OFC

The future of optical networking
And communication

6-10 March 2022
San Diego, California, USA
ofcconference.org

Talks and posters by members of the FONTE consortium, incl. abstracts

FONTE has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie Grant Agreement No 766115

Speaking at OFC 2022

Darko Zibar
(FONTE WP Leader)
DTU

Sander Wahls
(FONTE WP Leader)
TU Delft

Vinod Bajaj
ESR
TU Delft

Vahid Aref
Invited Speaker
(FONTE WP Leader)
Nokia Bell Labs

Vahid Aref (Nokia Bell Labs)

Invited Speaker

09 March
17:00 - 17:30
(UTC - 08:00)

End-to-end Learning of Joint Geometric and Probabilistic Constellation Shaping (W4I.3)

Vahid Aref *Nokia*

Invited

End-to-end Learning of Joint Geometric and Probabilistic Constellation Shaping

We present a novel autoencoder-based learning of joint geometric and probabilistic constellation shaping for coded-modulation systems. It can maximize either the mutual information (for symbol-metric decoding) or the generalized mutual information (for bit-metric decoding).Authors: Vahid Aref, Nokia / Mathieu Chagnon, Nokia

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Short Course SC483:

Hands-On: Machine Learning in Optical Networks

Darko Zibar
DTU

Short Course Benefits:

This course should enable participants to,

- Understand the main machine learning categories
- Become familiar with the most relevant ML algorithms used in practice (with a focus on neural networks)
- Understand the current status of the ML technology and its applications in optical networking and communications
- Compare properties and requirements for various ML evaluation techniques
- Gain insights on how to implement a proof-of concept algorithm for neural network learning

The course is intended for interested people from academia and industry without any previous knowledge in machine learning. A basic understanding of optical fiber transmission and programming can be helpful but is not a hard requirement. Attendance is also beneficial for machine learning experts with limited optical networking background who want to learn about the potential applications in the area of optical communication and networking.

Vinod Bajaj (TU Delft)

Date	Session
07 March 8:45 - 9:00 (UTC - 08:00)	Efficient Training of Volterra Series-Based Pre-Distortion Filter Using Neural Networks (M1H.3) Vinod Bajaj *TU Delft*

We present a simple, efficient "direct learning" approach to train Volterra series-based digital pre-distortion filters using neural networks. We show its superior performance over conventional training methods using a 64-QAM 64 GBaud simulated transmitter with varying transmitter nonlinearity and noisy conditions.Authors: Vinod Bajaj, TU Delft / Mathieu Chagnon, Nokia Bell Labs / Sander Wahls, TU Delft / Vahid Aref, Nokia Bell Labs

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https://arxiv.org/pdf/2112.06637.pdf
https://doi.org/10.5281/zenodo.6335505

The following FONTE Consortium members present additional research in their group at OFC, including research aligned with FONTE

Sergei K Turitsyn (Aston University)

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Date	Session
09 March 10:30 - 10:30 (UTC - 08:00)	Neural Network-Enhanced Optical Phase Conjugation for Nonlinearity Mitigation (W2A.38) Karina Nurlybayeva *Aston University*
09 March 14:15 - 14:30 (UTC - 08:00)	Optimized Physical Design of Metro Aggregation Networks Using Point to Multipoint Transceivers (W3F.2) Mohammad Mohammad Hosseini *Aston University* N3: Architecture and software-defined control for metro and core networks
09 March 15:15 - 15:30 (UTC - 08:00)	50 Gbaud QPSK E-Band Transmission Using Bismuth Doped Fiber Amplifiers (W3J.5) Aleksandr Donodin *Aston University* D5: Fiber-optic and waveguide devices and sensors S5: Digital transmission systems
10 March 10:30 - 10:30 (UTC - 08:00)	Domain Adaptation: the Key Enabler of Neural Network Equalizers in Coherent Optical Systems (Th2A.35) Pedro Jorge Freire de Carvalho Souza *Aston University*

Jaroslaw Prilepsky (Aston University)

Date	Session
09 March 14:15 - 14:30 (UTC - 08:00)	Optimized Physical Design of Metro Aggregation Networks Using Point to Multipoint Transceivers (W3F.2) Mohammad Mohammad Hosseini *Aston University* **N3: Architecture and software-defined control for metro and core networks**
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Darko Zibar (DTU)

Date	Session
07 March 12:15 - 12:30 (UTC - 08:00)	Comparison of Models for Training Optical Matrix Multipliers in Neuromorphic PICs (M2G.5) Ali Cem *Technical University of Denmark* **N2: Optical networking for data center and computing applications**

SC483 - Machine Learning in Optical Networks

Monday, 07 March
08:30 - 12:30

Short Course Level:

Instructor:

Massimo Tornatore, *Politecnico di Milano, Italy*
Darko Zibar, *DTU FOTONIK, Denmark*

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Francesco Da Ros (DTU)

Date	Session
07 March 12:15 - 12:30 (UTC - 08:00)	Comparison of Models for Training Optical Matrix Multipliers in Neuromorphic PICs (M2G.5) Ali Cem *Technical University of Denmark* **N2: Optical networking for data center and computing applications**

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Sander Wahls (TU Delft)

Date	Session
07 March 8:45 - 9:00 (UTC - 08:00)	Efficient Training of Volterra Series-Based Pre-Distortion Filter Using Neural Networks (M1H.3) Vinod Bajaj *TU Delft*
09 March 10:30 - 10:30 (UTC - 08:00)	Experimental Validation of Nonlinear Fourier Transform-Based Kerr-Nonlinearity Identification Over a 1600 km SSMF Link (W2A.39) Pascal de Koster *Delft University of Technology*
10 March 10:30 - 10:30 (UTC - 08:00)	Full Spectrum b-Modulation of Time-Limited Signals Using Linear Programming (Th2A.38) Sander Wahls *Technische Universiteit Delft*

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Vinod Bajaj (TU Delft)

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Yves Jaouen (Telecom Paris)

Date	Session
09 March 10:30 - 10:30 (UTC - 08:00)	Symbiotic Joint Operation of Quantum and Classical Coherent Communications (W2A.37) Raphael Aymeric *Télécom Paris*

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Vahid Aref (Nokia Bell Labs)

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07 March 8:45 - 9:00 (UTC - 08:00)	Efficient Training of Volterra Series-Based Pre-Distortion Filter Using Neural Networks (M1H.3) Vinod Bajaj *TU Delft*
09 March 17:00 - 17:30 (UTC - 08:00)	End-to-end Learning of Joint Geometric and Probabilistic Constellation Shaping (W4I.3) Vahid Aref *Nokia* **Invited**

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