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Why we need new partnerships for new data

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Why we need new partnerships for new data

By Ignacio Rodriguez Larrad, PostDoc, Wireless Communication Networks, Aalborg University, Denmark

■ The ITU AI/Machine Learning (ML) in 5G Challenge attracted over 20 problem statements proposed by different industry and academic organizations. Participants from all over the world are competing to find the neural network-based algorithms that lead to the optimal solution.

The available problem statements are organized into different tracks related to diverse themes such as network, security, operators, or vertical markets.

The number of statements is certain to increase significantly in future editions of the ITU AI/ML in 5G Challenge. The application of AI and machine learning to networks is gaining strong momentum in industry and academia, and the ITU AI/ML in 5G Challenge will engage more and more students, researchers and engineering professionals.

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> *The Grand Challenge Finale in December is an exciting prospect.*
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> Ignacio Rodriguez Larrad

The Grand Challenge Finale in December is an exciting prospect – sure to shed new light on how AI and machine learning will help us to optimize networking.

New partnerships to expand access to data

Access to high-quality data remains a key challenge facing innovation in AI and machine learning.

Synthetic datasets built with simulations have played an important part in the ITU AI/ML in 5G Challenge in view of the difficulties associated with access to data from operating networks. And some of the problem statements were very relevant and well-formulated but lacked any source of data – participants needed to find and provide their own datasets as part of their solutions.

While most of the problem statements were open to international participants, some were restricted to national competitions. However, one has to understand that the data belongs to the institution that provides it and is therefore subject to [internal/national] export regulations and national general data protection regulations.

Regulation, business and the nature of data all factor considerably into data availability, and data availability factors considerably into the success of a global competition like the ITU AI/ML in 5G Challenge.

This also highlights the importance of the ITU AI/ML in 5G Challenge in encouraging data availability.

ITU is working to attract and engage new institutions who are able to share problem statements and data with the international community.

To achieve accurate functional ML/AI algorithms, high-quality input data is essential.

Extensive datasets from operating networks would be ideal inputs to AI/ML algorithms. However, at present it is very difficult to obtain such collections of data from commercial network operators. It requires some effort to collect specific data and treat and anonymize it. Operators need to protect the privacy of their customers, and they are also hesitant to share data containing business-critical information about the operational status or performance of their networks.

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Research networks – real-world operational networks managed by public research institutions – will continue to play a key role in the collection of traces for ML/AI processing in the coming years.

Collecting data from research networks also requires some effort, and typically also the treatment and anonymization of the collected data, but research networks come with fewer complexities when it comes to sharing datasets with other institutions.

Research institutions from all over the world are part of the open data movement, with research communities advocating for open access to experimental research data and associated scientific findings and articles.

But research networks are not easy to build.

While it is quite common to see research networks operating in unlicensed spectrum such as Wi-Fi networks or wireless Internet of Things (IoT) networks such as LoRa, it is rare to see research networks in 4G or 5G cellular systems.

These networks come at a much higher cost and research institutes will depend on the sponsorship and close collaboration of vendors and operators.

How Aalborg University collaborates with industry on its AAU 5G Smart Production Lab

As an example of a research network with big ML/AI potential established at a public research institute in collaboration with vendors and operators, Aalborg University (AAU), Denmark, hosts one of the most advanced Industry 4.0 wireless playgrounds in Europe.

The recently inaugurated AAU 5G Smart Production Lab is a small factory industrial research lab with access to a wide range of operational industrial-grade manufacturing and production equipment from different vendors, including production line modules, robotic arms, and autonomous mobile robots.

In collaboration with Nokia Bell Labs and the telecommunications operator Telenor Denmark, the research lab is equipped with 4G (two private networks), 5G (one private, standalone network), and Wi-Fi 6 (two networks). This makes it possible for AAU researchers and industrial partners to work together in the integration and testing of advanced Industrial IoT systems for the factories of the future.

