2023 2nd International Conference on
Intelligent Computing and Next Generation Networks

ICNGN2023
Conference Schedule

Hangzhou, China
November 17-18, 2023
https://www.icngn.org

Spectrum Academy IEEE Compendex on Engineering Village Scopus

Welcome Messages

Dear Colleagues and Friends,

It is a great plea sure and honor to invite you to 2023 2nd International Conference on Intelligent Computing and Next Generation Networks (ICNGN 2023) will take place in Hangzhou, China, in November 17-18, 2023. We are excited about the opportunities of holding an innovative hybrid conference and reaching a wider audience that a conference can include. Participants from around the world are expected to actively participate in this event.

The theme for this conference is innovating and inspiring the researchers to adopt the outcome for implementation. The objectives of the ICNGN are to bridge the knowledge gap between academia and industry and promote research esteem in intelligent computing and next generation networks. It is expected that researchers will bring new prospects for collaboration across disciplines and gain ideas facilitating novel breakthroughs.

Many thanks go out to the members of the TPC and the Organizing Committee for their input and support.

You can expect a very fruitful and enjoyable time during the conference. We look forward to welcoming you for the ICNGN2023.

Welcome to Hangzhou and enjoy the Conference!

Organizing Committee of ICNGN2023

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Dr. Muhamamd Asif Khan, Qatar University, Qatar

ICASIS2023

Time Schedule (Beijing Time, UTC/GMT+8)

November 17, 2023 UTC/GMT+8 (Online in ZOOM)		
Speaker's time slot	**Standard Time (Beijing UTC/GMT+8)**	**Presentation Information**
Keynote Session 1		
9:00-9:30AM UTC/GMT+8	9:00-9:30 AM	**Reconfigurable Intelligent Surface Aided MIMO Communications: Challenges and Opportunities** Xiaojun Yuan | University of Electronic Science and Technology of China, China
Invited Session 1		
November 16 22:30-23:00 PM UTC/GMT-3	9:30-10:00 AM	**HealthGuard: Blockchain-Powered Healthcare Data Security** Gabriel Gomes de Oliveira | State University of Campinas, Brazil
10:00-10:30AM UTC/GMT+8	10:00-10:30 AM	**Reconfigurable intelligent surface enabled future network** Ruiqi (Richie) Liu | Wireless Research Institute, ZTE Corporation, China
16:30-17:00 PM UTC/GMT+12	10:30-11:00 AM	**Towards Robust Foundation Model: Adversarial Contrastive Learning** Jingfeng Zhang | University of Auckland, New Zealand
11:00-11:30 UTC/GMT+8	11:00-11:30 AM	Chengnian Long | Shanghai Jiao Tong University, China
Keynote Session 2		
11:30-12:00 AM UTC/GMT+8	11:30-12:00 AM	Changxu (Sean) Wu| Tsinghua University, China
	12:00-13:00 pm	**Break**
Keynote Session 3		
8:00-08:30 AM UTC/GMT+3	13:00-13:30 PM	**Towards Extreme Band Communications** Mohamed-Slim Alouini | King Abdullah University of Science and Technology (KAUST), Saudi Arabia
Invited Session 2		
13:30-14:00 PM UTC/GMT+8	13:30-14:00 PM	**Real-Time Scene Recovery** Tieyong Zeng | The Chinese University of Hong Kong (CUHK), China

