

2021 Ninth International Symposium on Computing and Networking (CANDAR 2021)

Virtual Conference
23 – 26 November 2021



IEEE Catalog Number: CFP2119X-POD
ISBN: 978-1-6654-4247-3

**Copyright © 2021 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:	CFP2119X-POD
ISBN (Print-On-Demand):	978-1-6654-4247-3
ISBN (Online):	978-1-6654-4246-6
ISSN:	2379-1888

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

CURRAN ASSOCIATES INC.
proceedings
.com

2021 Ninth International Symposium on Computing and Networking (CANDAR)

CANDAR 2021

Table of Contents

Message from the Organizers	ix
Conference Organizers	x
Program Committee	xii
Reviewers	xvi

Long Papers

Accelerate CNN Models via Filter Pruning and Sparse Tensor Core	1
<i>An-Tai Chen (National Taiwan University, Taiwan), Pangfeng Liu (National Taiwan University, Taiwan), Ding-Yong Hong (Academia Sinica, Taiwan), and Jan-Jan Wu (Academia Sinica, Taiwan)</i>	
Efficient Multi-Party Contact Tracing	10
<i>Mathieu de Goyon (Osaka University, Japan), Atsuko Miyaji (Osaka University, Japan), and Yangguang Tian (Osaka University, Japan)</i>	
Solving the Sparse QUBO on Multiple GPUs for Simulating a Quantum Annealer	19
<i>Tomohiro Imanaga (Hiroshima University, Japan), Koji Nakano (Hiroshima University, Japan), Ryota Yasudo (Hiroshima University, Japan), Yasuaki Ito (Hiroshima University, Japan), Yuya Kawamata (NTT DATA Corporation, Japan), Ryota Katsuki (NTT DATA Corporation, Japan), Shiro Ozaki (NTT DATA Corporation, Japan), Takashi Yazane (NTT DATA Corporation, Japan), and Kenichiro Hamano (NTT DATA Corporation, Japan)</i>	
Hip to Be (Latin) Square: Maximal Period Sequences from Orthogonal Cellular Automata	29
<i>Luca Mariot (Delft University of Technology, The Netherlands)</i>	
An Intrusion Detection System for Imbalanced Dataset Based on Deep Learning	38
<i>Mariama Mbow (Kyushu University, Japan), Hiroshi Koide (Kyushu University, Japan), and Kouichi Sakurai (Kyushu University, Japan)</i>	
Efficient Final Exponentiation for Pairings on Several Curves Resistant to Special TNFS	48
<i>Yuki Nanjo (Okayama University, Japan), Masaaki Shirase (Future University Hakodate, Japan), Yuta Kodera (Okayama University, Japan), Takuya Kusaka (Okayama University, Japan), and Yasuyuki Nogami (Okayama University, Japan)</i>	

Low-Latency High-Bandwidth Interconnection Networks by Selective Packet Compression	56
<i>Naoya Niwa (Keio University, Japan), Hideharu Amano (Keio University, Japan), and Michihiro Koibuchi (National Institute of Informatics, Japan)</i>	
Trajectory Anonymization through Laplace Noise Addition in Latent Space	65
<i>Yuiko Sakuma (Keio University, Japan), Thai P. Tran (Keio University, Japan), Tomomu Iwai (Keio University, Japan), Akihito Nishikawa (Keio University, Japan), and Hiroaki Nishi (Keio University, Japan)</i>	

Regular Papers

Group Signatures with Designated Traceability	74
<i>Hiroaki Anada (University of Nagasaki, Japan), Masayuki Fukumitsu (Hokkaido Information University, Japan), and Shingo Hasegawa (Tohoku University, Japan)</i>	
On the Performance of Hidden Markov Model Spectrum Opportunity Forecast on Limited Observed Channel Activity	81
<i>Rodrigo Feitosa Bezerra (University of Brasilia, Brazil), Jacir Luiz Bordim (University of Brasilia, Brazil), Marcus Vinicius Lamar (University of Brasilia, Brazil), and Marcos Fagundes Caetano (University of Brasilia, Brazil)</i>	
A State Transfer Method That Adapts to Network Bandwidth Variations in Geographic State Machine Replication	88
<i>Tairi Chiba (Toyohashi University of Technology, Japan), Ren Ohmura (Toyohashi University of Technology, Japan), and Junya Nakamura (Toyohashi University of Technology, Japan)</i>	
M-KUBOS/PYNQ Cluster for Multi-Access Edge Computing	95
<i>Takumi Inage (Keio University, Japan), Kazuei Hironaka (Keio University, Japan), Kensuke Iizuka (Keio University, Japan), Kohei Ito (Keio University, Japan), Yasuyu Fukushima (Keio University, Japan), Mitaro Namiki (Tokyo University of Agriculture and Technology, Japan), and Hideharu Amano (Keio University, Japan)</i>	
PZLAST: An Ultra-Fast Sequence Similarity Search Tool Implemented on a MIMD Processor	102
<i>Hitoshi Ishikawa (PEZY Computing, K.K., Japan), Hiroshi Mori (National Institute of Genetics, Japan), Koichi Higashi (National Institute of Genetics, Japan), Yoshiaki Kato (RIKEN, Japan), Tomofumi Sakai (Infinite Curation, Inc., Japan), Toshikazu Ebisuzaki (RIKEN, Japan), and Ken Kurokawa (National Institute of Genetics, Japan)</i>	
Efficient and Large Scale Pre-Training Techniques for Japanese Natural Language Processing..	108
<i>Akihiko Kasagi (Fujitsu Ltd., Japan), Masahiro Asaoka (Fujitsu Ltd., Japan), Akihiro Tabuchi (Fujitsu Ltd., Japan), Yosuke Oyama (Fujitsu Ltd., Japan), Takumi Honda (Fujitsu Ltd., Japan), Yasufumi Sakai (Fujitsu Ltd., Japan), Thang Dang (Fujitsu Ltd., Japan), and Tsuguchika Tabaru (Fujitsu Ltd., Japan)</i>	

