2021 IEEE 41st International Conference on Distributed Computing Systems (ICDCS 2021)

Washington, DC, USA
7 – 10 July 2021

Pages 1-572
Table of Contents

Message from the General Chair and Program Chairs xxi
Organizing Committee xxii
Technical Program Committee xxiv
Reviewers xxxiv
Sponsors xxxvi

Edge Computing - I: Session 1A

Communication-Efficient Federated Learning with Adaptive Parameter Freezing 1
Chen Chen (Huawei Research Hong Kong), Xu Hong (Chinese University of Hong Kong), Wang Wei (Hong Kong University of Science and Technology), Li Baochun (University of Toronto), Li Bo (Hong Kong University of Science and Technology), Chen Li (Huawei Research Hong Kong), and Zhang Gong (Huawei Research Hong Kong)

Towards Efficient Inference: Adaptively Cooperate in Heterogeneous IoT Edge Cluster 12
Xiang Yang (Beijing University of Posts and Telecommunications), Qi Qi (Beijing University of Posts and Telecommunications), Jingyu Wang (Beijing University of Posts and Telecommunications), Song Guo (Hong Kong Polytechnic University), and Jianxin Liao (Beijing University of Posts and Telecommunications)

SHARE: Shaping Data Distribution at Edge for Communication-Efficient Hierarchical Federated Learning 24
Yongheng Deng (Tsinghua University, China), Feng Lyu (Central South University, China), Ju Ren (Central South University, China), Yongmin Zhang (Central South University, China), Yuezhi Zhou (Tsinghua University, China), Yaoxue Zhang (Tsinghua University, China), and Yuanxuan Yang (Stony Brook University, USA)

Incentive-Driven Long-Term Optimization for Edge Learning by Hierarchical Reinforcement Mechanism 35
Yi Liu (The Hong Kong Polytechnic University, China), Leijie Wu (The Hong Kong Polytechnic University, China), Yufeng Zhan (Beijing Institute of Technology, China), Song Guo (The Hong Kong Polytechnic University, China), and Zicong Hong (The Hong Kong Polytechnic University, China)
BigData: Session 1B

On the Power of False Negative Awareness in Indicator-Based Caching Systems 46
Itamar Cohen (Politecnico di Torino, Italy), Gil Einziger (Ben-Gurion University of the Negev, Israel), and Gabriel Scalosub (Ben-Gurion University of the Negev, Israel)

The Vertical Cuckoo Filters: A Family of Insertion-Friendly Sketches for Online Applications 57
Pengtao Fu (National University of Defense Technology, China), Lailong Luo (National University of Defense Technology, China), Shangsen Li (National University of Defense Technology, China), Deke Guo (National University of Defense Technology, China), Geyao Cheng (National University of Defense Technology, China), and Yun Zhou (National University of Defense Technology, China)

An Efficient and Balanced Graph Partition Algorithm for the Subgraph-Centric Programming Model on Large-Scale Power-law Graphs 68
Shuai Zhang (SKL Computer Architecture, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China; School of Computer Science and Technology, University of Chinese Academy of Sciences), Zite Jiang (SKL Computer Architecture, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China; School of Computer Science and Technology, University of Chinese Academy of Sciences), Xingzhong Hou (SKL Computer Architecture, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China; School of Computer Science and Technology, University of Chinese Academy of Sciences), Zhen Guan (SKL Computer Architecture, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China), Mengting Yuan (Wuhan University), and Haihang You (SKL Computer Architecture, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China)

Pluto: High-Performance IoT-Aware Stream Processing 79
Taegeon Um (Seoul National University), Gyewon Lee (Seoul National University; FriendliAI), and Byung-Gon Chun (Seoul National University; FriendliAI)

OS and Middleware: Session 1C

Gengar: An RDMA-Based Distributed Hybrid Memory Pool 92
Zhuhui Duan (Huazhong University of Science and Technology, China), Haikun Liu (Huazhong University of Science and Technology, China), Haodi Lu (Huazhong University of Science and Technology, China), Xiaofei Liao (Huazhong University of Science and Technology, China), Hai Jin (Huazhong University of Science and Technology, China), Yu Zhang (Huazhong University of Science and Technology, China), and Bingsheng He (National University of Singapore, Singapore)

Re-Architecting Distributed Block Storage System for Improving Random Write Performance 104
Myoungwon Oh (Samsung Electronics), Jiwoong Park (Sungshin Women's University), Sung Kyu Park (Samsung Electronics), Adel Choi (Samsung Electronics), Jongyoul Lee (Samsung Electronics), Jin-Hyeok Choi (Samsung Electronics), and Heon Y. Yeom (Seoul National University)
Gear: Enable Efficient Container Storage and Deployment with a New Image Format
Hao Fan (Huazhong University of Science and Technology, China),
Shengwei Bian (Huazhong University of Science and Technology, China),
Song Wu (Huazhong University of Science and Technology, China), Song Jiang (University of Texas at Arlington, U.S.), Shadi Ibrahim (Inria, Univ. Rennes, CNRS, IRISA, France), and Hai Jin (Huazhong University of Science and Technology, China)

Dyconits: Scaling Minecraft-Like Services through Dynamically Managed Inconsistency
Jesse Donkeroliet (VU Amsterdam, the Netherlands), Jim Cuipers (VU Amsterdam, the Netherlands), and Alexandru Iosup (VU Amsterdam, the Netherlands)

