Transformers" by *Joseph W. Sirrianni, Xiaoqing Liu, and Douglas Adams*

This article proposes a cyber argumentation platform to collect an empirical dataset with explicitly labeled stance polarity and intensity relationships. Six models are established and trained on the empirical dataset. The results demonstrate that the proposed method of encoding the stance polarity and intensity labels allows the models to predict stance polarity and intensity without compromising their accuracy for stance detection, making these models more versatile.

12. "Solving Last-Mile Logistics Problem in Spatiotemporal Crowdsourcing via Role Awareness With Adaptive Clustering" by *Baoying Huang, Haibin Zhu, Dongning Liu, Naiqi Wu, Yan Qiao, and Qian Jiang*

This article formalizes the last-mile logistics problem (LMAP) for fresh produce via the group role assignment framework and proposes a role awareness method by using adaptive clustering in spatiotemporal crowdsourcing based on task granularity. The formalization of LMAP makes it easy to find a solution using the IBM ILOG CPLEX optimization package (CPLEX). It is verified by simulation experiments, and the experimental results demonstrate the practicability of the proposed solutions.

13. "Financial Advisor Recruitment: A Smart Crowdsourcing-Assisted Approach" by *Raby Hamadi, Hakim Ghazzai, Hichem Besbes, and Yehia Massoud*

This article proposes an automated crowdsourcing system to organize cooperation between financial advisors and investors. An unsupervised technique is used in the crowdsourcing platform's database to regroup highly similar consultants into clusters to narrow the search space. machine learning (ML) is employed to predict the expected score of a matching resulting from a combination of an investor and a financial advisor based on their profiles and previous activities. Preliminary results suggest that, without interacting with the advisers' work strategies, the framework can improve competitiveness among advisors, thereby improving service quality and client benefits.

14. "Bottom–Up Modeling of Design Knowledge Evolution: Application to Circuit Design Community Characterization" by *Xiaowei Liu, Alex Doboli, and Simona Doboli*

This article proposes a new computational model and the related algorithmic methods to characterize circuit design communities over time. The model defines the criterion of knowledge evolution continuation and identifies four mechanisms to maximize the possibility of knowledge evolution continuation. These four criteria are described by specific attributes about diversity, cardinality, specific roles in the community, expected return, and expected usefulness. The bottom–up model explains knowledge evolution using two operators, combination/improvement for knowledge expansion, and blocking for concept elimination. New metrics are proposed to describe the effect of the two operators. Experiments consider three large datasets of circuit designs, and the results conceptually confirmed the model.

15. "Community Hiding by Link Perturbation in Social Networks" by *Xianyu Chen, Zhongyuan Jiang, Hui Li, Jianfeng Ma, and Philip S. Yu*

This article studies the community hiding problem, which aims to properly hide a target community into other communities by perturbing a budget-limited number of social links. The community hiding problem is formalized and a gain function is designed. By proving the feasibility of link perturbation operations, an efficient algorithm to solve the community hiding problem is proposed. In order to evaluate the community hiding algorithm, the H-score evaluation method is adopted. Extensive experiments are conducted on varieties of real social networks, and the results demonstrate that the proposed algorithm is more efficient than other community deception algorithms.

16. "A Theoretically Guaranteed Approach to Efficiently Block the Influence of Misinformation in Social Networks" by *Mohammad Ali Manouchehri, Mohammad Sadegh Helfroush, and Habibollah Danyali*

This article proposes a two-step method called influence blocking maximization using martingale (IBMM) to solve the influence blocking maximization (IBM) problem under the competitive independent cascade model (ICM). The number of required samples is calculated using a set of estimation techniques based on the martingale, and then the samples and find top-k savior nodes are generated. Extensive experiments are conducted on three real-world datasets and three rumor sets with different behaviors. The results show that the effectiveness of IBMM is close to greedy and IBMM is very fast.

