Name	:	Nathanaël Perraudin
Address	:	In der Breiti 13, 8047 Zürich
Nationality	:	Swiss
Phone	:	+41 76 822 42 60
E-mail	:	nathanael.perraudin@gmail.com
Website	:	https://perraudin.info
Scholar	:	https://scholar.google.ch/citations?user=Rlz7I8gAAAAJ
Github	:	https://github.com/nperraud

Summary

Interdisciplinary machine learning researcher (h-index 21) with 10 years experience in deep learning, graph theory, generative models and signal processing. Leader of numerous open-source projects.

Work experience

08. 2017 - Present — **Machine learning researcher at the Swiss Data Science Center - ETH Zürich.** Machine learning with focus in interdisciplinary research. Projects include:

- **SPECTRE:** state-of-the-art graph generation using spectral conditioning
- **DeepSphere:** state-of-the-art spherical neural network based on Graph Neural Network
- **TifGAN:** adversarial generation (GAN) of time-frequency features for audio synthesis **(ML lead)**
- **Deep Learning for Observational Cosmology:** Generative adversarial networks (GAN) to accelerate N-body simulations

11. 2019 - 12. 2020 — **Co-founder & data scientist at Imbafactory**. Imbafactory provided access to detailed eSports data in real-time.

- Design, impementation, and training of video game prediction models
- Setup data processing pipelines for the live prediction of eSport video games

04. 2013 - 06. 2017 — **Ph.D. in signal processing at "laboratoire de traitement des signaux 2" - EPFL** supervised by Prof. Pierre Vandergheynst. Investigation of graph based algorithms with applications in signal processing and machine learning.

- **Stationary graph signals:** probabilistic modeling for data on graphs
- **Learning graphs:** use of graph to represent manifolds in machine learning problems
- **Graph uncertainty principles:** mathematical characterization of the fundamental properties of a graph

Selected publications (Scholar)

- Nathanaël Perraudin and Pierre Vandergheynst. Stationary signal processing on graphs. *IEEE Transaction on Signal Processing Signal Processing*, 65(13):3462–3477, 2017.
- Nathanaël Perraudin, Michaël Defferrard, Tomasz Kacprzak, and Raphael Sgier. Deepsphere: Efficient spherical convolutional neural network with healpix sampling for cosmological applications. *Astronomy and Computing*, 2019.
- Karolis Martinkus, Andreas Loukas, Nathanaël Perraudin and Roger Wattenhofer SPECTRE: Spectral Conditioning Helps to Overcome the Expressivity Limits of One-shot Graph Generators *Thirty-ninth International Conference on Machine Learning (**ICML**)*, 2022.

- Andrès Marafioti, Nicki Holighaus, Nathanaël Perraudin, Piotr Majdak Adversarial Generation of Time-Frequency Features with application in audio synthesis. *Thirty-sixth International Conference on Machine Learning (**ICML**)*, 2019.
- Vassilis Kalofolias and Nathanaël Perraudin Large Scale Graph Learning From Smooth Signals. *International Conference on Learning Representations (**ICLR**)*, 2019.
- Paulina Grnarova, Kfir Levy, Aurelien Lucchi, Nathanaël Perraudin, Ian Goodfellow, Thomas Hofmann, Andreas Krause A domain agnostic measure for monitoring and evaluating GANs. *Advances in Neural Information Processing Systems (**NeurIPS**)*, 2019.

Education

2013 - 2017	**EPFL Ph.D.** in graph signal processing with applications in machine learning
2010 - 2012	**EPFL Masters degree** in electrical and electronic engineering, ranking 3rd
2010 - 2012	**EPFL minor diploma** in energy
2007 - 2010	**EPFL Bachelor of Science** in electrical and electronic Engineering

Prizes

2010 - 2011	**Excellence scholarship**: award granted to a maximum of one student per department and year, based on academic performance.

Expertise

Graph	Graph neural networks, graph signal processing, graph spectral theory, graph learning, graph spectral theory
Machine learning	Generative adversarial networks, generative modeling, diffusion models, deep learning, recommender systems, manifold learning
Signal processing	Time-frequency analysis, sparsity, convex and non-convex optimization, proximal splitting methods

Software contributions (Github)

GSPBox PyGSP	Founder and lead contributor of an open-source graph-based general-purpose signal processing library in MATLAB and Python `https://epfl-lts2.github.io/gspbox-html/`
UNLocBoX PyUNLocBoX	Founder and lead contributor of an open-source convex optimization (proximal methods) library available in MATLAB and Python. `https://epfl-lts2.github.io/unlocbox-html/`
Open research	Multiple open-source lead contributions: • **Tifresi**: Time Frequency Spectrogram Inversion • **DeepSphere**: Spherical convolutional neural network • **Audio Inpainting**: Recover long missing parts of a song.

Other

Language skills	French (native), English (fluent), German (C1, fluent), Spanish (A2)
Workshop organizer	**- AICosmo2019**: artificial intelligence methods in cosmology **- Carving Through Data**: A different introductory course to Machine Learning (2019 and 2020 editions) **- KING2015**: key insights on networks and graphs
Teaching	Assistant lecturer, deep learning, ETHZ (2018, 2021, 2022)