Cloud Computing - I: Session 2A

Gillis: Serving Large Neural Networks in Serverless Functions with Automatic Model Partitioning
Minchen Yu (Hong Kong University of Science and Technology), Zifeng Jiang (Hong Kong University of Science and Technology), Hok Chun Ng (Hong Kong University of Science and Technology), Wei Wang (Hong Kong University of Science and Technology), Ruichuan Chen (Nokia Bell Labs), and Bo Li (Hong Kong University of Science and Technology)

GeoCol: A Geo-Distributed Cloud Storage System with Low Cost and Latency using Reinforcement Learning
Haoyu Wang (University of Virginia, USA), Haiying Shen (University of Virginia, USA), Zijian Li (Beijing University of Posts and Telecommunications, China), and Shuhao Tian (University of Glasgow, UK)

GreenHetero: Adaptive Power Allocation for Heterogeneous Green Datacenters
Haoran Cai (Huazhong University of Science and Technology; Huawei Technologies Co., Ltd.), Qiang Cao (Huazhong University of Science and Technology), Hong Jiang (University of Texas at Arlington), and Qiang Wang (Huazhong University of Science and Technology)

Haechi: A Token-Based QoS Mechanism for One-Sided I/Os in RDMA Based Storage System
Qingyue Liu (Rice University, USA) and Peter Varman (Rice University, USA)

A Truthful Procurement Auction for Incentivizing Heterogeneous Clients in Federated Learning
Ruiting Zhou (Wuhan University, China), Jinlong Pang (Wuhan University, China), Zhibo Wang (Zhejiang University, China), John C.S. Lui (The Chinese University of Hong Kong, China), and Zongpeng Li (Wuhan University, China)

Defuse: A Dependency-Guided Function Scheduler to Mitigate Cold Starts on FaaS Platforms
Jiacheng Shen (The Chinese University of Hong Kong, China), Tianyi Yang (The Chinese University of Hong Kong, China), Yuxin Su (The Chinese University of Hong Kong, China), Yangfan Zhou (Fudan University, China), and Michael R. Lyu (The Chinese University of Hong Kong, China)
Blockchain - I: Session 2B

Strengthened Fault Tolerance in Byzantine Fault Tolerant Replication 205.................................
Zhuolun Xiang (University of Illinois at Urbana-Champaign), Dahlia Malkhi (Novi), Kartik Nayak (Duke University), and Ling Ren (University of Illinois at Urbana-Champaign)

Behind Block Explorers: Public Blockchain Measurement and Security Implication 216..............
Hwanjo Heo (KAIST/ETRI, South Korea) and Seungwon Shin (KAIST, South Korea)

EPA-Route: Routing Payment Channel Network with High Success Rate and Low Payment Fees 227
Han Xue (State Key Lab of Computer Architecture, ICT, CAS; University of Chinese Academy of Sciences), Qun Huang (Peking University), and Yungang Bao (State Key Lab of Computer Architecture, ICT, CAS; University of Chinese Academy of Sciences)

Root Cause Analyses for the Deteriorating Bitcoin Network Synchronization 239....................
Muhammad Saad (University of Central Florida), Songqing Chen (George Mason University), and David Mohaisen (University of Central Florida)

FASTBLOCK: Accelerating Blockchains via Hardware Transactional Memory 250.....................
Yue Li (HCST, CS, Peking University, China), Han Liu (Tsinghua University, China), Yuanliang Chen (University of Oxford, UK), Jianbo Gao (HCST, CS, Peking University, China), Zhenhao Wu (HCST, CS, Peking University, China), Zhi Guan (National Engineering Research Center for Software Engineering, Peking University, China), and Zhong Chen (HCST, CS, Peking University, China)

LDSP: Shopping with Cryptocurrency Privately and Quickly under Leadership 261...................
Lucien K. L. Ng (The Chinese University of Hong Kong), Sherman S. M. Chow (The Chinese University of Hong Kong), Donald P. H. Wong (The Chinese University of Hong Kong), and Anna P. Y. Woo (The Chinese University of Hong Kong)

IoT - I: Session 2C

Online Routing and Scheduling for Time-Sensitive Networks 272...........................................
Yudong Huang (Beijing University of Posts and Telecommunications), Shuo Wang (Beijing University of Posts and Telecommunications), Tao Huang (Beijing University of Posts and Telecommunications), Binwei Wu (Purple Mountain Laboratories), Yunxiang Wu (Purple Mountain Laboratories), and Yunjie Liu (Beijing University of Posts and Telecommunications)

MSS: Lightweight Network Authentication for Resource Constrained Devices via Mergeable Stateful Signatures 282..........................................................
Abdulrahman Bin Rabiah (University of California, Riverside (UCR)), Yugarshi Shashwat (University of California, Riverside (UCR)), Fatemah Alharbi (Taibah University, Yanbu), Silas Richelson (University of California, Riverside (UCR)), and Nael Abu-Ghazaleh (University of California, Riverside (UCR))
Dimmer: Self-Adaptive Network-Wide Flooding with Reinforcement Learning 293
Valentin Poirot (Kiel University, Germany and Chalmers University of Technology, Sweden) and Olaf Landsiedel (Kiel University, Germany and Chalmers University of Technology, Sweden)

