

ITUEvents

ITU AI/ML in 5G Challenge - The Journey

ITU
AI/ML in 5G
Grand Challenge Finale

*Applying machine learning in
communication networks*

15-17 December 2020
12:00 - 16:00 Geneva

Thomas Basikolo, ITU

Sponsored by



ITU AI/ML in 5G
Grand Challenge Finale

*Applying machine learning in
communication networks*

**Applying AI/ML in Networks is different
from AI/ML in Computer Vision**

- ❖ Different time scales
- ❖ Noisy and dynamic network environment
- ❖ Limited computing resources in the network
- ❖ **Data:** which? where? labelled? trusted ?

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Value Creation of ITU Challenge

The ITU AI/ML in 5G Challenge will:

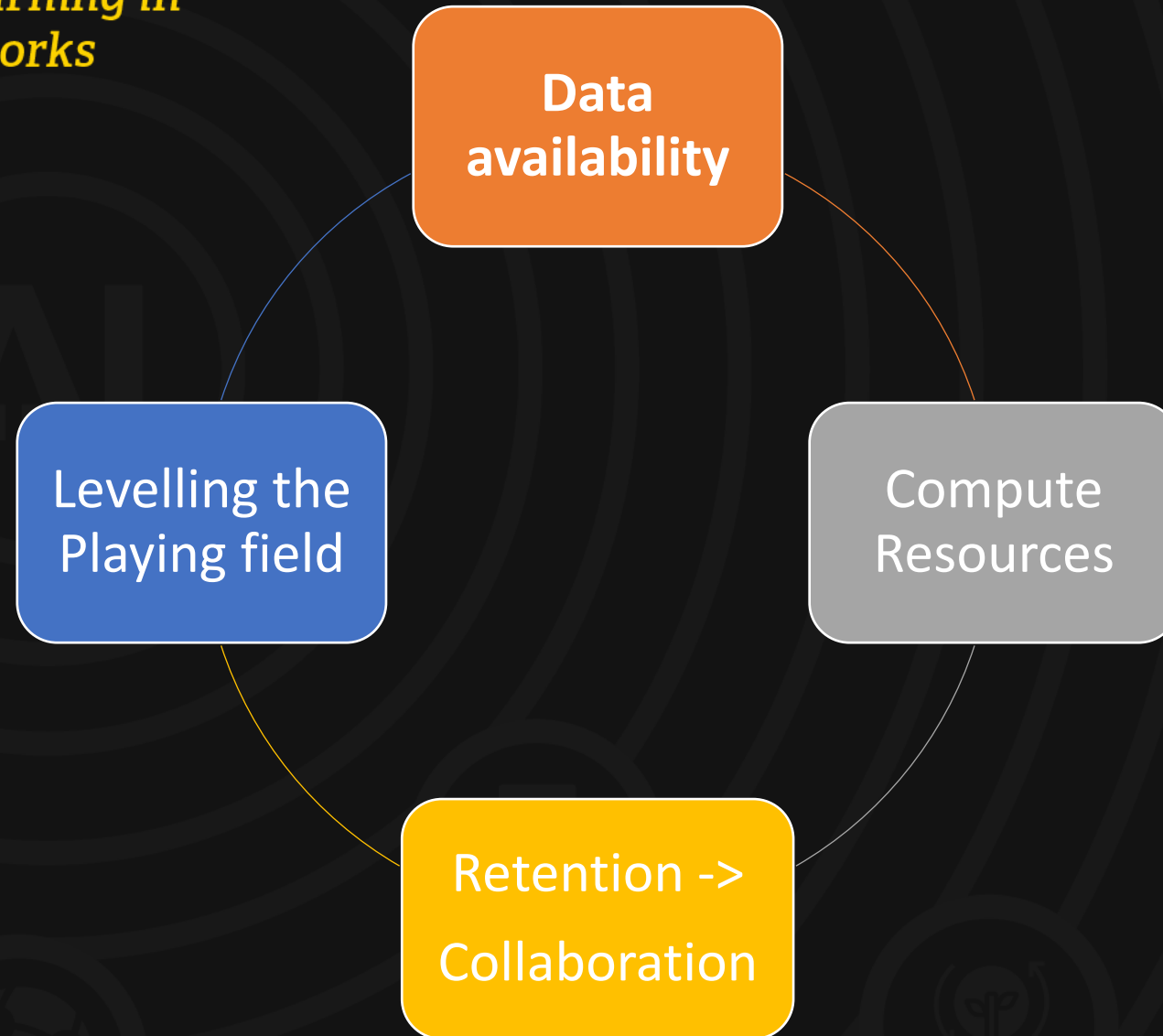
- ❖ Create a **community** in the field of AI/ML
- ❖ Innovate and solve network problems with AI/ML
- ❖ Apply ITU's AI/ML architecture framework in IMT-2020
- ❖ Uncover problems, identify standards gaps, point to solutions