17. "A Nonlinear Feature Fusion-Based Rating Prediction Algorithm in Heterogeneous Network" by *Lei Yi, Shujuan Ji, Lingmei Ren, Rui Su, and Yongquan Liang*

This article proposes a nonlinear feature fusion-based rating prediction algorithm in heterogeneous networks. It uses a meta-path-based HIN embedding model to extract the nodes' structural features, and the structural features are converted by a nonlinear fusion method. The fused features are input into the multilayer perceptron to achieve rating prediction. Experiments on real-life datasets, such as Movielens-100k, Yelp, Douban Book, and Douban Movie, are designed to prove the performance of the proposed model. Experimental results on the four datasets reveal that the algorithm is superior to the baselines.

18. "Social Signal-Driven Knowledge Automation: A Focus on Social Transportation" by *Hao Lu, Yifan Zhu, Yong Yuan, Weichao Gong, Juanjuan Li, Kaize Shi, Yisheng Lv, Zhendong Niu, and Fei-Yue Wang*

This article introduces a novel knowledge automation framework for multisource heterogeneous social signals, and the corresponding workflow, models, and application scenarios are also reviewed and concluded. The current challenges and future work of knowledge automation in ITS are discussed. They also propose a prospect that cyber–physical–social system (CPSS)-based knowledge automation will further benefit from integrating broader social signals and physical signals, leveraging emerging technologies, such as state-of-the-art deep learning methods, and building decentralized and trustful knowledge automation on the blockchain. Further improvement in the traffic knowledge automation theory and methods will greatly support the construction of parallel transportation or transportation 5.0 systems.

19. "Complicating the Social Networks for Better Storytelling: An Empirical Study of Chinese Historical Text and Novel" by *Chenhan Zhang, Qingpeng Zhang, Shui Yu, James J. Q. Yu, and Xiaozhuang Song*

The article proposed a text-mining algorithm to extract the social networks in the narratives. A regular expression is used to eliminate noisy text, and a character-oriented corpus for the character extraction task is independently built. Then develop a GUI-labeling tool based on Jupyter Notebook to accurately locate the speaker in each context and introduce a data augmentation approach to generate a sufficient number of new annotated data. The case studies show that the historical novel complicates the social networks of characters to enrich the literariness of the story.

20. "Continuous Profit Maximization: A Study of Unconstrained Dr-Submodular Maximization" by *Jianxiong Guo and Weili Wu*

This article extends profit maximization (PM) to formulate a continuous PM under the general marketing strategies (CPM-MS). In order to get a constant approximation guarantee, they first introduce the lattice-double greedy algorithm, and a lattice-based iterative pruning technique is also proposed to get theoretical bounds. Then, to overcome the difficulty to estimate the objective value of CPM-MS, they adopt reverse sampling strategies and combine it with lattice-based double greedy. The experiments are conducted on several real datasets, and

the results show that the technology significantly reduces the running times and validates their effectiveness.

21. "Detecting Framing Changes in Topical News" by *Karthik Sheshadri, Chaitanya Shivade, and Munindar P. Singh*

This article systematizes the discovery of framing changes through a fully unsupervised computational method that seeks to isolate framing change trends over several years, and contributes an unsupervised natural language processing approach that detects framing change trends over several years in domain news publishing. It identifies a key characteristic of such changes, namely during frame changes, the polarity of adjectives describing co-occurring nouns changes cumulatively over multiple years. The result shows that the approach agrees with and extends the results of earlier manual surveys.

II. Federated Data: Toward New Generation of Credible and Trustable Artificial Intelligence

Federated ecology can provide an effective solution for the serious isolated data island issues caused by data privacy protection and information security requirements in the era of artificial intelligence (AI) [items 1)–3) in the Appendix]. As the data foundation of federated ecology, federated data include the data of all the nodes in the federation, as well as their storage, computation, and communication resources. For privacy-preserving, federated data are divided into private data and non-private data, and through the federated control of these data, data federalization can be realized [item 3) in the Appendix].

