

European Technology Platform Networkworld Europe

Towards Realistic Usage of AI in 6G Networks Workshop

POST-EVENT REPORT

Organized by Networkworld Europe with the support of SNS OPS, European Commission and IEEE



Lisbon, November 06th 2023



Towards Realistic Usage of AI in 6G Networks Workshop - Event Overview

The workshop on **Realistic AI Usage in Networks** addressed the challenges and constraints associated with implementation and deployment of AI and ML methods in current and next generation networks (6G). Recent studies have unveiled that the actual deployment of AI/ML in networks offers only modest enhancements over classical means, while demanding excessive energy, data, time, and other resources. Scholars recently started raising concerns related to difficulties in reproducing even those modest gains in a reliable manner. Finally, the non-deterministic nature of promised outcomes makes it hard to use AI-based methods in many situations.

In response to these justified doubts, this workshop aims to foster discussions among researchers to identify pragmatic approaches and potential solutions with/for AI/ML methods to fully leverage their potential in future networked environment such as 6G networks. The workshop will focus on key areas of concern, including model distribution, handling large models, real-time data acquisition, and decision-making processes. Participants will engage in sharing insightful research and experiences, seeking to lay the groundwork for a more responsible and sustainable integration of AI in network settings.

By promoting collaborative exchanges of knowledge, the workshop aimed to contribute to a deeper understanding of **Realistic AI Usage in Networks**, setting the stage for advancements that align AI technologies with the practical needs of users and operators in network environments.

Location: Onsite Lisbon

Date: 06/11/2023

Duration: 1 full day (8 hours)

Number of attendees (including speakers): 25

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Towards Realistic Usage of AI in 6G Networks Workshop - Agenda

6 th November	
09:00	Registration. Welcome and Introduction to the Workshop. - Rui Aguiar
09:45	Session 1 - Rui Aguiar - Difficulties and benefits of AI/ML in NGN - Mário Antunes – Best practices compliance of AI in telecom - Michele Rossi - On the use of machine learning in upcoming wireless networks: addressing the interplay among communication, computing and sensing systems
11:00	Coffee break ☕
11:15	Session 2 - Carles Antón-Haro - AI for an energy-efficient 6G radio interface: the story so far, and the long way ahead - Giuseppe Aceto - AI-based Internet Traffic Classification – practical research questions, hot topics and promising solutions - Beatriz Mendes - Realistic Usage of AI in 6G Networks: Overcoming Impairments with AI Enablers - Arifur Rahman - Enabling Intelligence in 6G Networks from Theory to Practice
13:00	Lunch 🍴
14:15	Session 3 - Ramin Khalili - Resource-aware Federated Learning - Flavio Cirillo - Network Digital Twin: data-centric approach for network management - Holger Claussen - Future Networks, AI Challenges, and 6G-XCEL - Giada Landi -Challenges for automating AI/ML management in 6G networks
16:00	Coffee break ☕
16:15	Global Group Assessment

Towards Realistic Usage of AI in 6G Networks Workshop - Event Sessions

The workshop consisted of three sessions that will be summarized in the text below.

Session 1

Session 1 highlighted the transformative potential of AI in optimizing and enhancing Next-Generation Networks (NGNs). However, it also emphasized the need to address critical challenges related to bias, data availability, efficiency, and cost-effectiveness to ensure the responsible and effective implementation of AI in telecom networks.

Key Takeaways

- The integration of AI/ML in Next-Generation Networks (NGN) offers significant potential for optimizing network performance, resource allocation, and traffic classification.
- Addressing the challenges of biased Deep Neural Networks (DNNs) and ensuring compliance with AI/ML best practices are crucial for the successful adoption of AI in telecom networks.
- The development of common models and the assessment of data privacy impacts are essential for the responsible and effective implementation of AI in telecom networks.
- Addressing the scarcity of publicly available datasets and exploring the efficiency versus complexity trade-offs in neural network architectures are important considerations for developing AI applications for network optimization.

Issues Raised

- The prevalence of biased DNNs raises concerns about fairness and equity in network operations.
- The lack of publicly available datasets for network applications hinders the development and deployment of AI algorithms.
- The efficiency versus complexity trade-off in neural network architectures necessitates careful consideration of resource consumption and performance.

Session 2

Session 2 highlighted the transformative potential of AI in 6G networks, emphasizing its role in enabling advanced technologies and addressing the challenges associated with data scarcity, energy efficiency, and architectural complexities. However, it emphasized the need to address critical concerns related to trustworthiness, harmonization, and compliance to ensure the safe and effective adoption of AI in next-generation wireless networks.

Key Takeaways

- AI/ML is actively being researched and integrated into standards development organizations for 6G.
- Several challenges need to be addressed to effectively implement AI in 6G networks, such as ensuring energy efficiency, establishing curated datasets, and balancing data-driven and conventional engineering approaches.
- Trustworthiness, harmonization with other network functionalities, and compliance with existing AI policies and regulations are essential for successful AI adoption in 6G.

Issues Raised

- Energy efficiency of AI algorithms is crucial for 6G networks, which are expected to be more energy-constrained than previous generations.
- Curated datasets for AI applications in 6G networks are scarce, which can hinder the development and deployment of AI-based solutions.
- Balancing data-driven and conventional engineering approaches is challenging in 6G networks due to the complexity and heterogeneity of the network environment.
- The integration of AI into 6G networks requires continuous monitoring, coordination, and innovative solutions to ensure accessibility and scalability for all stakeholders.

Session 3

Session 3 highlighted the transformative potential of AI for 6G networks, emphasizing its role in enabling advanced technologies, addressing challenges related to distributed learning, network management, and automation. However, it also

emphasized the need to address critical concerns related to heterogeneous environments, data integration, consensus finding, and the integration of AI functions.

Key Takeaways

- Network Digital Twins provides a data-centric approach to network management, leveraging virtual representations of real-world entities synchronized in real-time.
- The future of wireless networks demands low latency, massive connectivity, and energy efficiency, necessitating AI-based optimization and hyper-flexible, AI-defined networks.
- Challenges in AI implementation for 6G networks include slow consensus finding, automation of network optimization, and the integration of digital twins and edge AI.

Issues Raised

- Data heterogeneity, computing node complexity, and the need for high-fidelity Network Digital Twins pose challenges for effective data integration and network management.
- Integrating digital twins and edge AI in network optimization requires careful consideration of data privacy, model validation, and the integration of AI functions.
- Automating AI/ML management in 6G networks demands a comprehensive approach that addresses the entire lifecycle of AI/ML operations, integrates with network management procedures, and considers interdependencies between different AI functions.

Towards Realistic Usage of AI in 6G Networks Workshop – Feedback after the session

Several formal and informal feedback was received after the workshop, with compliments on the quality of the workshop and its content.