BiCord: Bidirectional Coordination among Coexisting Wireless Devices 304
Zihao Yu (Tsinghua University, China), Pengyu Li (Tsinghua University, China), Carlo Alberto Boano (Graz University of Technology, China), Yuan He (Tsinghua University, China), Meng Jin (Tsinghua University, China), Xiuzhen Guo (Tsinghua University, China), and Xiaolong Zheng (Beijing University of Posts and Telecommunications, China)

MAD for FANETs: Movement Assisted Delivery for Flying Ad-hoc Networks 315
Novella Bartolini (Sapienza University of Rome), Andrea Coletta (Sapienza University of Rome), Andrea Gennaro (Sapienza University of Rome), Gaia Maselli (Sapienza University of Rome), and Matteo Prata (Sapienza University of Rome)

An Efficient Message Dissemination Scheme for Cooperative Drivings via Multi-Agent Hierarchical Attention Reinforcement Learning 326
Bingyi Liu (Wuhan University of Technology, China), Weizhen Han (Wuhan University of Technology, China), Enshu Wang (State University of New York at Buffalo, USA), Xin Ma (University of Texas at Arlington, USA), Shengwu Xiong (Wuhan University of Technology, China), Chunming Qiao (State University of New York at Buffalo, USA), and Jianping Wang (City University of Hong Kong, Hong Kong)

Cloud and Security: Session 3A

When Delta Sync Meets Message-Locked Encryption: a Feature-Based Delta Sync Scheme for Encrypted Cloud Storage 337
Suzhen Wu (Xiamen University, China), Zhanhong Tu (Xiamen University, China), Zhiqiang Shen (Xiamen University, China), and Bo Mao (Xiamen University, China)

A Two-Stage Heavy Hitter Detection System Based on CPU Spikes at Cloud-Scale Gateways 348
Jianyuan Lu (Alibaba Group), Tian Pan (Alibaba Group), Shan He (Alibaba Group), Mao Miao (Alibaba Group), Guangze Zhou (Alibaba Group), Yining Qi (Zhejiang University), Biao Lyu (Alibaba Group), and Shunmin Zhu (Alibaba Group)

A Multi-Tenant Framework for Cloud Container Services 359
Chao Zheng (Alibaba Group), Qinghui Zhuang (Alibaba Group), and Fei Guo (Alibaba Group)

Everyone in SDN Contributes: Fault Localization via Well-Designed Rules 370
Zhijun Hu (Wuhan University, China), Libing Wu (Wuhan University, China), Jianxin Li (Deakin University, Australia), Chao Ma (Wuhan University, China), and Xiaoqun Shi (Wuhan University, China)

FlashFlow: A Secure Speed Test for Tor 381
Matthew Traudt (U.S. Naval Research Laboratory), Rob Jansen (U.S. Naval Research Laboratory), and Aaron Johnson (U.S. Naval Research Laboratory)
Algorithms - I: Session 3B

Leaderless Consensus 392
Karolos Antoniadis (EPFL), Antoine Desjardins (EPFL), Vincent Gramoli (University of Sydney and EPFL), Rachid Guerraoui (EPFL), and Igor Zablotchi (EPFL)

Polygraph: Accountable Byzantine Agreement 403
Pierre Civit (Sorbonne Université, Australia), Seth Gilbert (National University of Singapore, Singapore), and Vincent Gramoli (University of Sydney, Australia)

Cutting the Request Completion Time in Key-Value Stores with Distributed Adaptive Scheduler 414
Wanchun Jiang (Central South University, China), Haoyang Li (Central South University, China), Yulong Yan (Central South University, China), Fa Ji (Central South University, China), Ming Jiang (Central South University, China), Jianxin Wang (Central South University, China), and Tong Zhang (Nanjing University of Aeronautics and Astronautics, China)

Bankrupting Sybil Despite Churn 425
Diksha Gupta (National University of Singapore, Singapore), Jared Saia (University of New Mexico, USA), and Maxwell Young (Mississippi State University, USA)

Upper and Lower Bounds for Deterministic Approximate Objects 438
Danny Hendler (Ben-Gurion University of the Negev, Israel), Adnane Khattabi (LaBRI, University of Bordeaux, France), Alessia Milani (LaBRI, Bordeaux INP, France), and Corentin Travers (LaBRI, Bordeaux INP, France)

Time and Communication Complexity of Leader Election in Anonymous Networks 449
Dariusz R. Kowalski (Augusta University, USA; SWPS University, Poland) and Miguel A. Mosteiro (Pace University, USA)

Fault Tolerance: Session 3C

ProgrammabilityMedic: Predictable Path Programmability Recovery under Multiple Controller Failures in SD-WANs 461
Songshi Dou (Beijing Institute of Technology), Zehua Guo (Beijing Institute of Technology), and Yuanqing Xia (Beijing Institute of Technology)