ICASIS2023

November 17, 2023 UTC/GMT+8 (Online in ZOOM)		
Speaker's time slot	**Standard Time (Beijing UTC/GMT+8)**	**Presentation Information**
Invited Session 2		
14:00-14:30 PM UTC/GMT+8	14:00-14:30 PM	**Brain-inspired Computing with Emerging Memristors: Opportunity and challenges** Yishu Zhang | Zhejiang University, China
Oral Session		
8:30-8:45 PM UTC/GMT+2	14:30-14:45 PM	**The Two Sides of AI in Cybersecurity: Opportunities and Challenges** Mowafaq Salem Alzboon | Jadara University, Jordan
6:45-7:00 PM UTC/GMT+0	14:45-15:00 PM	**Detection of asphalt roads degradation using Deep Learning applied to Unmanned Aerial Vehicle imagery** Adama COULIBALY | University Gaston Berger, Senegal
November 16 23:00-23:15 PM UTC/GMT-8	15:00-15:15 PM	**A Comprehensive Study on Model Initialization Techniques Ensuring Efficient Federated Learning** Adwaita Janardhan Jadhav | San Diego, USA
Online Poster		
Online Poster	**ID 64** **Wenxiu Zhang**	P4-DVPF: Dynamic Verification of Packets Forwarding Based on P4 for SDN
Online Poster	**ID 71** **Yian Zhu**	A Physical Demonstration System for Time-Sensitive Networking in In-vehicle Environment
Online Poster	**ID 79** **Ibrahima DIAGNE**	Land monitoring system: Comparison of traditional machine learning and U-Net convolutional neural networks approaches applied to semantic segmentation of drone imagery
Online Poster	**ID 89** **Chuhan Ni**	Intelligence Fiber Optic Sensors used in Gas transmission pipeline monitoring
Online Poster	**ID 92** **Yiren Zhou**	Exploring the Characteristics of Popular Deep Learning GitHub Repositories
Online Poster	**ID 99** **Zhe Li**	Research on ATP Technology in Small Zoom Wireless Optical Communication

Keynote Speakers

Xiaojun Yuan

University of Electronic Science and Technology of China, China

Xiaojun Yuan (Senior Member, IEEE) received the Ph.D. degree in electrical engineering from the City University of Hong Kong, Hong Kong, in 2009. From 2009 to 2011, he was a Research Fellow with the Department of Electronic Engineering, the City University of Hong Kong. He was also a Visiting Scholar with the Department of Electrical Engineering, the University of Hawaii at Manoa, Honolulu, HI, USA, in spring and summer 2009, and in the same period of 2010. From 2011 to 2014, he was a Research Assistant Professor with the Institute of Network Coding, The Chinese University of Hong Kong. From 2014 to 2017, he was an Assistant Professor with the School of Information Science and Technology, ShanghaiTech University, Shanghai, China. He is currently a state-specially-recruited Professor with the University of Electronic Science and Technology of China, Chengdu, China. He has authored or coauthored more than 220 peer-reviewed research papers in the leading international journals and conferences in the related areas. His research interests include signal processing, machine learning, and wireless communications, including but not limited to intelligent communications, structured signal reconstruction, Bayesian approximate inference, and distributed learning. He was on several technical programs for international conferences. He was the Editor of IEEE leading journals, including IEEE Transactions on Wireless Communications and IEEE Transactions on Communications. He was the co-recipient of the Best Paper Award of IEEE International Conference on Communications (ICC) 2014, the Best Journal Paper Award of IEEE Technical Committee on Green Communications and Computing (TCGCC) 2017, and IEEE Heinrich Hertz Award for Best Communication Letter 2022.

Title: Reconfigurable Intelligent Surface Aided MIMO Communications: Challenges and Opportunities

Abstract: Reconfigurable intelligent surface (RIS) is regarded as one of the candidate technologies to enable next-generation wireless communications (6G). A RIS is made of a large number of low-cost reconfigurable elements, a.k.a. meta-atoms or unit cells, that are able to control how incident electromagnetic (EM) waves are reflected. The unit cells of a RIS can be designed to cooperatively achieve specific purposes, such as scattering the impinging waves, absorbing the impinging waves, and focusing the reflected wave to certain directions. In this talk, we introduce the channel modeling, optimization, and capacity analysis of RIS-assisted MIMO systems. First of all, we propose a partition-based passive beamforming method to reduce the number of variables to be optimized, thereby reducing computational overhead. Then, we propose a near-field RIS-assisted MIMO channel model based on the spherical-wave assumption. Based on the established channel model, we study the spatial multiplexing capability of the cascaded line-of-sight MIMO channel, and analyze the capacity of the system by jointly optimizing the active and passive beamforming, and the transceiver array orientations.

