2023 Eighth International Conference on Fog and Mobile Edge Computing (FMEC 2023)

Tartu, Estonia 18-20 September 2023



IEEE Catalog Number: ISBN: CFP23CMP-POD 979-8-3503-1698-8

Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number:	CFP23CMP-POD
ISBN (Print-On-Demand):	979-8-3503-1698-8
ISBN (Online):	979-8-3503-1697-1

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



The Eighth IEEE International Conference on Fog and Mobile Edge Computing (FMEC 2023)

Table of Contents

Keynote Speeches

Keynote 1: Unlocking the Wireless Metaverse with 6G and Artificial Intelligence (AI)	
Professor Walid Saad, Virginia Tech, USA	1
Keynote 2: Large Language Models for Telecom	2
Professor Mérouane Debbah, Khalifa University of Science and Technology Abu Dhabi, UAE	3
Keynote 3: NETWORKING 2030: Metaverse, Extended Reality, Hologram Type and Mulsemedia	
Communication Challenges for 6G/Beyond Wireless Systems	5
Professor Ian F. Akyildiz, Founder and President of the Truva Inc. Advisory Board member at TII	
Keynote 4: Metaverse, Metastability and Beyond	6
Dr. Tania Lorido-Botran, Research scientist at Roblox	0

FMEC2023 Title	Page
Federated Ensemble YOLOv5 - A Better Generalized Object Detection Algorithm	7
Vinit Hegiste, Tatjana Legler and Martin Ruskowski	,
Task Classification for Optimal Offloading and Resource Allocation in Vehicular Edge Compu	ıting
Memona Mubashir, Rizwan Ahmad, Ahsan Saadat, Saqib Rasool Chaudhry, Adnan K. Kiani and	15 IS
Muhammad Mahtab Alam	
Federated Bayesian Network Ensembles	22
Florian van Daalen, Lianne Ippel, Andre Dekkers and Inigo Bermejo	22
Blockchain-Enabled Renewable Energy Traceability with a Crypto-based Arbitrage Pricing	
Model	34
Victor Kebande and Jianguo Ding	
An Overview of using of Artificial Intelligence in Enhancing Security and Privacy in Mobile Security	ocial
Networks	12
Hussam Fakhouri, Sadi Alawadi, Feras Awaysheh, Faten Hamad, Sawsan Alzubi and Mohamed	I Al-
Adwan	
Grey Wolf Optimizer-based Task Scheduling for IoT-based Applications in the Edge Computi	ng 52
Aram Satouf, Ali Hamidoglu, Omer Melih Gul and Alar Kuusik	52
Predictive Machine Learning Analysis for Reliable D2D Discovery in 6G Critical Communicati	ons 58
Ali Masood, Muhammad Mahtab Alam and Yannick Le Moullec	50
Trusted Federated Learning Framework for Attack Detection in Edge Industrial Internet of	
Things	64
Mahendra Pratap Singh, Ashutosh Anand, Aashish Prateek Janaswamy, Sudarshan Sundarraja	n 04
and Maanak Gupta	
Evaluating Distributed Computation Offloading Scalability for Multiple Robots	72
Fatima Ayoub and Rudi Villing	72
Hyperparameters Optimization for Federated Learning System: Speech Emotion Recognition	n
Case Study	80
Kateryna Mishchenko, Samaneh Mohammadi, Mohammadreza Mohammadi and Sima Sinaei	
Trace-based Performance Analysis for Deep Learning in Edge Container Environments	87