FreeLauncher: Lossless Failure Recovery of Parameter Servers with Ultralight Replication 472
Yangyang Zhang (Beihang University, China), Jianxin Li (Beihang University, China), Yiming Zhang (NiceX Lab, China), Lijie Wang (Beihang University, China), and Ling Liu (Georgia Institute of Technology)
StripeMerge: Efficient Wide-Stripe Generation for Large-Scale Erasure-Coded Storage 483
Qiaori Yao (Huazhong University of Science & Technology), Yuchong Hu (Huazhong University of Science & Technology), Liangfeng Cheng (Huazhong University of Science & Technology), Patrick P. C. Lee (The Chinese University of Hong Kong), Dan Feng (Huazhong University of Science & Technology), Weichun Wang (HIKVISION), and Wei Chen (HIKVISION)

Efficiently Recovering Stateful System Components of Multi-Server Microkernels 494
Wentai Li (Shanghai Jiao Tong University, China), Jinyu Gu (Shanghai Jiao Tong University, China), Nian Liu (Shanghai Jiao Tong University, China), and Binyu Zang (Shanghai Jiao Tong University, China)

Practical Byzantine Reliable Broadcast on Partially Connected Networks 506
Silvia Bonomi (Sapienza Università di Roma), Jérémie Decouchant (Delft University of Technology), Giovanni Farina (Sapienza Università di Roma), Vincent Rahli (University of Birmingham), and Sébastien Tixeuil (Sorbonne University, CNRS, LIP6)

Machine Learning - I: Session 4A

GDDR: GNN-Based Data-Driven Routing 517
Oliver Hope (University of Cambridge, UK) and Eiko Yoneki (University of Cambridge, UK)

Sync-Switch: Hybrid Parameter Synchronization for Distributed Deep Learning 528
Shijian Li (Worcester Polytechnic Institute), Oren Mangoubi (Worcester Polytechnic Institute), Lijie Xu (State Key Lab of Computer Science, Institute of Software, Chinese Academy of Sciences), and Tian Guo (Worcester Polytechnic Institute)

Distributed Online Service Coordination Using Deep Reinforcement Learning 539
Stefan Schneider (Paderborn University, Germany), Haydar Qarawlus (Fraunhofer ISST, Germany), and Holger Karl (Paderborn University, Germany)

Accelerating Distributed K-FAC with Smart Parallelism of Computing and Communication Tasks 550
Shaohuai Shi (The Hong Kong University of Science and Technology), Lin Zhang (The Hong Kong University of Science and Technology), and Bo Li (The Hong Kong University of Science and Technology)

GRACE: A Compressed Communication Framework for Distributed Machine Learning 561
Hang Xu (KAUST), Chen-Yu Ho (KAUST), Ahmed M. Abdelmoniem (KAUST), Aritra Dutta (KAUST), El Houcine Bergou (KAUST), Konstantinos Karatsenidis (KAUST), Marco Canini (KAUST), and Panos Kalnis (KAUST)

Complexity-Aware Adaptive Training and Inference for Edge-Cloud Distributed AI Systems 573
Yinghan Long (Purdue University), Indranil Chakraborty (Purdue University), Gopalakrishnan Srinivasan (Purdue University), and Kaushik Roy (Purdue University)
Blockchain - II: Session 4B

A Game-Theoretic Analysis of Cross-Chain Atomic Swaps with HTLCs 584
Jiahua Xu (UCL Centre for Blockchain Technologies), Damien Ackerer (Covario), and Alevtina Dubovitskaya (Lucerne University of Applied Sciences and Arts)

Dissecting the Performance of Chained-BFT 595
Fangyu Gai (University of British Columbia, Okanagan Campus), Ali Farahbakhsh (University of British Columbia, Okanagan Campus), Jianyu Niu (University of British Columbia, Okanagan Campus), Chen Feng (University of British Columbia, Okanagan Campus), Ivan Beschastnikh (University of British Columbia, Canada), and Hao Duan (Hangzhou Qulian Technology, China)

Blockumulus: A Scalable Framework for Smart Contracts on the Cloud 607
Nikolay Ivanov (Michigan State University), Qiben Yan (Michigan State University), and Qingyang Wang (Louisiana State University)

Occam: A Secure and Adaptive Scaling Scheme for Permissionless Blockchain 618
Jie Xu (City University of Hong Kong, Hong Kong), Yingying Cheng (Huawei Technologies, Hong Kong), Cong Wang (City University of Hong Kong, Hong Kong), and Xiaohua Jia (City University of Hong Kong, Hong Kong)

MVCom: Scheduling Most Valuable Committees for the Large-Scale Sharded Blockchain 629
Huawei Huang (Sun Yat-Sen University, China), Zhenyi Huang (Sun Yat-Sen University, China), Xiaowen Peng (Sun Yat-Sen University, China), Zibin Zheng (Sun Yat-Sen University, China), and Song Guo (The Hong Kong Polytechnic University)

On the Synchronization Power of Token Smart Contracts 640
Orestis Alpos (University of Bern, Switzerland), Christian Cachin (University of Bern, Switzerland), Giorgia Azzurra Marson (University of Bern, Switzerland), and Luca Zanolini (University of Bern, Switzerland)

Mobile and Wireless Computing: Session 4C

Recognizing 3D Orientation of a Two-RFID-Tag Labeled Object in Multipath Environments Using Deep Transfer Learning 652
Zhongqin Wang (University of Technology Sydney, Australia), Min Xu (University of Technology Sydney, Australia), and Fu Xiao (Nanjing University of Posts and Telecommunications, China)