Keynote Speakers

Changxu (Sean) Wu

Tsinghua University, China

Dr. Wu graduated from the Department of Industrial and Operations Engineering at the University of Michigan Ann Arbor in 2007. After graduation, he worked as an assistant professor, associate professor, and tenured full professor at the State University of New York and the University of Arizona in the United States. In 2020, he was selected to return to China as a full-time tenured full professor at Tsinghua University. Dr. Wu's research integrates cognitive science and engineering systems design, and is committed to modeling human cognitive systems and their applications in system design, improving the safety and efficiency of human-computer systems, promoting human performance in human-computer interaction and optimizing human workload. Dr. Wu has published 133 papers in the field of human factors engineering, including 95 journal papers, 36 conference papers, 2 English monograph chapters, and a number of intelligent system design patents. IEEE Transactions on Intelligent Transportations Systems, MAN, and Cybernetics, IEEE Transactions on Intelligent Transportations Systems, Psychological Review (Impact Factor: 9.02), ACM Transactions on Computer-Human Interaction, and several other journals. He has served as Chair of the Human Performance Modeling Technology Group of the International Society for Human Factors Engineering (HFES). He is also an associate editor of four international SCI journals: IEEE Transactions on Human Machine Systems, IEEE Transactions on Intelligent Transportation Systems (IEEE Intelligent Transportation Systems), Human Factors and Ergonomics in Manufacturing & Service Industries, Behaviour & Information Technology. In 2015, he received the Senior Fellow of the Year Award from the Dean of the School of Engineering and Applied Sciences at the State University of New York at Buffalo. Dr. Wu trained students to work in Pennsylvania State University and other famous universities, as well as the United States General Motors, General Electric, Lenovo and other major enterprises.

Mohamed-Slim Alouini

King Abdullah University of Science and Technology (KAUST), Saudi Arabia

Mohamed-Slim Alouini was born in Tunis, Tunisia. He received the Ph.D. degree in Electrical Engineering from the California Institute of Technology (Caltech) in 1998. He served as a faculty member at the University of Minnesota then in the Texas A&M University at Qatar before joining in 2009 the King Abdullah University of Science and Technology (KAUST) where he is now a Distinguished Professor of Electrical and Computer Engineering. Prof. Alouini is a Fellow of the IEEE and OPTICA (Formerly the Optical Society of America (OSA)). He is currently particularly interested in addressing the technical challenges associated with the uneven distribution, access to, and use of information and communication technologies in rural, low-income, disaster, and/or hard-to-reach areas.

Title: Towards Extreme Band Communications

Abstract: A rapid increase in the use of wireless services over the last few decades has led to the problem of radio-frequency (RF) spectrum exhaustion. More specifically, due to this RF spectrum scarcity, additional RF bandwidth allocation, as utilized in the recent past over "traditional bands", is not anymore enough to fulfill the demand for more wireless applications and higher data rates. The talk goes first over the potential offered

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by extreme band communication (XB-Com) systems to relieve spectrum scarcity. Indeed, mm-wave, THz, and free space optics broadband wireless systems recently attracted several research interests worldwide due to the progress in electronics and photonics technologies. By utilizing these extreme frequency bands and employing extreme large bandwidths, the 6G target data rates over 100 Gbps could be achieved. The talk then summarizes some of the challenges that need to be surpassed before such kinds of systems can be deployed. For instance, it explains how the THz transmission band has immunity against the fog compared with the optical one, while being affected by the rain as it is the case for the mm-wave band. In addition, the role of ultra-massive multiple-input multiple-output (UM-MIMO) systems and reconfigurable intelligent surfaces in overcoming the distance problem at very high frequencies will be discussed. Finally, the talk offers an overview of some recent studies illustrating how these different XB-Com technologies can collaborate to increase emerging and future networks' reliability and coverage while maintaining their high capacity.