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Challenges of the Challenge



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1300+ contributors

911 teams

62 countries

11 regional hosts

23 open challenges

10+ ITU Recommendations
and Specifications

100 AI/ML in 5G solutions

30+ GitHub repositories 

<https://github.com/ITU-AI-ML-in-5G-Challenge>

**ITU AI/ML in 5G
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33

finalists

1

Global
Champion

200000?

Swiss Francs Grand Prize as well as
other prizes offering global recognition

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Thanks to our regional hosts:



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Thanks to our gold sponsor:



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Thanks to our bronze sponsors:



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Thanks to our promotion partners:



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Challenge Management Board



Challenge Management Board
Cheng Qiang
AIIA/CAICT



Challenge Management Board
Liao Jun
China Unicom



Challenge Management Board
Juan Suarez-Varela
*Barcelona Neural
Networking Center
(BNN-UPC)*



Challenge Management Board
Yoichi Maeda
*The Telecommunication
Technology Committee*



Challenge Management Board
Salih Ergut
Turkcell



Challenge Management Board
Yuan Liya
ZTE



Challenge Management Board
Mostafa Essa
Vodafone



Challenge Management Board
Deng Chao
China Mobile



Challenge Management Board
Paul Patras
University of Edinburgh



Challenge Management Board
Francisco Müller
*Federal University of
Pará (UFPA)*



Challenge Management Board
Akihiro Nakao
University of Tokyo



Challenge Management Board
Xu Dan
China Telecom



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Judge
Prof. Albert Cabellos
*Barcelona Neural
Networking Center
(BNN-UPC)*



Judge
Yuan Liya
ZTE



Judge
Dr. Ammar Muthanna
SPbSUT, Russia



Judge
Dr. Ankur Narang
Hike



Judge
Akihiro Nakao
University of Tokyo

Judge
Prof. Brejesh Lall
*Indian Institute of Technology,
New Delhi (IIT/D)*



Judge
Dr. Bo Lv
*China Academy of
Information and
Communications
Technology (CAICT)*