Joint Order Dispatch and Repositioning for Urban Vehicle Sharing Systems via Robust Optimization 663
Yiran Zhao (Shanghai Jiao Tong University, China), Guiyun Fan (Shanghai Jiao Tong University, China), Haiming Jin (Shanghai Jiao Tong University, China), Wenze Ma (Shanghai Jiao Tong University, China), Baoshuang He (Shanghai Jiao Tong University, China), and Xinbing Wang (Shanghai Jiao Tong University, China)
MandiPass: Secure and Usable User Authentication via Earphone IMU 674
Jianwei Liu (Zhejiang University, China), Wenfan Song (Zhejiang University, China), Leming Shen (Zhejiang University, China), Jinsong Han (Zhejiang University, China), Xian Xu (Zhejiang University, China), and Kui Ren (Zhejiang University, China; Key Laboratory of Blockchain and Cyberspace Governance of Zhejiang Province, China; Alibaba-Zhejiang University, China)

Cooperative Charging as Service: Scheduling for Mobile Wireless Rechargeable Sensor Networks 685
Jia Xu (Nanjing University of Posts and Telecommunications, China), Suyi Hu (Nanjing University of Posts and Telecommunications, China), Sixu Wu (Nanjing University of Posts and Telecommunications, China), Kaijun Zhou (Nanjing University of Posts and Telecommunications, China), Haipeng Dai (Nanjing University, China), and Lijie Xu (Nanjing University of Posts and Telecommunications, China)

MinSum Movement of Barrier and Target Coverage using Sink-Based Mobile Sensors on the Plane 696
Longkun Guo (Qilu University of Technology, China), Wenjie Zou (Fuzhou University, China), Chenchen Wu (Tianjin University of Technology, China), Dachuan Xu (Beijing University of Technology, China), and Dingzhu Du (University of Texas at Dallas, USA)

Heterogeneous Spatio-Temporal Graph Convolution Network for Traffic Forecasting with Missing Values 707
Weida Zhong (State University of New York at Buffalo), Qiuling Suo (State University of New York at Buffalo), Xiaowei Jia (University of Pittsburgh), Aidong Zhang (University of Virginia), and Lu Su (Purdue University)

Edge Computing- II: Session 5A

CAD3: Edge-Facilitated Real-Time Collaborative Abnormal Driving Distributed Detection 718
Ahmad Alhilal (The Hong Kong University of Science and Technology, Hong Kong), Tristan Braud (The Hong Kong University of Science and Technology, Hong Kong), Xiang Su (University of Helsinki, Finland; University of Oulu, Finland), Luay Al Asadi (AlBaraka Bank Syria, Syria), and Pan Hui (The Hong Kong University of Science and Technology, Hong Kong)

Enabling Low Latency Edge Intelligence Based on Multi-Exit DNNs in the Wild 729
Zhaowu Huang (Southeast University, China), Fang Dong (Southeast University, China), Dian Shen (Southeast University, China), Junxue Zhang (Hong Kong University of Science and Technology, China), Huitian Wang (Southeast University, China), Guangxing Cai (Southeast University, China), and Qiang He (Swinburne University of Technology, Australia)

Proactive Deployment of Chain-Based VNF Backup at the Edge using Online Bandit Learning 740
Chen Wang (Shandong University, China), Qin Hu (Indiana University-Purdue University Indianapolis, USA), Dongxiao Yu (Shandong University, China), and Xiuzhen Cheng (Shandong University, China)
Privacy-Preserving Neural Network Inference Framework via Homomorphic Encryption and SGX 

Huizi Xiao (Xidian University, China), Qingyang Zhang (Anhui University, China), Qingqi Pei (Xidian University, China), and Weisong Shi (Wayne State University, USA)

Statistical Tail-Latency Bounded QoS Provisioning for Parallel and Distributed Data Centers 

Xi Zhang (Texas A&M University, USA) and Qixuan Zhu (Texas A&M University, USA)

Security and Privacy: Session 5B


Imtiaz Karim (Purdue University), Syed Rafiul Hussain (Pennsylvania State University), and Elisa Bertino (Purdue University)

A Suspicion-Free Black-box Adversarial Attack for Deep Driving Maneuver Classification Models 

Ankur Sarker (University of Virginia, USA), Haiying Shen (University of Virginia, USA), and Tanmoy Sen (University of Virginia, USA)

Gradient-Leakage Resilient Federated Learning 

Wenqi Wei (Georgia Institute of Technology, USA), Ling Liu (Georgia Institute of Technology, USA), Yanzhao Wu (Georgia Institute of Technology, USA), Gong Su (IBM T. J. Watson Research Center, USA), and Arun Iyengar (IBM T. J. Watson Research Center, USA)

Practical Location Privacy Attacks and Defense on Point-of-Interest Aggregates 

Wei Tong (Nanjing University, China), Chang Xia (Nanjing University, China), Jingyu Hua (Nanjing University, China), Qun Li (College of William and Mary, USA), and Sheng Zhong (Nanjing University, China)

On Private Data Collection of Hyperledger Fabric 

Shan Wang (Southeast University), Ming Yang (Southeast University), Yue Zhang (Jinan University), Yan Luo (University of Massachusetts Lowell), Tingjian Ge (University of Massachusetts Lowell), Xinwen Fu (University of Massachusetts Lowell), and Wei Zhao (Shenzhen Institute of Advanced Technology)

