

Mathieu Goutay

DEEP LEARNING FOR COMPUTER VISION @ THALES, PH.D.

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Work and Academic Experiences

Thales LAS

Élancourt, France

DEEP LEARNING FOR COMPUTER VISION RESEARCH SCIENTIST

2022 - Now

- Development of multiple object detectors and classifiers based on state-of-the-art Deep Learning (DL) methods.
- Improvement of Machine Learning (ML)-based object tracking algorithms and comparison against DL-based solutions.
- Conception of algorithms that aim to clean, sort and classify aerial imagery based on expert features.
- Implementation of deep-learning algorithms for object re-identification to assess their performance on proprietary datasets.
- Neural network architectures and software used: FNN, CNN, Transformers, ResNets, Kalman filters, Pytorch, Python, Pandas, GeoPandas...

Nokia Bell Labs & INSA Lyon

Paris Saclay, France

PH.D. THESIS IN DEEP LEARNING APPLIED TO SIGNAL PROCESSING IN WIRELESS COMMUNICATION SYSTEMS

2019 - 2022

- Preparation of a Ph.D thesis co-supervised by Dr. Jakob Hoydis and Dr. Jean-Marie Gorce, from Nokia Bell Labs, Paris Saclay, and Inria, Lyon.
- Publication of five research articles, including one in the highest-ranked journal of my category. Nine patents awarded or under examination.
- Writing of a library using Tensorflow and Python to enable end-to-end training of communication systems.
- Enhancing MIMO receivers under latency constraints using convolutional neural networks (CNNs) and hypernetworks with weight sharing.
- Designing waveforms tailored for specific needs using recurrent neural networks, CNNs, and ResNets.

Nokia Bell Labs

Paris Saclay, France

AI RESEARCH INTERN

Feb. 2018 - Aug. 2018

- Using various machine learning techniques to enable the end-to-end learning of a communication system without a channel model.
- Publication of a research article including a theoretical analysis of the proposed solution and numerical evaluations.

Alstom - Innovation Department

Villeurbanne, France

R&D INTERN

Mar. 2017 - Jun. 2017

- Using Bluetooth Low Energy and other technologies to help people with reduced mobility to take common transports. Patented solution.
- Realization of a working prototype able to localize disabled passengers and produce corresponding audio and visual actions.

INSA Lyon

Villeurbanne, France

INNOVATION PROJECT

Sept. 2017 - Jan. 2018

- Large-scale room monitoring to reduce the energy consumption of shared buildings. Elected as the best project out of 16 competitors.

Education

INSA Lyon & Nokia Bell Labs

Paris Saclay, France

PH.D. THESIS IN DEEP LEARNING APPLIED TO SIGNAL PROCESSING IN WIRELESS COMM. SYSTEMS (DETAILED ABOVE)

2019 - 2022

INSA Lyon

Villeurbanne, France

MSc. IN ENGINEERING (TELECOMMUNICATIONS) : OBTAINED WITH JURY'S CONGRATULATIONS

2013 - 2018

- Learning about communication systems, networks, and machine learning. Preparatory School with 95% of classes in English.
- Main courses: signal processing, information theory, computer science, machine learning, algebra, calculus, and probabilities.
- Heavily invested in the associative life: head of communication for the BAL INSA Lyon, member of the student office's board of directors...

New Jersey Institute of Technologies

Newark, NJ, USA

EXCHANGE STUDENT : GPA 4.0/4.0

Sept. 2016 - Dec. 2016

- Learning about Processors, Networks, Technical Writing, Security.

Paul Sabatier High School

Carcassonne, France

BACCALAURÉAT (HIGH-SCHOOL DEGREE) IN MATHEMATIC : OBTAINED WITH JURY'S CONGRATULATIONS

2010 - 2013

Teaching

INSA Lyon

Villeurbanne

PART-TIME TEACHER (74H)

2020 - 2021

- Creation of tutorials and projects about deep learning, reinforcement learning, deep reinforcement learning, and Tensorflow: 54h.
- Creation, supervision and grading of a project on deep learning for the physical layer of communication systems: 20h.

Publications as First Author

Applications of Deep Learning to the Design of Enhanced Wireless Communication Systems

Ph.D. Thesis

AVAILABLE AT [HTTPS://ARXIV.ORG/PDF/2205.01210.PDF](https://arxiv.org/pdf/2205.01210.pdf)

2022

Learning OFDM Waveforms with PAPR and ACLR Constraints

(Journal)

SUBMITTED TO IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS

2021

End-to-End Learning of OFDM Waveforms with PAPR and ACLR Constraints

Madrid, Spain

2021 IEEE GLOBAL COMMUNICATIONS CONFERENCE (GLOBECOM)

2021

Machine Learning-enhanced Receive Processing for MU-MIMO OFDM Systems

Lucca, Italy

2021 IEEE 21ST INTERNATIONAL WORKSHOP ON SIGNAL PROCESSING ADVANCES IN WIRELESS COMMUNICATIONS (SPAWC)

2021

Machine Learning for MU-MIMO Receive Processing in OFDM Systems

(Journal)

IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS - MACHINE LEARNING IN COMMUNICATIONS AND NETWORKS

2020

Deep HyperNetwork-Based MIMO Detection

Atlanta, Georgia, USA

2020 IEEE 21ST INTERNATIONAL WORKSHOP ON SIGNAL PROCESSING ADVANCES IN WIRELESS COMMUNICATIONS (SPAWC)

2020

Deep Reinforcement Learning Autoencoder with Noisy Feedback

Avignon, France

WORKSHOP ON MACHINE LEARNING FOR COMMUNICATIONS WMLC 2019, WiOpt 2019

2019

Massive Machine Type Communications Uplink Traffic: Impact of Beamforming at the Base Station

Saint Malo, France

2018 25TH INTERNATIONAL CONFERENCE ON TELECOMMUNICATIONS (ICT)

2018

Patents

Ten patents submitted, including three patents under examination by patent offices and seven already awarded :

- Communication System Having a Configurable Modulation Order and an Associated Method and Apparatus
- Method and Apparatus for Optimization of Signal Shaping for a Multi-User Multiple Input Multiple Output Communication System
- Demapping Received Data
- Apparatuses and Methods for Providing Feedback
- A Receiver for a Communication System
- Communication System (WO2022074639A2)
- Method for Assisting the Movement of a Mobility-Impaired Person in a Public Transport Means, Associated Computer Program Product and System

Foreign Languages

English : Business fluent

Spanish : Basic

Hobbies

- Long-time photography passionate (mgoutay.myportfolio.com)
- Member of a music festival gathering 1500 persons (www.tendrestival.fr).
- Keeping up with the latest technology news.
- Volunteering for *Les restos du cœur*.

Honors & Awards

2019 **First Place in the Machine Learning Challenge**, 6th IRACON Training School on Machine & Deep Learning Techniques for (Beyond) 5G Wireless Communication Systems

CTTC, Barcelona

2018 **Best Student**, Nokia France Student Awards

Paris Saclay, France

Referees

Dr. Jean-Marie Gorce
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Dr. Jakob Hoydis
jhoydis@nvidia.com