Judge
**Prof. Carmelo J. A.
Bastos Filho**
University of Pernambuco

Judge
Dr. Ming Ai
*China Information and Communication
Technologies (CICT)*



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Judge

Dr. Zonghua Zhang
Huawei

Judge

Xing Wang
China Mobile

Judge

Mr. Tomohiro Otani
KDDI

Judge

Mengfei Feng
China Mobile

Judge

YangYang Sun
China Unicom

Judge

**Prof. Rafael Stubs
Parpinelli**
*Universidade do Estado
de Santa Catarina*

Judge

Quan Liu
China Unicom

Judge

Mr. Takanori Iwai
Nec

Judge

Dr. Eoghan Furey
Letterkenny Institute of Technology



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Iran University of Science & Technology
Instituto Politécnico Nacional (IPN)
Aalborg University
Odessa National Academy of Telecommunications n.a. A.S. Popov
Universitat Politècnica de Valencia
Universidade Federal do Para
University of Bristol
Istanbul Technical University
Universitat Politècnica de Catalunya
IoT Academy
Federal University of Technology, Minna
PES University
National aviation university
University of Toronto
Universitat Pompeu Fabra
Korea University
King Abdullah University of Science and Technology
Waseda University
Ankara University
Letterkenny Institute of Technology
Universidad Tecnológica Nacional
Electronic and Postal Communications Authority (AKEP)
University of Surrey Institute for Communication Systems(ICS)
University of Trento
Istanbul Technical University
University of Cyprus
The University of Tokyo
UCSI University
University of Antioquia
Baltic Institute of Advanced Technology
Makerere University

The University of Trinidad and Tobago
King Abdulaziz City for Science and Technology
University of Tabouk
Taif University
University of Minnesota
University of Padova
Universiteit Antwerpen
King AbdulAziz Univeristy
Ecole de Technologie Supérieure (ETS),
Aalto University
Amirkabir University of Technology
KACST
Hong Kong University of Science and Tech
Faculty of Eng., Mansoura University
Indian Institute of Technology Hyderabad
KLE Technological University
University of the West Indies
Canadian University Dubai
University of Arkansas at Little Rock
Imperial College London
Royal Holloway, University of London
KLE Technological University
University of Strathclyde
Vellore Institute of Technology
Telecom Centres of Excellence (TCOE) India
The Bonch-Bruевич Saint-Petersburg State University of Telecommunications
Technische Universität Dresden
Federal University of Santa Maria
Banasthali University
Sup'com tunis
KOCAELI UNIVERSITY

Università degli Studi Federico II
Università di Napoli Parthenope
Consorzio Nazionale Interuniversitario per le Telecomunicazioni CNIT
Tohoku University
IMDEA Networks
Kyoto Joho Gakuen
University of Texas-Dallas
Sreenidhi Institute of Science and Tech
Worcester Polytechnic Institute
Beijing University of Posts and Telecommunications
University of California, Berkeley
American University of Beirut
Shanghai Jiao Tong University
Nara Institute of Science and Technology
The Kyoto College of Graduate Studies for Informatics
Sun Yat-sen University
University of Texas at Austin
Northeastern University
University of Oulu
University of Fukui
George Mason University
Lund University
Northeastern University
Kyushu Institute of Technology
University of Arizona
Technical University Munich
Linköping University
Doshisha University
TU Berlin
Nanyang Technological University

Kansai University
IIIT Delhi
Ibn Tofail University
Poznan University of Technology
Ben Gurion University
Stanford University
Osaka Prefecture University
The University of New South Wales
Jerusalem College of Technology
Nara Institute of Science and Technology
Kyoto College of Graduate Studies for Informatics
Kyusyu Institute of Technology
IIIT Bangalore
IIIT Sri City
Indian Institute of Technology Jammu
Yokohama national University
Tokyo Univ. of Agriculture and Tech
University of Cambridge
University Tunku Abdul Rahman
University of Washington
Universidad Técnica del Norte
King Abdullah University of Science and Technology
Texas A&M University
Vellore Institute of Technology
Mbarara University of Scie. & Techlogy
Trinity College Dublin
University of Minnesota - Twin Cities
Ecole nationale Supérieure d'Informatique
King Abdulaziz university
Universidad Carlos III de Madrid