Area-Efficient Binary and Ternary CNN Accelerator Using Random-Forest-Based Approximation ...	
114	

Kaisei Kimura (University of Aizu, Japan), Sho Yatabe (University of Aizu, Japan), Sora Isobe (University of Aizu, Japan), Yoichi Tomioka (University of Aizu, Japan), Hiroshi Saito (University of Aizu, Japan), Yukihide Kohira (University of Aizu, Japan), and Qiangfu Zhao (University of Aizu, Japan)

Cost-Performance Evaluation of Heterogeneous Tierless Storage Management in a Public Cloud...	
121	

Reika Kinoshita (Fujitsu Ltd., Japan), Satoshi Immamura (Fujitsu Ltd., Japan), Lukas Vogel (Technical University of Munich, Germany), Satoshi Kazama (Fujitsu Ltd., Japan), and Eiji Yoshida (Fujitsu Ltd., Japan)

Dementia Sign Detection System Using Digital Twin	127
<i>Toru Kobayashi (Nagasaki University, Japan), Kazuki Fukae (Nagasaki University, Japan), Tetsuo Imai (Hiroshima City University, Japan), and Kenichi Arai (Nagasaki University, Japan)</i>	

Browser-Based Manipulation of Virtual Objects through MVVM Architecture with Data Binding	
134	

Kentaro Nagaki (Hiroshima University, Japan) and Satoshi Fujita (Hiroshima University, Japan)

A Strongly Unlinkable Group Signature Scheme with Matching-Based Verifier-Local Revocation for Privacy-Enhancing Crowdsensing	141
---	-----

Yuto Nakazawa (Hiroshima University, Japan) and Toru Nakanishi (Hiroshima University, Japan)

A Construction Method of Final Exponentiation for a Specific Cyclotomic Family of Pairing-Friendly Elliptic Curves with Prime Embedding Degrees	148
---	-----

Yuki Nanjo (Okayama University, Japan), Masaaki Shirase (Future University Hakodate, Japan), Yuta Kodera (Okayama University, Japan), Takuya Kusaka (Okayama University, Japan), and Yasuyuki Nogami (Okayama University, Japan)

An Asynchronous P System with a DPLL Algorithm for Solving a Satisfiability Problem	155
<i>Takuya Noguchi (Kyushu Institute of Technology, Japan) and Akihiro Fujiwara (Kyushu Institute of Technology, Japan)</i>	

Evaluation of an HLS-Based Heterogeneous Redundant Design Approach for Functional Safety Systems on FPGAs	162
---	-----

Taichi Saikai (Nagasaki University, Japan), Kotoko Miyata (Nagasaki University, Japan), Taito Manabe (Nagasaki University, Japan), and Yuichiro Shibata (Nagasaki University, Japan)

Semi-Uniform Deployment of Mobile Robots in Perfect ℓ -ary Trees	168
<i>Masahiro Shibata (Kyushu Institute of Technology, Japan) and Sébastien Tixeuil (Sorbonne Université, France)</i>	

Reducing Revocation Lists in CS-Based Revocable Group Signature Scheme Using Vector Commitment	175
--	-----

Kouhei Sugimoto (Hiroshima University, Japan) and Toru Nakanishi (Hiroshima University, Japan)

Visual Studio Code Extension and Auto-Completion for Mizar Language	182
<i>Hiroto Taniguchi (Yamaguchi University, Japan) and Kazuhisa Nakasho (Yamaguchi University, Japan)</i>	

Implementation and Evaluation of Ring Oscillator-Based True Random Number Generator	189
<i>Naoya Torii (Soka University, Japan), Ryuichi Minagawa (Soka University, Japan), Hideaki Kevin Omae (Soka University, Japan), and Kotaro Hayashi (Soka University, Japan)</i>	
A Proposal of Code Modification Problem for Web Client Programming Using JavaScript	196
<i>Khaing Hsu Wai (Okayama University, Japan), Nobuo Funabiki (Okayama University, Japan), Khin Thet Mon (Okayama University, Japan), San Hay Mar Shwe (Okayama University, Japan), Htoo Htoo Sandi Kyaw (Okayama University, Japan), and Khin Sandar Lin (Pathein University, Myanmar)</i>	
Template Protected Fingerprint Verification Using Set Similarity-Based Minutia Cylinder Code and MinHash	203
<i>Yoshiko Yasumura (Hitachi, Ltd., Japan), Masakazu Fujio (Hitachi, Ltd., Japan), Wataru Nakamura (Hitachi, Ltd., Japan), Yosuke Kaga (Hitachi, Ltd., Japan), and Kenta Takahashi (Hitachi, Ltd., Japan)</i>	
Author Index	211