Elsevier Information Systems Special Issue on

Emerging Trends and Challenges in Edge-Fog-Cloud Interplay in the Internet of Things (IoT)

The Intelligent Internet of Things (IoT) tsunami and public embracement, and the ubiquitous adoption of devices in virtually every industry is affecting every aspect of life, ranging from smart cars, smart homes, smart cities, smart factories to smart health, and smart environments. The integration of IoT and Cloud Computing has created another paradigm, the cloud IoT, to address some of the major challenges of IoT, such as advanced analytics capabilities and big data storage. However, in the cloud IoT model, the massive amount of data coming from "smart things" needs to be uploaded to the cloud, demanding a considerable amount of available communication bandwidth. Cloud-based IoT model cannot meet the strict computing time requirement in latency-critical applications requiring a real-time operation. An excellent example of such a case is eHealth applications such as arrhythmia monitoring and classification in which volume, variety, and velocity, as well as end-to-end response time and communication bandwidth, should be handled efficiently. Edge or Fog Computing has emerged as a solution to address the drawbacks of Cloud-based IoT solutions in which computing and storage resources are located not only in the cloud but also at the edges near the source of data. Hierarchical collaborative edge-fog-cloud architecture brings tremendous benefits as it makes possible to distribute the intelligence and computation —including data analysis, machine learning (ML) training, and decision making—to achieve an optimal solution while satisfying the given constraints (i.e., optimization for energy versus optimization for latency) of each use case. However, due to the hierarchical, cross-layer, and distributed nature of this IoT model, many challenges from smart things, to network, architecture, algorithms/software, and security still need to be addressed to develop consistent, suitable, scalable, safe, flexible and power-efficient systems. The objectives of this Special Issue (SI) is to address all important aspects of emerging technologies for edge-fog-cloud computing in IoT covering architectures, techniques, protocols, policies, applications, distributed machine learnings, as well as the interaction between edge, fog and cloud analytics. Authors are invited to submit high-quality papers containing original work from either academia or industry reporting novel advances in (but not limited to) the following topics:

- Distributed architectures and reference models.
- Resource Management Mechanisms.
- Service placement, migration and adaptation.
- Low-latency High-reliability energy-efficient network protocols and communications in edge-fog-cloud.
- The impact of 5G technology on edge-fog-cloud interplay.
- Edge-fog-cloud management protocols and policies for workload communication and distribution.
- Privacy and security issues including secure firmware, communications, and strategies to detect and mitigate attacks, as well as Over the air updates for safety IoT devices.
- Trust-Oriented Designs of next-generation hierarchical IoT systems.
- Optimization of the utility-privacy tradeoffs.
- Big-data analytics, machine learning algorithms, and scalable/parallel/distributed algorithms.
- Collaborative distributed machine learning and data analytics from Edge to Fog and Cloud.
- Privacy-preserving Machine Learning and Data Processing solutions in hierarchical IoT solutions.
- Privacy-Preserving Machine Learning (PPML) and Multi-party computation (MPC) techniques.
- Performance monitoring & evaluation.
- Real-world experiences and use cases (eHealth, automotive, transportation and logistics, retail, industry 4.0, etc.)

Important Dates

Submissions Deadline: June 15, 2020
Revision Due: September 15, 2020
Final Manuscript Due: October 30, 2020
First Reviews Due: August 15, 2020
Second Reviews Due/Notification: October 15, 2020
Publication Date: 2020

Submission Guidelines

Solicited original submissions must not be currently under consideration for publication in other venues. Author guidelines are at https://www.journals.elsevier.com/information-systems/.