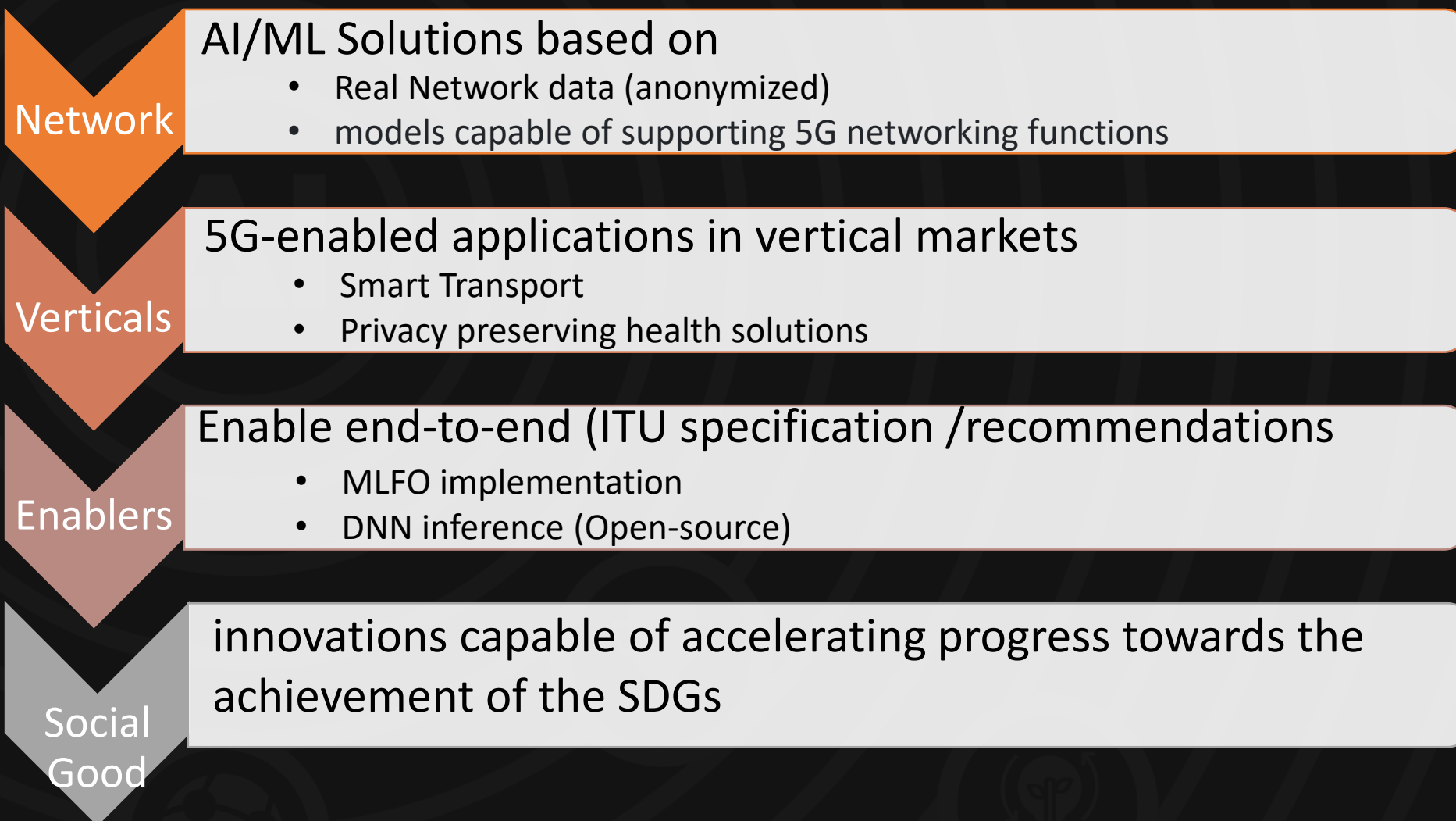
... and more ...



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AI/ML Solutions



Winning prizes and certificates

Teams from various problem statements will compete for the ITU AI/ML in 5G Challenge Champion title, and several awards will be presented to winning solutions at the Grand Challenge Finale taking place 15-17 December 2020.

Winners certificate: Awarded to winning teams in the following categories:

1st prize:

ITU AI/ML in 5G
Challenge Gold
Champion

Cash prize: 5000 CHF

2nd prize:

ITU AI/ML in 5G
Challenge Silver
Champion

Cash prize: 3000 CHF

3rd prize:

ITU AI/ML in 5G
Challenge Bronze
Champion

Cash prize: 2000 CHF

Three *Runners up* will receive
1000 CHF each.