In data-driven AI technologies, federated data play an important role, and it can help realize effective data retrieval, pre-processing, processing, mining, and visualization for AI-based applications. It can also provide effective solutions for the dilemmas faced by AI technologies, such as training AI models without sufficient data, increasing the generality of AI models for different application scenarios [item 4) in the Appendix] and establishing a unified processing workflow for data security and privacy control in AI-based applications [item 5) in the Appendix].

A. Architecture of Federated Data

Federated data can be regarded as a paradigm of parallel data, which can transfer big data to data intelligence [item 6) in the Appendix]. In federated data, data experimentation plays central roles to explore optimal solutions according to Morton's law [item 7) in the Appendix], which can be realized based on reinforcement learning and parallel reinforcement learning [items 8) and 9) in the Appendix]. Federated data also provide an effective solution for data security and privacy issues, in either centralized or distributed manner. Based on federated ecology and federated learning [item 10) in the Appendix], we propose an architecture for federated data, which includes six components, namely real data/physical object, virtual data/digital twins, federated data experimentation, federated fusion, federated security, and credible federated wisdom, as shown in Fig. 1.

The first two components are used for handling real data from physical objects and virtual data generated from the digital twins mounted on that specific equipment, as well as virtual data generated by other approaches. The digital twins component is also responsible for the retrieval of actual data, e.g., monitoring their running status.

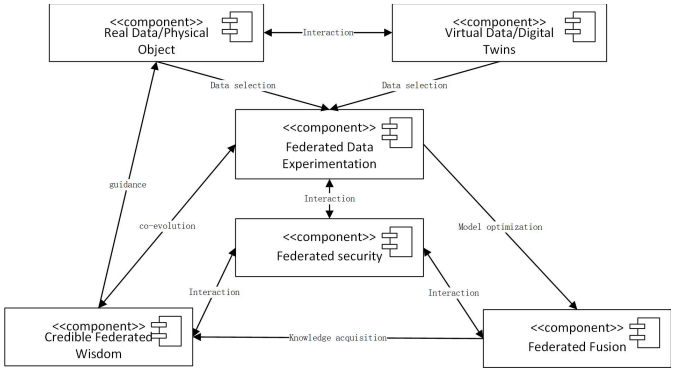

Fig. 1. Overall architecture of federated data.

The federated data experimentation is one of the key processes for exploring the optimal model by searching in the solution space, e.g., using reinforcement learning and parallel reinforcement learning to find the optimal parameters for the local models.

The federated fusion component is responsible for the synthesis of the local models into a global optimal model, by using specially designed model fusion algorithms, such as dynamic fusion mechanism [item 10) in the Appendix]. The global optimal model will then be used by the local nodes. All the transmission processes of these models will use some kinds of encryption mechanisms, or link to the blockchain to support model sharing and guarantee the securities of the transmission processes [item 3) in the Appendix].

The federated security component is responsible for realizing data security and privacy. The data ownership and the usage rights are separated, that is, for a specific node, the data are stored in its local address, and the models trained by these data are transferred to the federated fusion and federated data experimentation components, which is similar to federate learning. Moreover, the security can also be improved by blockchain or other encryption approaches.

From the results of federated data experimentation and federation fusion, credible federated intelligence can be obtained, where data are stored locally and only models are exchanged, to ensure data security. The federated intelligence can be used to guide the running of physical objects.

Federated data can improve the self-learning capabilities of AI through the loop in the federated data architecture, and when the current virtual data and real data interactions are given, the optimal solutions can be obtained through the federated data experimentations.