Invited Speakers

Gabriel Gomes de Oliveira

University of Campinas (UNICAMP), Brazil

He is currently a Researcher at the State University of Campinas (UNICAMP). Develops research projects related to: Artificial Intelligence (AI), Big Data, Intelligent Information Systems (IIS), Internet of Things (IoT), Intelligent Transportation Systems (ITS), Smart Cities, and Sensors. Reviewer of several Congresses and Journals, such as, (ACM, Elsevier, SAGE, Hindawi, IEEE, IET, Taylor Francis, Springer, and Wiley, among others) of national scope and mainly international, with more than 1200 Revisions, recognized by Publons or with Certificates issued. In addition to numerous publications in Conferences (ACM, IEEE, and Springer), and High Impact Factor Journals. YP Chair IEEE Sensor and Systems Joint Council South Brazil (2022 to date). Finally, Editor of Special Series of Scientific Journals, Editor of Springer Nature, (Smart Innovation, Systems, and Technologies), and IOP Publisher Invited to join as Associate Editor of Journals: IET Circuits, Devices & Systems and IET Wireless Sensor Systems (2022 -2025). And Academic Editor of the Journal PLOS ONE.

Title: HealthGuard: Blockchain-Powered Healthcare Data Security

Abstract: Healthcare information is sensitive and private. Consequently, users must ensure that their medical data is treated confidentially, securely, and privately. Medical data is easily stolen, altered, or even deleted entirely. If the situation happens, medical data cannot be logged or retrieved reliably, which delays treatment progress and even endangers the patient's life. Conventional methods of medical data storage led to threats of data by attackers. Significantly, medical applications face se-curity problems like data stealing. The Blockchain overcomes the security issue in medical applications, since its features, such as decentralization, cryptography-based security, immutability, and consensus algorithms, store medical data in a secure way called blocks and shared keys. This work highlights the decentralized medical data storage on different blockchain networks and its performance.

Chengnian Long

Shanghai Jiao Tong University, China

Chengnian Long is a tenured professor of Department of Automation, School of Electronic Information and Electrical Engineering, Shanghai Jiao Tong University. He is Deputy Director at Blockchain Research Center, Shanghai Jiao Tong University and adjunct professor at Intelligent Connected Electric Vehicle Innovation Center, Shanghai Jiao Tong University. His research interest mainly focuses on the Intelligent Connected Systems(ICS), including Artificial Intelligence of Things (AIoT), Blockchain, and Distributed Autonomous System. He was the Editor of IEEE Transactions on Intelligent Transportation Systems, IEEE Blockchain Technical Briefs and IET Blockchain. He is a senior member ofthe IEEE.

Ruiqi (Richie) Liu

Wireless Research Institute, ZTE Corporation, China

Ruiqi (Richie) Liu (S'14-M'20) received the B.S. and M.S. degree (with honors) in electronic engineering from the Department of Electronic Engineering, Tsinghua University in 2016 and 2019 respectively. He is now a master researcher in the wireless and computing research institute of ZTE Corporation, responsible for long-term research as well as standardization. His main research interests include reconfigurable intelligent surfaces, integrated sensing and communication and wireless positioning. He