Judges Prize certificates: Awarded
to winners of each problem
statement as recommended by
the host (excluding those under
Winners certificate). Each winner
receives 300 CHF.

Honorable mention certificate.

*Encouragement/Community
award certificate:* Awarded to
teams that were active during
the mentoring programme
and successfully submitted a
solution.

Certificate of completion:
Awarded to teams that
completed the challenge by
submitting a solution.

ITU AI/Machine Learning in 5G Challenge webinars

<p>19/06/2020</p> <p>Graph Neural Networking Challenge 2020</p> <p>José Suárez-Varela Researcher, Barcelona Neural Networking Center, Universitat Politècnica de Catalunya (BNN-UPC), Spain</p> <p>See webinar</p>	<p>26/06/2020</p> <p>Beam Selection – Machine Learning Applied to the Physical Layer of Millimeter – Wave MIMO Systems</p> <p>Aldebaro Klautau Professor, Federal University of Pará (UFPA), Brazil</p> <p>See webinar</p>	<p>03/07/2020</p> <p>Channel Estimation – Machine Learning Applied to the Physical Layer of Millimeter – Wave MIMO Systems</p> <p>Nuria González Prelčić Associate Professor, North Carolina State University, United States</p> <p>See webinar</p>	<p>10/07/2020</p> <p>ITU AI/ML in 5G Challenge: Improving the Capacity of IEEE 802.11 WLANs through Machine Learning</p> <p>Francesc Wilhelmi Researcher, Universitat Pompeu Fabra, Spain</p> <p>See webinar</p>	<p>17/07/2020</p> <p>ITU AI/ML in 5G Challenge: DNN Inference Optimization Challenge</p> <p>Liya Yua Open Source & Standardization Engineer, ZTE</p> <p>See webinar</p>	<p>22/07/2020</p> <p>Radio Link Failure Prediction Challenge</p> <p>Salih Ergüt 5G R&D Senior Expert, Turkcell</p> <p>See webinar</p>	<p>24/07/2020</p> <p>5G + AI + Immersive + Assistive Services in Telecommunications</p> <p>Brejesh Lall Professor, Indian Institute of Technology, Delhi</p> <p>See webinar</p>	<p>27/07/2020</p> <p>AI Techniques for Privacy-Preserving Remote Medical Diagnosis + Spectrum and Network Resource Sharing in 5G Networks</p> <p>Brejesh Lall Professor, Indian Institute of Technology, Delhi</p> <p>See webinar</p>	<p>29/07/2020</p> <p>Machine Learning for Wireless LANs + Japan Challenge Introduction</p> <p>Akihiro Nakao Professor, University of Tokyo</p> <p>Koji Yamamoto Associate Professor, Kyoto University</p> <p>Tomohiro Otani Executive Director, KDDI Research, Inc.</p> <p>Takanori Iwai Research Manager, NEC Corporation</p> <p>See webinar</p>
<p>31/07/2020</p> <p>LYIT/ITU-T AI Challenge: Demonstration of Machine Learning Function Orchestrator (MLFO) Via Reference Implementations</p> <p>Shaguftha Henna Lecturer, Letterkenny Institute of Technology (LYIT), Ireland</p> <p>See webinar</p>	<p>07/08/2020</p> <p>ITU AI/ML in 5G Challenge: Lecture on Machine Learning and Participation in Japan Challenge</p> <p>Akihiro Nakao Professor, University of Tokyo</p> <p>Koji Yamamoto Associate Professor, Kyoto University</p> <p>Tomohiro Otani Executive Director, KDDI Research, Inc.