B. Federated Data Decomposition

The detailed processes of federated data are proposed according to the standard of federated learning approved by IEEE [item 11) in the Appendix], as shown in Fig. 2, in which a number of nodes can involve in the federated data environment. Each node (called client nodes) can involve in the

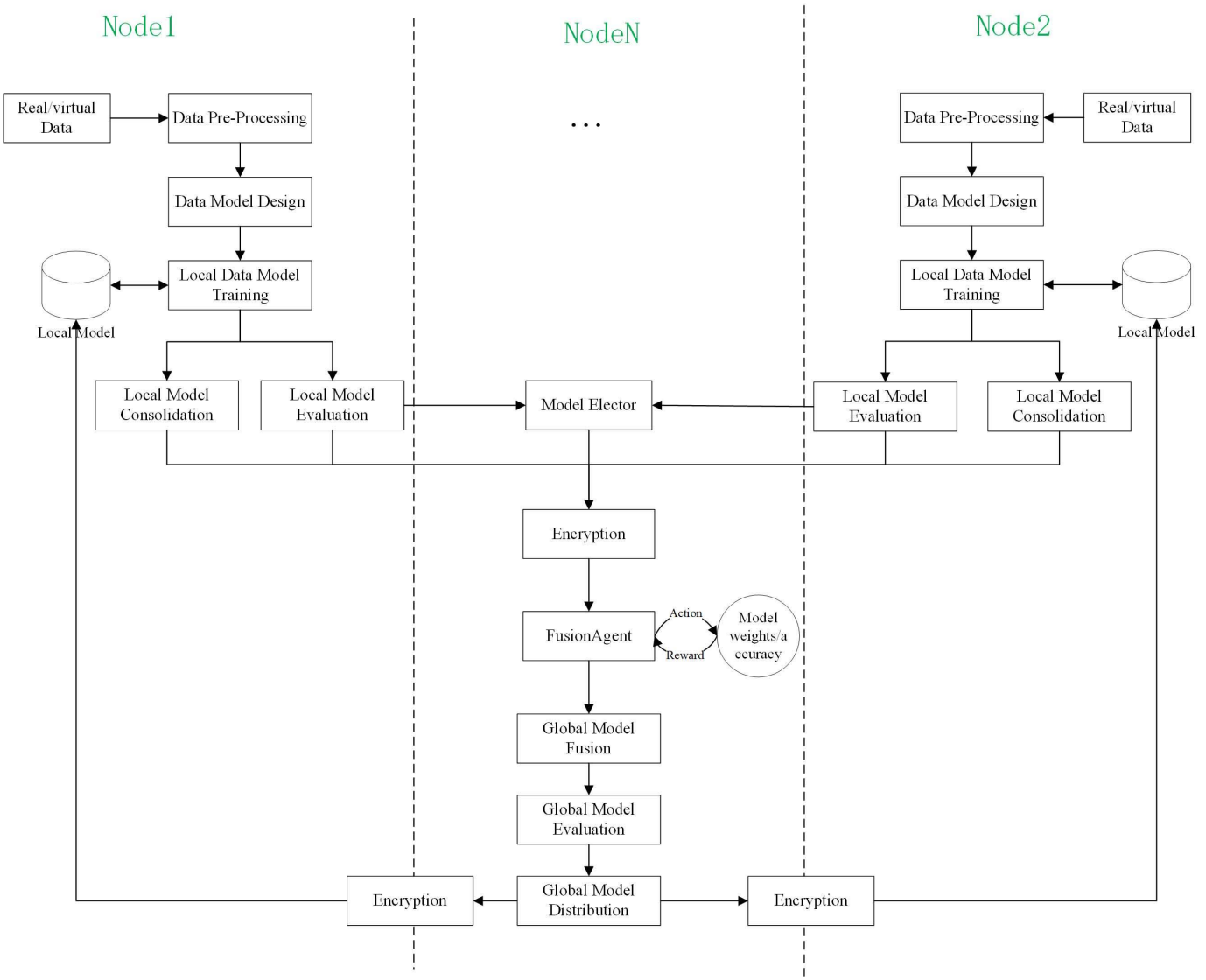

Fig. 2. Detailed processes of federated data.

global fusion of the optimal models, and one or more nodes can serve as the model fusion nodes (called server nodes). In the above process, both the virtual data and the actual data can be used as input. Then, these data are being processed to eliminate data noise and also normalized with commonly used normalization approaches such as min-max normalization and Z-score normalization. After that, an appropriate data model will be designed for a given data set by using different machine learning algorithms, such as clustering, classification, and associate analysis.