Machine Learning - II: Session 5C

Federated Model Search via Reinforcement Learning 

Dixi Yao (Shanghai Jiao Tong University, China), Lingdong Wang (Shanghai Jiao Tong University, China), Jiagu Xu (Shanghai Jiao Tong University, China), Liyang Xiang (Shanghai Jiao Tong University, China), Shuo Shao (Shanghai Jiao Tong University, China), Yingqi Chen (Shanghai Jiao Tong University, China), and Yanjun Tong (Shanghai Jiao Tong University, China)
Harmony: A Scheduling Framework Optimized for Multiple Distributed Machine Learning Jobs  .841
Woo-Yeon Lee (Samsung Research), Yunseong Lee (Seoul National University), Won Wook Song (Seoul National University), Youngseok Yang (Seoul National University), Joo Yeon Kim (Samsung Research), and Byung-Gon Chun (Seoul National University; FriendliAI)

BaFFLe: Backdoor Detection via Feedback-Based Federated Learning  .852
Sebastien Andreina (NEC Laboratories Europe, Germany), Giorgia Azzurra Marson (NEC Laboratories Europe, Germany), Helen Möllering (ENCRYPTO/TU Darmstadt, Germany), and Ghassan Karame (NEC Laboratories Europe, Germany)

QMA: A Resource-Efficient, Q-Learning-Based Multiple Access Scheme for the IIoT  .864
Florian Meyer (Hamburg University of Technology, Germany) and Volker Turau (Hamburg University of Technology, Germany)

Preserving Privacy in Personalized Models for Distributed Mobile Services  .875
Akanksha Atrey (University of Massachusetts Amherst), Prashant Shenoy (University of Massachusetts Amherst), and David Jensen (University of Massachusetts Amherst)

Cloud Computing - II: Session 6A

FastUp: Fast TCAM Update for SDN Switches in Datacenter Networks  .887
Ying Wan (Tsinghua University, China), Haoyu Song (Futurewei Technologies, USA), Hao Che (University of Texas at Arlington, USA), Yang Xu (Fudan University, China), Yi Wang (Southern University of Science and Technology, China), Chuwen Zhang (Tsinghua University, China), Zhijun Wang (University of Texas at Arlington, USA), Tian Pan (Beijing University of Posts and Telecommunications, China), Hao Li (Xi’an Jiaotong University, China), Hong Jiang (University of Texas at Arlington, USA), Chengchen Hu (Xilinx, Singapore & Xi’an Jiaotong University, China), and Bin Liu (Tsinghua University, China)

INT-Probe: Lightweight In-Band Network-Wide Telemetry with Stationary Probes  .898
Tian Pan (Beijing University of Posts and Telecommunications, China), Xingchen Lin (Beijing University of Posts and Telecommunications, China), Haoyu Song (Futurewei Technologies, USA), Enge Song (Beijing University of Posts and Telecommunications, China), Zizheng Bian (Beijing University of Posts and Telecommunications, China), Hao Li (Xi’an Jiaotong University, China), Jiao Zhang (Beijing University of Posts and Telecommunications, China), Fuliang Li (Northeastern University, China), Tao Huang (Beijing University of Posts and Telecommunications, China), Chenhao Jia (Beijing University of Posts and Telecommunications, China), and Bin Liu (Tsinghua University, China)

SRUF: Low-Latency Path Routing with SRv6 Underlay Federation in Wide Area Network  .910
Bangbang Ren (National University of Defense Technology), Deke Guo (National University of Defense Technology), Guoming Tang (Peng Cheng Laboratory), Lailong Luo (National University of Defense Technology), Weijun Wang (University of Goettingen), and Xiaoming Fu (University of Goettingen)
Mitigating Port Starvation for Shallow-Buffered Switches in Datacenter Networks  .921
Wenjun Lyu (Rutgers University, USA; Central South University, China),
Jiawei Huang (Central South University, China), Jingling Liu (Central
South University, China), Zhaoyi Li (Central South University, China),
Shaojun Zou (Central South University, China), Weihe Li (Central South
University, China), Jianxin Wang (Central South University, China),
and Desheng Zhang (Rutgers University, USA)

GTCP: Hybrid Congestion Control for Cross-Datacenter Networks  .932
Shaojun Zou (Central South University, China; Changsha University,
China), Jiawei Huang (Central South University, China), Jingling Liu
(Central South University, China), Tao Zhang (Changsha University,
China), Ning Jiang (Central South University, China), and Jianxin Wang
(Central South University, China)

TCP BBR in Cloud Networks: Challenges, Analysis, and Solutions  .943
Phuong Ha (University of Nebraska-Lincoln), Minh Vu (University of
Nebraska-Lincoln), Tuan-Anh Le (Thu Dau Mot University), and Lisong Xu
(University of Nebraska-Lincoln)

Algorithms - II: Session 6B

Game of Coins  .954
Alexander Spiegelman (Novi Research, USA), Idit Keidar (Technion,
Israel), and Moshe Tennenholtz (Technion, Israel)

Infinite Balanced Allocation via Finite Capacities  .965
Petra Berenbrink (Universität Hamburg, Germany), Tom Friedetzky
(Durham University, U.K.), Christopher Hahn (Universität Hamburg,
Germany), Lukas Hintze (Universität Hamburg, Germany), Dominik Kaaser
(University of Hamburg, Germany), Peter Kling (University of Hamburg,
Germany), and Lars Nagel (Loughborough University, U.K.)