</p> <p>Takanori Iwai Research Manager, NEC Corporation</p> <p>See webinar</p>	<p>07/08/2020</p> <p>An Overview of the ITU-ML5G-PS-012 "ML5G-PHY [Beam Selection]"</p> <p>Aldebaro Klautau Federal University of Pará (UFPA), Brazil</p> <p>See webinar</p>	<p>17/08/2020</p> <p>Applying Knowledge Graph and Digital Twin Technologies to Smart Optical Network</p> <p>Anran Xu Researcher, China Information and Communication Technologies Group Corporation (CICT)</p> <p>See webinar</p>	<p>19/08/2020</p> <p>ITU/AI/ML in 5 Challenge Open House and Roundtable No. 2</p> <p>Prerana Mukherjee Assistant Professor, School of Engineering, Jawaharlal Nehru University, Delhi, India</p> <p>See webinar</p>	<p>21/08/2020</p> <p>A Universal Compression Algorithm for Deep Neural Networks</p> <p>Wojciech Samek Head of the Machine Learning Group, Fraunhofer Heinrich Hertz Institute, Germany</p> <p>See webinar</p>	<p>26/08/2020</p> <p>ITU AI/ML in 5G Challenge: China Mobile Network Topology Optimization Competition Question Analysis</p> <p>Wang Xing Researcher, China Mobile Research Institute</p> <p>See webinar</p>	<p>31/08/2020</p> <p>Traffic Recognition and Long-Term Traffic Forecasting Based on AI Algorithms and Metadata for 5G/IMT-2020 and Beyond</p> <p>Artem Volkov Researcher</p> <p>Ammar Muthanna Associate Professor, St. Petersburg State University of Telecommunications, Russia</p> <p>See webinar</p>	<p>01/09/2020</p> <p>Milvus: An Open Source Vector Similarity Search Engine</p> <p>Jun Gu Partner, Zilliz</p> <p>See webinar</p>
<p>04/09/2020</p> <p>How to Bring AI into 5G Radio Access Network</p> <p>Qi Sun Senior Researcher, China Mobile Research Institute</p> <p>See webinar</p>	<p>28/09/2020</p> <p>Wireless 2.0: Towards a Smart Radio Environment Empowered by Reconfigurable Intelligent Metasurfaces and Artificial Intelligence</p> <p>Marco Di Renzo Professor, CNRS & Paris-Saclay University, France</p> <p>See webinar</p>	<p>16/11/20</p> <p>Harnessing Deep Learning for Mobile Service Traffic Decomposition to Support Network Slicing</p> <p>Alexis Duque Research Associate, Net AI</p> <p>See webinar</p>	<p>18/11/2020</p> <p>The Road Towards an AI-Native Air Interface for 6G</p> <p>Jakob Hoydis Head, Research Department on Radio Systems and AI, Nokia Bell Labs</p> <p>See webinar</p>	<p>27/11/2020</p> <p>Leveraging AI & Machine Learning to Optimize Today's 5G Radio Access Network Systems and to Build the Foundation of Tomorrow's 6G Wireless Systems</p> <p>Tim O'Shea Co-Founder/CTO, DeepSig</p> <p>See webinar</p>	<p>02/12/2020</p> <p>Toward Effective Network Traffic Analytics of Mobile Apps via Deep Learning</p> <p>Domenico Ciuonzo Assistant Professor, DIETI, University of Naples, Federico II, Italy</p> <p>See webinar</p>	<p>04/12/2020</p> <p>Scaling CNN Inference for Extreme Throughput</p> <p>Michaela Blott Distinguished Engineer, Xilinx</p> <p>See webinar</p>	<p>08/12/2020</p> <p>Towards Open, Programmable, and Virtualized 5G Networks</p> <p>Michele Polese Associate Research Scientist, Northeastern University, United States</p> <p>See webinar</p>	<p>* At the time of publication, some webinars had not yet taken place.</p>

AI and Machine Learning in 5G

Lessons from the ITU Challenge



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Join the Conversation



Define the future of AI/ML in 5G:

itu-challenge.slack.com



We will talk about the outlook for next year at 15:35-15:45. Make sure to tune in.

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