	Soyeon Park and Hyokyung Bahn	
-	Towards Energy-Aware Federated Traffic Prediction for Cellular Networks	
	Vasileios Perifanis, Nikolaos Pavlidis, Selim Yilmaz, Francesc Wilhelmi, Elia Guerra, Marco Miozzo,	93
	Pavlos Efraimidis, Paolo Dini and Remous-Aris Koutsiamanis	
	RegAgg: A Scalable Approach for Efficient Weight Aggregation in Federated Lesion	
	Segmentation of Brain MRIs	101
	Muhammad Irfan Khan, Esa Alhoniemi, Elina Kontio, Suleiman A. Khan and Mojtaba Jafaritadi	
	Optical Character Recognition Using Optimized Convolutional Networks Alessia	4.07
	Anum Nawaz, Muhammad Irfan and Tomi Westerlund	107
-	Robust-DSN - Performance and Fault Tolerance of a Distributed Storage Network	445
	Zeeshan Hameed, Hamid R. Barzegar, Nabil El Ioini and Claus Pahl	115
-	Modelling And Simulation For Detecting Vulnerabilities And Security Threats Of SmartContracts	
	Using Machine Learning	123
	Ala Mughaid, Ibrahim Obeidat, Shadi Alzubi, Andaleeb Shdaifat and Razan Alhayina	
-	Enabling on-demand Crowdsourced Federated Learning Over IoT	
	Mehreen Tahir and Muhammad Intizar Ali	128
-	Federated Learning for Early Dropout Prediction on Healthy Ageing Applications	
	Christos Chrysanthos Nikolaidis. Vasileios Perifanis. Nikolaos Pavlidis and Pavlos Efraimidis	135
-	Analyzing Application Response Time Lag: in Mobile Edge and Fog Computing Environments	
	Mohamed Fazil Hussain. Malek Athamnah. Salwa Saveedul Hasan and Hasan Rauf	143
-	Federated Object Detection for Quality Inspection in Shared Production	
	Vinit Hegiste. Tatiana Legler. Kirill Fridman and Martin Ruskowski	151
-	IESF: Interval Event Streaming Format for the Data Lake of Production	
	Michael Zeng, Maximilian Rudack, Mario Moser, Sebastian Ulrich, Avmen Gannouni, Anas	159
	Abdelrazeg, Andreas Bührig-Polaczek and Robert Schmitt	
-	Botnet Detection Using Label Propagation and Batch K-means Clustering for Securing IoT	
	Networks	167
	Muder Almiani, Alia Abughazleh, Ala Mughaid and Yaser Jararweh	
-	Enhanced Decision Mechanism for RAN Subslicing in Management Closed Control Loop	
	Marika Kulmar, Ivo Müürsepp and Muhammad Mahtab Alam	175
-	Histogram-Based Federated XGBoost using Minimal Variance Sampling for Federated Tabular	
	Data	182
	William Lindskog, Christian Prehofer and Sarandeep Singh	
-	Automatic NLOS Classification from Virtual 3D City Models	
	lvo Müürsepp and Muhammad Mahtab Alam	190
-	Distributed Edge Machine Learning Pipeline Scheduling with Reverse Auctions	
	Connor Imes, David King and John Paul Walters	196
-	Genetic Algorithm-Based Dynamic Backdoor Attack on Federated Learning-Based Network	
	Traffic Classification	
	Mahmoud Nazzal, Nura Aljaafari, Ahmed Sawalmeh, Abdallah Khreishah, Muhammad Anan.	204
	Abdulelah Algosaibi, Mohammed Alnaeem, Adel Aldalbahi, Abdulaziz Alhumam, Conrado Vizcarra	
	and Shadan Alhamed	
-	Efficient On-device Transfer Learning using Activation Memory Reduction	24.0
	Amin Yoosefi, Hamid Mousavi, Masoud Daneshtalab and Mehdi Kargahi	210
-	Label-Aware Aggregation for Improved Federated Learning	
	Ahmad Khalil, Aidmar Wainakh, Ephraim Zimmer, Javier Parra-Arnau, Antonio Fernandez Anta,	216
	Tobias Meuser and Ralf Steinmetz	

Federated Learning Showdown: The Comparative Analysis of Federated Learning Frameworks

Sai Praneeth Karimireddy, Narasimha Raghavan Veeraragavan, Severin Elvatun and Jan Franz	224
Nygård	
Communication Topologies for Decentralized Federated Learning	222
Michael Dötzer, Yixin Mao and Klaus Diepold	252
A Federated Learning Benchmark on Tabular Data: Comparing Tree-Based Models and Neural	
Networks	239
William Lindskog and Christian Prehofer	
Federated Boolean Neural Networks Learning	247
Louis Leconte, Van Minh Nguyen and Eric Moulines	247
NebulOuS: A Meta-Operating System with Cloud Continuum Brokerage Capabilities	
Yiannis Verginadis, Christos-Alexandros Sarros, Mario Reyes de Los Mozos, Simeon Veloudis,	254
Radosław Piliszek, Nicolas Kourtellis and Geir Horn	
An Investigation of Recent Backdoor Attacks and Defenses in Federated Learning	262
Qiuxian Chen and Yizheng Tao	202
ART4FL: An Agent-based Architectural Framework for Trustworthy Federated Learning in the	
IoT	270
Fahed Alkhabbas, Sadi Alawadi, Majed Ayyad, Romina Spalazzese and Paul Davidsson	
Zero-Touch privacy preserving provisioning in an Edge-, Fog-, and Cloud environment	276
Raphael Schermann, Simone Bussa, Rainer Urian and Christian Steger	270
An embedded low-cost solution for a fog computing device on the Internet of Things	204
Pietro d'Agostino, Massimo Violante and Gianpaolo Macario	204
Securing the Digital Fortress: Unveiling the Modern Battleground for Sustainable OSs and the	
Digital Threatscape	292
Shadi Alzubi, Muder Almiani, Ala Mughaid, Samar Hendawi and Islam Al Talahin	