Expansion and Flooding in Dynamic Random Networks with Node Churn  .976
Luca Becchetti (Sapienza Università di Roma, Italy), Andrea Clementi
(Università di Roma Tor Vergata, Italy), Francesco Pasquale
(Università di Roma Tor Vergata, Italy), Luca Trevisan (Università
Bocconi, Italy), and Isabella Ziccardi (Università dell’ Aquila, Italy)

Black Hole Search in Dynamic Rings  .987
Giuseppe Antonio Di Luna (Sapienza University), Paola Flocchini
(University of Ottawa), Giuseppe Prencipe (University of Pisa), and
Nicola Santoro (Carleton University)

Exploiting Locality in Scalable Ordered Maps  .998
Matthew Rodriguez (Lehigh University), Ahmed Hassan (Lehigh
University), and Michael Spear (Lehigh University)

Deterministic Contention Resolution without Collision Detection: Throughput vs Energy  .1009
Gianluca De Marco (University of Salerno, Italy), Dariusz R. Kowalski
(Augusta University, USA), and Grzegorz Stachowiak (University of
Wroclaw, Poland)
IoT - II: Session 6C

Evidence in Hand: Passive Vibration Response-Based Continuous User Authentication 1020
Hangcheng Cao (Hunan University), Hongbo Jiang (Hunan University),
Daibo Liu (Hunan University), and Jie Xiong (University of Massachusetts Amherst)

PupilMeter: Modeling User Preference with Time-Series Features of Pupillary Response 1031
Hongbo Jiang (Hunan University), Xiangyu Shen (Hunan University), and
Daibo Liu (Hunan University)

Hand-Key: Leveraging Multiple Hand Biometrics for Attack-Resilient User Authentication
Using COTS RFID 1042
Jianwei Liu (Zhejiang University, China), Xiang Zou (Zhejiang
University, China), Feng Lin (Zhejiang University, China; Key
Laboratory of Blockchain and Cyberspace Governance of Zhejiang
Province, China), Jinsong Han (Zhejiang University, China; Key
Laboratory of Blockchain and Cyberspace Governance of Zhejiang
Province, China), Xian Xu (Zhejiang University, China), and Kui Ren
(Zhejiang University, China; Key Laboratory of Blockchain and
Cyberspace Governance of Zhejiang Province, China; Alibaba-Zhejiang
University Joint Research Institute of Frontier Technologies, China)

RF-Prism: Versatile RFID-Based Sensing through Phase Disentangling 1053
Songzhen Yang (Tsinghua University), Meng Jin (Tsinghua University),
Yuan He (Tsinghua University), and Yunhao Liu (Tsinghua University)

Online Learning Algorithms for Offloading Augmented Reality Requests with Uncertain
Demands in MECs 1064
Zichuan Xu (Dalian University of Technology, China), Dongqi Liu
(Dalian University of Technology, China), Weifa Liang (City University
of Hong Kong, Hong Kong), Wenzheng Xu (Sichuan University, China),
Haipeng Dai (Nanjing University, China), Qifeng Xia (Dalian University
of Technology, China), and Pan Zhou (Huazhong University of Science
and Technology, China)

A Practical Side-Channel Based Intrusion Detection System for Additive Manufacturing
Systems 1075
Sizhuang Liang (Georgia Institute of Technology, USA), Xirui Peng
(Georgia Institute of Technology, USA), H. Jerry Qi (Georgia Institute
of Technology, USA), Saman Zonouz (Rutgers University, USA), and
Raheem Beyah (Georgia Institute of Technology, USA)

Demos and Posters

Demo: Software-Defined Virtual Networking across Multiple Edge and Cloud Providers with
EdgeVPN.io 1088
Renato Figueiredo (Electrical and Computer Engineering, University of
Florida) and Kensworth Subratie (Electrical and Computer Engineering,
University of Florida)

Demo: Application Monitoring as a Network Service 1091
Mona Elsaadawy (McGill University, Canada), Laetitia Fesselier (McGill
University, Canada), and Bettina Kemme (McGill University, Canada)
Demo: Disaggregated Dataplanes

Heena Nagda (Georgia Institute of Technology), Rakesh Nagda (University of Pennsylvania), Nik Sultana (University of Pennsylvania), and Boon Thau Loo (University of Pennsylvania)

Demo: Proof-of-Work Network Simulator for Blockchain and Cryptocurrency Research

Simeon Wuthier (University of Colorado, Colorado Springs) and Sang-Yoon Chang (University of Colorado, Colorado Springs)

Demo: Cloak: A Framework for Development of Confidential Blockchain Smart Contracts

Qian Ren (Oxford-Hainan Blockchain Research Institute, China), Han Liu (Oxford-Hainan Blockchain Research Institute, China), Yue Li (Oxford-Hainan Blockchain Research Institute, China), and Hong Lei (Oxford-Hainan Blockchain Research Institute, China; Hainan University, China)

Demo: BubbleNet: Towards Developing an IoT-Based Physically Distant Classroom for Personal Bubbles