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seeking motivated individuals who are willing to pursue a PhD degree under Jingfeng's is the author or co-author of several books and book chapters. He has participated in national key research projects as the researcher or research lead. During his 3-year service at 3GPP from 2019 to 2022, he has authored and submitted more than 500 technical documents with over 100 of them approved, and he served as the co-rapporteur of the work item (WI) on NR RRM enhancement and the feature lead of multiple features. He currently serves as the Vice Chair of ISG RIS in the ETSI. He actively participates in organizing committees, technical sessions, tutorials, workshops, symposia and industry panels in IEEE conferences as the chair, organizer, moderator, panelist or invited speaker. He served as the guest editor for Digital Signal Processing and the lead guest editor for the special issue on 6G in IEEE OJCOMS. He serves as the Deputy Editor-in-Chief of IET Quantum Communication and the Editor of ITU Journal of Future and Evolving Technologies (ITU J-FET). He is the Standardization Officer for IEEE ComSoc ETI on reconfigurable intelligent surfaces (ETI-RIS) and the Standards Liaison Officer for IEEE ComSoc Signal Processing and Computing for Communications Technical Committee (SPCC-TC). His recent awards include the 2022 SPCC-TC Outstanding Service Award and the Beijing Science and Technology Invention Award (Second Prize, 2022).

Title: Reconfigurable intelligent surface enabled future network

Abstract: Recently, reconfigurable intelligent surfaces (RISs) are considered as a strong candidate for next generation wireless technologies, thanks to its advantage of being able to configure the wireless propagation environment in a cost-effective and energy-efficient way. Many literature study the theoretical aspects of RIS-assisted communication while prototyping and field trials are only starting to appear. A key step towards the standardization and commercialization of RISs is to complete comprehensive field trials in cellular networks, such as the 5th generation (5G) network. There are several typical deployment scenarios in 5G networks such as indoors, outdoors and mixed indoors and outdoors, where RISs can provide coverage to weak reception areas, enhance transmission robustness, fix coverage holes and increase the maximum available data rate. In this talk, a variety types of RIS prototypes are fabricated and tested with off-theshelf 5G user equipments (UEs) in 5G networks to validate the performance gain introduced by RISs to typical deployment scenarios of 5G at different working frequencies. Some system-level simulations are also conducted for several typical scenarios to be used as a baseline to compare to the trial results, where all parameters are selected according to 5G standards. The experimental results confirm the feasibility and effectiveness of RISs to solve coverage issues and improve received signal qualities in 5G networks across different frequency ranges. The potential standardization roadmap and future plans for RIS to become a vital component of 5G-Adv and 6G networks are also given.

Jingfeng Zhang

University of Auckland, New Zealand

Jingfeng Zhang is tenured assistant professor at the University of Auckland, and also a scientist at the "Imperfect Information Learning Team'' in RIKEN-AIP. He serves as guest lecturer at the University of Tokyo in 2022-2023 and serves as main lecturer at the University of Auckland, giving machine learning related courses.

He serves as an associate editor for IEEE Transactions on Artificial Intelligence. He is a long-standing reviewer for prestigious ML conferences such as ICLR, ICML, NeurIPS, etc. His long-term research interest is to build a secure and responsible ML environment. Jingfeng is now PhD Accredited Supervisor at the University of Auckland, and actively

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supervision. Jingfeng is now interested in robust foundation models.

He obtained his Ph.D. degree at the School of Computing at the National University of Singapore. He was the PI of multiple grants, including "JST Strategic Basic Research Programs, ACT-X, FY2021-2023", "JSPS Grants-in-Aid for Scientific Research (KAKENHI), Early-Career Scientists, FY2022-2023", "RIKEN-Kyushu Univ Science & Technology Hub Collaborative Research Program, FY2022", and was a recipient of the RIKEN Ohbu Award 2021 (50 recipients each year in all RIKEN's disciplines).

Title: Towards Robust Foundation Model: Adversarial Contrastive Learning

Abstract: Foundation models (e.g., Generated Pretrained Transformer (GPT), Stable Diffusion, CLIP, etc.) trained on the unlabeled data at scale that can be then adapted to a wide range of downstream tasks. However, on deployment in critical applications, foundation model are vulnerable to adversarial perturbations that negatively affect all downstream applications. Therefore, we need to develop robust foundation models. To this end, we study adversarial contrastive learning (ACL) that is fundamental machine learning algorithm to build robust foundation models.