AAU 5G Smart Production Lab

Source: Aalborg University, Denmark, 2020.
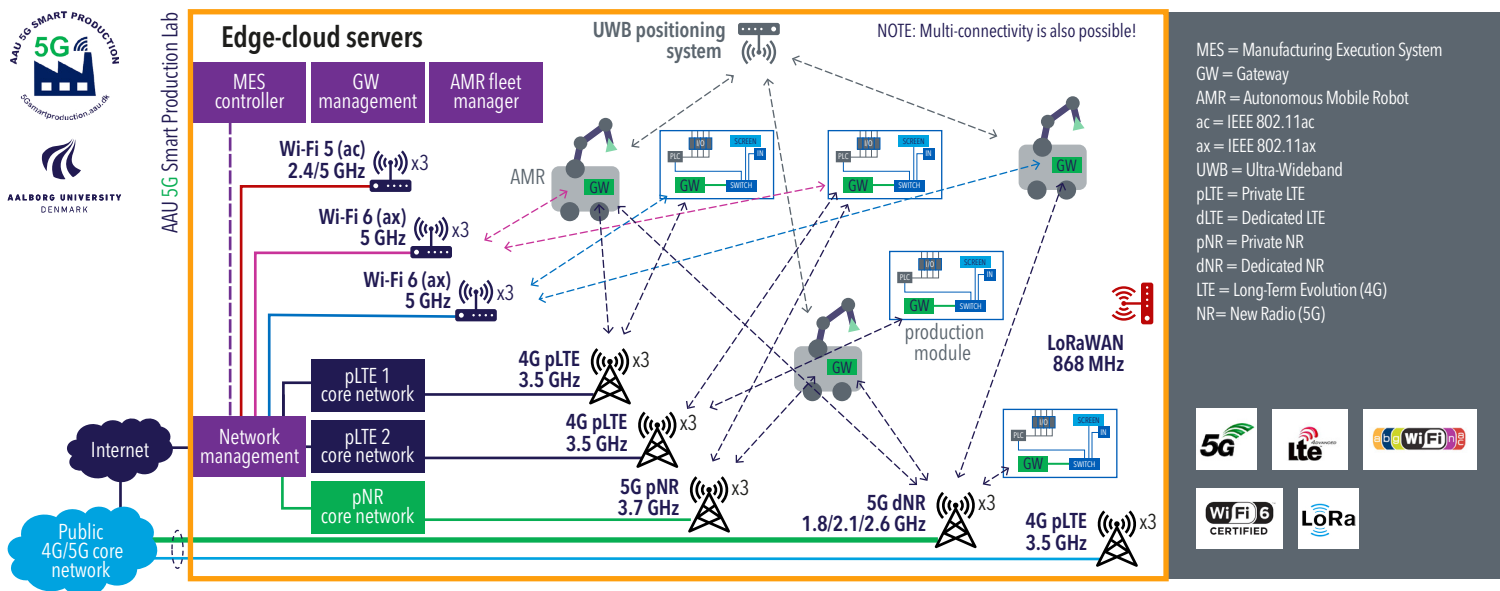
The lab is also equipped with a research LoRa network sponsored by Cibicom Denmark, and an ultra-wideband positioning system.

All wireless research networks in the lab are interconnected via a central dedicated network management interface which allows not only for the control and configuration of the different networks but also the monitoring and collection of network data traces in dedicated edge-cloud servers.

Having the possibility of recording unrestricted network information, simultaneously with measurements from the different user devices, opens new research possibilities for AAU and the international research community working on AI and machine learning applications in networking.

Let's expand our work together

Research networks built together by research communities and industry can generate extensive and relevant sets of multi-domain and multi-technology performance data. This data could be very useful for the design and optimization of advanced wireless solutions targeting the different communication requirements of real-world operational industrial IoT use cases. ◼

Recently inaugurated AAU 5G Smart Production Lab

Source: Aalborg University, Denmark, 2020.

Equipment in the AAU 5G Smart Production Lab

Source: Aalborg University, Denmark, 2020.

Industry 4.0

Automation

IoT

System integration

Connection

Big Data

Cloud computing

Source: techstartups.com, 2020.