During the training process, the client nodes will train the model with local data, and several techniques such as model consolidation approaches can be used to improve the accuracy of the model, i.e., training the model layer by layer to align its weights with other nodes. Then, each client node sends the parameters of its model to the server nodes for model fusion. Before the model fusion, the local model trained by each node should be evaluated first, and the model elector will decide the acceptable parameters of the model in each round of training. If the parameters obtained in this round of training can improve the accuracy of the model, it will be included in the model fusion; otherwise, it will be rejected by the model elector since these parameters may reduce the accuracy of the fused model. Since federated data are working in a decentralized manner, selecting different nodes to contribute their parameters to the model is extremely important in the model fusion [item 10) in the Appendix].

In federated data experimentation, reinforcement learning and parallel reinforcement learning have been proved to be effective. The inputs of the models in different nodes serve as the environment of reinforcement learning, and the corresponding outputs are the optimized parameters of these local models. Then, these parameters are fused in the global model fusion. After that, the accuracy of the global model will be evaluated, and if the accuracy is improved, the global model will be distributed to all the involved nodes. Similarly, the federated data working process forms a closed loop of self-learning.

All the transmission processes of these models between the client and server nodes can be encrypted. These nodes can also be mounted to the blockchain to further improve data security and user privacy. In addition to the security and privacy of federated learning, federated data can also help to build credible and trustable artificial intelligence.

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APPENDIX
RELATED WORK

1) F.-Y. Wang, R. Qin, Y. Chen, Y. Tian, X. Wang, and B. Hu, "Federated ecology: Steps toward confederated intelligence," *IEEE Trans. Comput. Social Syst.*, vol. 8, no. 2, pp. 271–278, Mar. 2021.
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4) T. R. Besold and U. Schmid, "Why generality is key to human-level artificial intelligence," *Adv. Cognit. Syst.*, vol. 4, pp. 13–24, Jun. 2016.
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8) W. Zhang, Z. Hou, X. Wang, Z. Xu, X. Liu, and F.-Y. Wang, "Parallel-data-based social evolution modeling," *Tsinghua Sci. Technol.*, vol. 26, no. 6, pp. 1–17, 2021, doi: 10.26599/TST.2020.9010052.
9) T. Liu, B. Tian, Y. Ai, L. Li, D. Cao, and F.-Y. Wang, "Parallel reinforcement learning: A framework and case study," *IEEE/CAA J. Automatica Sinica*, vol. 5, no. 4, pp. 827–835, Jul. 2018.
10) W. Zhang *et al.*, "Dynamic fusion-based federated learning for COVID-19 detection," *IEEE Internet Things J.*, early access, Feb. 14, 2021, doi: 10.1109/JIOT.2021.3056185.
11) *IEEE Guide for Architectural Framework and Application of Federated Machine Learning*, Standard 3652.1-2020, 2021.

Fei-Yue Wang (Fellow, IEEE) received the Ph.D. degree in computer and systems engineering from Rensselaer Polytechnic Institute, Troy, NY, USA, in 1990.

In 1990, he joined The University of Arizona, Tucson, AZ, USA, where he became a Professor and the Director of the Robotics and Automation Laboratory and the Program in Advanced Research for Complex Systems. In 1999, he founded the Intelligent Control and Systems Engineering Center, Institute of Automation, Chinese Academy of Sciences (CAS), Beijing, China. In 2002, he participated in the development of the Key Laboratory of Complex Systems and Intelligence Science, CAS, as the Director, where he was also the Vice President of Research, Education, and Academic Exchanges at the Institute of Automation from 2006 to 2010. In 2011, he was named as the Director of the State Key Laboratory for Management and Control of Complex Systems, Beijing. His current research interests include methods and applications for intelligent and parallel systems, social computing, parallel intelligence, and knowledge automation.