First, we constructed a causal theoretical framework to formulate the ACL, which inspires to design a superior algorithm that achieves a new state-of-the-art robustness transferability. Furthermore, we built the RobustSSL benchmark https://robustssl.github.io that can objectively and comprehensively compare all existing ACL algorithms.

Second, we built an efficient ACL via Robustness-Aware Coreset Selection (RCS). We translate the RCS problem to (weak) submodular set optimization problem with cardinality constraint, in which the greed search is efficient and can also guarantee the optimality to some extent. In particular, with the RCS, we are the first to apply ACL on large-scale ImageNet dataset. Thus, we prove the concept of possibility of applying ACL on large-scale foundation models.

Tieyong Zeng

The Chinese University of Hong Kong (CUHK), Hong Kong, China

Dr. Tieyong Zeng is a Professor at the Department of Mathematics, The Chinese University of Hong Kong (CUHK). Together with colleagues, he has founded the Center for Mathematical Artificial Intelligence (CMAI) since 2020 and served as the director of CMAI. He received the B.S. degree from Peking University, Beijing, China, the M.S. degree from Ecole Polytechnique, Palaiseau, France, and the Ph.D. degree from the University of Paris XIII, Paris, France, in 2000, 2004, and 2007, respectively. His research interests include image processing, optimization, artificial intelligence, scientific computing, computer vision, machine learning, and inverse problems. He has published around 100 papers in the prestigious journals such as SIAM Journal on Imaging Sciences, SIAM Journal on Scientific Computing, Journal of Scientific Computing, IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), International Journal of Computer Vision (IJCV), IEEE Transactions on Neural Networks and Learning

Systems (TNNLS), IEEE Transactions on Image Processing (TIP), IEEE Medical Imaging (TMI), and Pattern Recognition. He is laureate of the 2021 Hong Kong Mathematical Society (HKMS) Young Scholars Award, due to the significant contributions in mathematical imaging and data science

Title: Real-Time Scene Recovery

Abstract: Scene recovery is a fundamental imaging task with several practical applications, including video surveillance and autonomous vehicles, etc. In this talk, we

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provide a new real-time scene recovery framework to restore degraded images under different weather/imaging conditions, such as underwater, sand dust and haze. A degraded image can actually be seen as a superimposition of a clear image with the same color imaging environment (underwater, sand or haze, etc.). Mathematically, we can introduce a rank-one matrix to characterize this phenomenon, i.e., rank-one prior (ROP). Using the prior, a direct method with the complexity O(N) is derived for real-time recovery. For general cases, we develop ROP + to further improve the recovery performance. Comprehensive experiments of the scene recovery illustrate that our method outperforms competitively several state-of-the-art imaging methods in terms of efficiency and robustness.

Yishu Zhang

Zhejiang University, China

Dr. Yishu Zhang is a researcher of the Science and Technology Hundred Talents Program of the School of Micro-Nano Electronics, Zhejiang University. He graduated from Jilin University with a bachelor's degree in Microelectronics in 2014. In 2019, he received a doctorate in engineering from the Singapore University of Technology and Design, and later served as a postdoctoral researcher at the National University of Singapore. During his Ph.D. study, he was engaged in neuromorphic computing research at Sungkyunkwan University in South Korea and the Institute of Information and Communications in Singapore. The main research directions include the design and development of brain-inspired smart chips based on new memristive devices and biocompatible biological smart electronic chips. During his doctoral period, he designed and developed biologically similar ultra-low power artificial neurons and synaptic devices, laying a solid foundation for the realization of large-scale artificial intelligence chips. Relevant results have been published in top international academic journals such as Nature Communications, Nano Letters, Small and Applied Physics Letters. In the Singapore Industrial Symposium, the research results have won several poster awards from internationally renowned semiconductor companies such as AMD, MediaTek and STMicroelectronics. In addition, he won the 2019 National Scholarship for Outstanding Self-Financed International Students.