Brandon Purvis (University of Northern Iowa, Cedar Falls, Iowa, USA), Dheryta Jaisinghani (University of Northern Iowa, Cedar Falls, Iowa, USA), Sarah Diesburg (University of Northern Iowa, Cedar Falls, Iowa, USA), and Haroon Rashid (University of South Dakota, USA)

Demo: Automatically Retrainable Self Improving Model for the Automated Classification of Software Incidents into Multiple Classes

Badal Agrawal (Microsoft India, India) and Mohit Mishra (Indian Institute of Information Technology Guwahati, India)

Demo: Resource Allocation for Wafer-Scale Deep Learning Accelerator

Huihong Peng (Fuzhou University, China), Longkun Guo (Qilu University of Technology, China), Long Sun (Fuzhou University, China), and Xiaoyan Zhang (Nanjing Normal University, China)

Demo: Discover, Provision, and Orchestration of Machine Learning Inference Services in Heterogeneous Edge

Roberto Morabito (Princeton University) and Mung Chiang (Purdue University)

Demo: A FSM Approach to Web Collaboration

Cristian Gadea (University of Ottawa, Canada), Bogdan Ionescu (University of Ottawa, Canada), and Dan Ionescu (University of Ottawa, Canada)

Poster: Off-Path VoIP Interception Attacks

Tianxiang Dai (Fraunhofer SIT), Haya Shulman (Fraunhofer SIT), and Michael Waidner (Fraunhofer SIT, TU Darmstadt)

Poster: Fragmentation Attacks on DNS over TCP

Tianxiang Dai (Fraunhofer SIT), Haya Shulman (Fraunhofer SIT), and Michael Waidner (Fraunhofer SIT, TU Darmstadt)

Poster: A Tunable Model for Graph Generation Using LSTM and Conditional VAE

Shohei Nakazawa (Nagaoka University of Technology, Japan), Yoshiki Sato (Nagaoka University of Technology, Japan), Kenji Nakagawa (Nagaoka University of Technology, Japan), Sho Tsugawa (University of Tsukuba, Japan), and Kohei Watabe (Nagaoka University of Technology, Japan)
Poster: Function Delivery Network: Extending Serverless to Heterogeneous Computing 1128
Anshul Jindal (Technical University of Munich), Mohak Chadha (Technical University of Munich), Michael Gerndt (Technical University of Munich), Julian Frielinghaus (Technical University of Munich), Vladimir Podolskiy (Technical University of Munich), and Pengfei Chen (Sun Yat-sen University, Guangzhou, China)

Poster: Adaptive Video Offloading in Mobile Edge Computing 1130
Weibin Ma (University of Delaware, USA) and Lena Mashayekhy (University of Delaware, USA)

Poster: Quadratic-Time Algorithms for Optimal Min-Max Barrier Coverage with Mobile Sensors on the Plane 1132
Pei Yao (Fuzhou University, China), Longkun Guo (Qilu University of Technology, China), and Jiguo Yu (Qilu University of Technology, China)

Poster: An Efficient Permissioned Blockchain with Provable Reputation Mechanism 1134
Hongyin Chen (Peking University, China), Zhaohua Chen (Peking University, China), Yukun Cheng (Suzhou University of Science and Technology, China), Xiaotie Deng (Peking University, China), Wenhan Huang (Shanghai Jiao Tong University, China), Jichen Li (Peking University, China), Hongyi Ling (Peking University, China), and Mengqian Zhang (Shanghai Jiao Tong University, China)

Poster: Learning Index on Content-Based Pub/Sub 1136
Cheng Lin (Tongji University, China), Qinpei Zhao (Tongji University, China), and Weixiong Rao (Tongji University, China)

Poster: Approximate Caching for Mobile Image Recognition 1138
James Mariani (Michigan State University, United States of America), Yongqi Han (Michigan State University, United States of America), and Li Xiao (Michigan State University, United States of America)

Poster: Multi-Agent Combinatorial Bandits with Moving Arms 1140
Zhiming Huang (University of Victoria, Canada), Bingshan Hu (University of Victoria, Canada), and Jianping Pan (University of Victoria, Canada)

Poster: WallGuard - A Deep Learning Approach for Avoiding Regrettable Posts in Social Media 1142
Hervais Simo Fhom (Fraunhofer SIT, Germany) and Haya Shulman (Fraunhofer SIT, Germany)

Poster: Privacy Preserving Divisible Double Auction with A Hybridized TEE-Blockchain System 1144
Bingyu Liu (Illinois Institute of Technology), Yuanzhou Yang (Illinois Institute of Technology), Rujia Wang (Illinois Institute of Technology), and Yuan Hong (Illinois Institute of Technology)
A Refined Dijkstra's Algorithm with Stable Route Generation for Topology-Varying Satellite Networks

Zhengjie Luo (Beijing University of Posts and Telecommunications, China), Tian Pan (Beijing University of Posts and Telecommunications, China), Enge Song (Beijing University of Posts and Telecommunications, China), Houtian Wang (China Academy of Space Technology, China), Wenhao Xue (Beijing University of Posts and Telecommunications, China), Tao Huang (Beijing University of Posts and Telecommunications, China), and Yunjie Liu (Beijing University of Posts and Telecommunications, China)

Author Index