Guest Editors

Farshad Firouzi, Duke University
Sebastián Ventura, University of Córdoba
Bahar Farahani, Shahid Beheshti University

Advertising Plan and Review Administration

We will advertise this special issue in multiple channels:

- International conferences, including those related to the guest editors or their affiliated institutes. For instance, COINS, IoTBDS, Euromicro, CompArch, DAC, DATE, SAS, MobiHealth, CCNC, SmartComp, Mobiquitous, eHealth 360° Summit, IoT 360° Summit, BSN, VLSI-SoC, ICCAD, ISCA, ICCD, PDP, HPCA, and HPCS.
- Major international mailing lists, e.g. IEEE ComSoC mailing list, Reflective Middleware (distributed computing), etc. and internationally broadcasted newsletters such as IEEE CEDA, and IEEE RAS, and IEEE CASS.
- Partnering institutes of the guest editors, with over 40 partnering universities and institutes worldwide
- WikiCFP, LinkedIn and other online communities

Expected Number of Submissions: 30-40

Estimated Acceptance: ≈ 8-10

Authorship for the Proposed Issue

Guest Editors (GE) will submit at one paper. The main goal is to help readers understand the topic better and potentially stimulate new researchers to work in the area.

Sebastián Ventura is currently a Full Professor in the Department of Computer Science and Numerical Analysis at the University of Córdoba, where he heads the Knowledge Discovery and Intelligent Systems Research Laboratory. He received his B.Sc. and Ph.D. degrees in sciences from the University of Córdoba, Spain, in 1989 and 1996, respectively. He has published three books and about 300 papers in journals and scientific conferences, and he has edited three books and several special issues in international journals. He has also been engaged in 15 research projects (being the coordinator of seven of them) supported by the Spanish and Andalusian governments and the European Union. His main research interests are in the fields of data science, computational intelligence, and their applications. Dr. Ventura is a senior member of the IEEE Computer, the IEEE Computational Intelligence and the IEEE Systems, Man and Cybernetics Societies, as well as the Association of Computing Machinery (ACM).

Bahar Farahani received her M.S., Ph.D., and Postdoctoral degrees in Computer Engineering from the University of Science and Technology, University of Tehran, and Shahid Beheshti University, respectively. She is currently a lecturer at Shahid Beheshti University where he leads the Intelligent IoT Laboratory. She is also the CEO of Pirouzan Group, a top-leading Research and development center that delivers the Internet of Things (IoT), Machine Learning and Data-driven products and services to top-quality organizations and companies. She authored several peer-reviewed Conference/Journal papers as well as book chapters on IoT, Big Data, and AI. Dr. Farahani has served as a Guest Editor of several journals, such as Elsevier Future Generation Computer Systems, Elsevier Microprocessors and Microsystems, IEEE Transactions on Very Large Scale Integration Systems (TVLSI), and IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD). Besides, she has also served in the Technical Program Committee (TPC) of many international conferences/workshops on AI/IoT/eHealth, e.g., in the USA, Portugal, Greece, and the Czech Republic as well as the Technical Chair of COINS conference.

Farshad Firouzi received his M.S., Ph.D., and Postdoctoral degrees in Computer Engineering from University of Tehran, Karlsruhe Institute of Technology, and KU Leuven (IMEC), respectively. Dr. Firouzi is a top-producing expert and technical leader with 10+ years' experience offering strong performance in all aspects of AI/ML, Smart Data, Computer Architecture, VLSI, and IoT including R&D, consulting services, strategic planning, and technology solutions, across vertical industries, e.g., Semiconductor, Automotive, Finance, Manufacturing, Logistics, and eHealth. Dr. Firouzi authored 45+ Conference/Journal papers and the book "Intelligent Internet of Things: From Device to Fog and Cloud," published by Springer. He has served as Guest/Associate Editor of several well-known Journals (e.g., IEEE TVLSI, IEEE TCAD, Elsevier FGCS, and Elsevier MICPRO) as well as chair of 10+ international conferences/workshops on AI/IoT/eHealth, e.g., in the USA, Portugal, Greece, Czech Republic, Spain, and Germany. He is also the founder of IEEE COINS conference (https://coinsconf.com/), which is supported by IEEE IoT, IEEE ComSoc, IEEE CEDA, IEEE CAS, and IEEE RAS. Dr. Firouzi is currently an Assistant Professor at the Electrical and Computer Engineering department of Duke University.