Title: Brain-inspired Computing with Emerging Memristors: Opportunity and challenges

Abstract: As Moore's law approaching the end, neuromorphic computation – brain inspired computation - has emerged as one of the most promising technologies to continue the advancement of computing systems as it shows great potentials of improving the computational efficiency over conventional von-Neumann based computing paradigms in terms of energy efficiency and cognitive capability, such as learning and decision making. Aiming at overcoming the fundamental issue of von Neumann bottleneck and realization of human-level intelligence ultimately, neuromorphic systems try to implement large-scale artificial neural network (ANN) on hardware by emulating of the functions of biological neurons and synapses –the basic building blocks of nervous system. To this end, developing highly scalable and energy-efficient artificial neurons and synapses with bio-plausible functions is critical but remains great challenges. However, conventional complementary metal-oxide-semiconductor (CMOS) devices with binary states and complicated auxiliary circuits, cannot accommodate such requirements due to energy and areal inefficiencies. The recent advances in memristive nano-devices has opened up new avenues for implementing large-scale full memristive neural networks (FMNN) comprising memristive neurons and synapses because of unique analogue properties.

Oral Session

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Mowafaq Salem Alzboon

Jadara University, Jordan

Title: The Two Sides of AI in Cybersecurity: Opportunities and Challenges

Abstract: The advancement of artificial intelligence (AI) over the past several years has enabled businesses to identify and respond to cyberattacks in real-time. Nevertheless, its implementation is fraught with difficulties and dangers, such as possibly introducing bias and producing unpredictable results. For enterprises to make responsible and productive use of AI, they must take measures to reduce the dangers and difficulties outlined above. When enterprises do so, they can design cybersecurity solutions that are effective but also ethical and trustworthy, protecting against threats while retaining trust and transparency.

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Adama COULIBALY

University Gaston Berger, Senegal

Title: Detection of asphalt roads degradation using Deep Learning applied to Unmanned Aerial Vehicle imagery

Abstract: Asphalt roads deteriorate over time due to wear and tear, weather conditions and the effect of traffic loads. These degradations cause enormous damage to road users and economic losses to countries. In Senegal, the inspection of roads for maintenance purposes is done by field surveys and measurements, which is tedious, slow and expensive. This paper proposes a solution for automatic detection of the degraded state of paved roads using Deep Learning applied to drone imagery. The methodology includes three phases: collection of pavement images by drone, processing (annotation, training and test) of the images by YOLOv8 and localization of degraded areas on GeoTiff results of reconstructed pavements. The model was trained and tested on a dataset with a wide range of pavement images and the results show a precision rate of 86.7%, a recall rate of 78.8% and an F1 score of 82.5%.

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Adwaita Janardhan Jadhav

San Diego, USA

Title: A Comprehensive Study on Model Initialization Techniques Ensuring Efficient Federated Learning

Abstract: Advancement in the field of machine learning is unavoidable, but something of major concern is preserving the privacy of the users whose data is being used for training these machine learning algorithms. Federated learning(FL) has emerged as a promising paradigm for training machine learning models in a distributed and privacy-preserving manner which enables one to collaborate and train a global model without

sharing local data. But starting this learning process on each device in the right way, called "model initialization" is critical. The choice of initialization methods used for models plays a cru-cial role in the performance, convergence speed, communication

efficiency, privacy guarantees of federated learning systems, etc. In this survey, we dive deeper into a comprehensive study of various ways of model initialization techniques in FL. Unlike other studies, our research meticulously compares, categorizes, and delineates the merits and demerits of each technique, examining their applicability across diverse FL scenarios. We highlight how factors like client variability, data non-IIDness, model caliber, security considerations, and network restrictions influence FL model outcomes and propose how strategic initial-ization can address and potentially rectify many such challenges. The motivation behind this survey is to highlight that the right start can help overcome challenges like varying data quality, security issues, and network problems. Our insights provide a foundational base for experts looking to fully utilize FL, also while understanding the complexities of model initialization.