Dr. Wang was elected Fellow of the International Council on Systems Engineering (INCOSE), the International Federation of Automatic Control (IFAC), the American Society of Mechanical Engineers (ASME), and the American Association for the Advancement of Science (AAAS). He received the best paper awards for his work from the IEEE Intelligent Transportation Systems Society (ITSS) in 2012 and the IEEE Computational Intelligence Society in 2017, the Franklin V. Taylor Memorial Award in 2002, and the Andrew P. Sage Award from the IEEE Systems, Man, and Cybernetics Society (SMCS) in 2019. In 2007, he was a recipient of the National Prize in Natural Sciences of China and was awarded the Outstanding Scientist by the Association for Computing Machinery (ACM) for his research contributions in intelligent control and social computing. He was also a recipient of the IEEE ITS Outstanding Application and Research Awards in 2009, 2011, and 2015, and the IEEE SMC Norbert Wiener Award in 2014. He has been the General or Program Chair for more than 50 IEEE, Institute for Operations Research and the Management Sciences (INFORMS), IFAC, INCOSE, ACM, ASME, and other professional conferences. He was the President of the IEEE Intelligent Transportation Systems (ITS) Society from 2005 to 2007; the Chinese Association for Science and Technology, USA, in 2005; and the American Zhu Kezhen Education Foundation from 2007 to 2008. He was the Vice President of the ACM China Council from 2010 to 2011 and the Chair of the IFAC Technical Committee (IFAC TC) on Economic and Social Systems from 2008 to 2014 and from 2017 to 2023. He is the President of the IEEE Council on Radio Frequency Identification (RFID) and the Vice President of the IEEE SMC Society. He was the Vice President and the Secretary General of the Chinese Association of Automation from 2008 to 2018, and has been the President of the Supervision Council since 2018. He was the Founding Editor-in-Chief (EiC) of *International Journal of Intelligent Control and Systems* from 1995 to 2000, *IEEE Intelligent Transportation Systems Magazine* from 2006 to 2007, and *IEEE/CAA Journal of Automatica Sinica* from 2014 to 2017. He was the EiC of IEEE INTELLIGENT SYSTEMS from 2009 to 2012, IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS from 2009 to 2016, and IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS from 2017 to 2020, and the Founding EiC of the *Chinese Journal of Command and Control* and the *Chinese Journal of Intelligent Science and Technology*.

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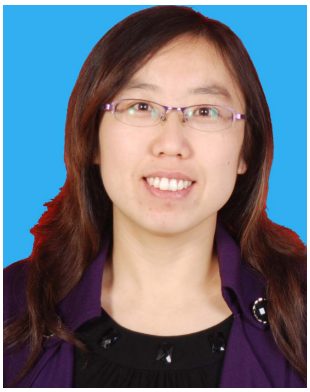

Rui Qin (Member, IEEE) received the B.S. degree in mathematics and applied mathematics and the M.S. degree in operational research and cybernetics from Hebei University, Baoding, China, in 2007 and 2010, respectively, and the Ph.D. degree in computer application technology from the University of Chinese Academy of Sciences, Beijing, China, in 2016.

She is currently an Associate Professor with the State Key Laboratory for Management and Control of Complex Systems, Institute of Automation, Chinese Academy of Sciences, Beijing. Her research interests include blockchain, social computing, computational advertising, and parallel management.

Xiao Wang (Member, IEEE) received the B.E. degree in network engineering from the Dalian University of Technology, Dalian, China, in 2011, and the M.E. and Ph.D. degrees in social computing from the University of Chinese Academy of Sciences, Beijing, China, in 2016.

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