Arthur **Ouaknine**

Postdoctoral researcher fellow

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Summary

I am a postdoctoral researcher fellow at McGill University and Mila (Quebec Artificial Intelligence Institute), in collaboration with David Rolnick. My research projects are focused on multi-modal and multi-task deep learning for remote sensing applied to forest monitoring. I am co-founder and chief technical officer (CTO) of Rubisco AI, a Mila startup that aims to monitor forest restoration projects. I am also a volunteer and core team member of Climate Change AI.

I completed my Ph.D. in March 2022 in collaboration between Institut Polytechnique de Paris (Telecom Paris; Image, Data and Signal department) and Valeo.ai (international research center in artificial intelligence applied to autonomous driving). The aim of my work was to use and adapt deep neural network architectures for scene understanding using automotive radar data and multi-sensor fusion.

Experience

McGill University and Mila — *Montreal, Quebec, Canada*

Postdoctoral researcher fellow — *Sep 2022 - Now*

- Deep learning and computer vision for multi-modal and multi-task learning for remote sensing applied to forest monitoring.
- Managing research projects of Master and Ph.D. students at Mila.
- Creation of OpenForest, a review of data and methods for machine learning in forest monitoring. Code and data are available at `https://github.com/RolnickLab/OpenForest`.
- Creation of a multi-modal, multi-task and multi-scale forest monitoring benchmark for remote sensing foundation models and a general method processing data from any spectral bands and resolutions. Code and data are available at `https://github.com/RolnickLab/Forest-Monitoring-Benchmark`.
- Member of the sustainability committee of Mila.

Rubisco AI — *Montreal, Quebec, Canada*

Co-founder & CTO — *May 2024 - Now*

- Monitoring of forest restoration projects with high resolution drone imagery and carbon stock estimation of individual trees.
- First proof of concept if available at `https://rubisco.ai/demo/`.

Climate Change AI — *Remote*

Core team member (Volunteer - Non-profit) — *Feb 2023 - Now*

- Co-lead organizer of the "Tackling Climate Change with Machine Learning" workshop at ICLR 2024.
  - Over 120 research articles submitted, 75 accepted including 7 spotlights and 3 best paper awards. All accepted works are available here.
  - Managing over 120 reviewers and 19 meta-reviewers.
  - Organizing the day-of event: 11 speakers (2 keynotes, 2 panels), 9 spotlights (including tutorials).
  - Audience of 150 people on-site and over 600 people online.
- Lead the webinars team. Average of one event per month with an audience of 50 to 100 people.

Valeo.ai — *Paris, France*

Ph.D. Student in Deep Learning — *Jan 2019 - Mar 2022*

- Creation of the CARRADA open source dataset for scene understanding with camera and radar data. Annotations are generated on radar representations using a semi-supervised algorithm based on natural images. Code and data are available at `https://github.com/valeoai/carrada_dataset`.
- Creation of deep neural network architectures with their associated loss functions for multi-view radar semantic segmentation. Code and pre-trained models are available at `https://github.com/valeoai/MVRSS`.
- Creation of a deep neural network architecture for HD radar preprocessing estimation and multi-task learning.
- Preliminary work on multi-sensor fusion for self-supervised learning.
- Accepted articles at ICPR 2020, ICCV 2021 and CVPR 2022. See publications section for further details.
- Teaching assistant in computer vision and machine learning. Co-supervisor of student projects (1 to 4 students): radar semantic segmentation, SAR image denoising, iceberg segmentation and tracking, deforestation detection (optical and SAR images). Details are available here.
- Co-organizer of the Deep Learning Working Group of the IMAGES team at Telecom Paris.

Valeo.ai — *Paris, France*

Research Engineer — *Sep 2018 - Dec 2018*

- Discussions between Valeo and Telecom team members about radar theory and data.
- Creation of a radar simulator for data generation.
- Classification of the simulated data using deep learning.

Faircast — *Paris, France*

Research Engineer (Freelance) — *Jun 2018*

- 3D point cloud segmentation using Superpoint Graph (L. Landrieu and M. Simonovsky, CVPR 2018) on LiDAR data for object removal in Parisian apartments.

Zyl
Saint-Maur-des-Fossés, France

Computer Vision Engineer — *Sep 2017 - Mar 2018*

- Application of deep learning methods for computer vision (object detection) embedded on smartphone (compression).
- Deep Learning modelling for Visual Sentiment Analysis (D. Borth et al., ACM 2013) and transfer learning.
- State-of-the-art reviews of deep learning applied to image classification, object detection and model compression. See publication section for further details.

Idemia
Paris, France

Data Science Project — *Oct 2016 - Jun 2017*

- Facial keypoint detection using deep neural networks with a few number of labelled data.
- Active learning process with uncertainty quantification for training optimization using Monte Carlo Dropout (Y. Gal and Z. Ghahramani, ICML 2016)

Rexel
Paris, France

Data Scientist — *Apr 2016 - Sep 2016*

- Machine learning modelling for client targeting (churn probability prediction, elasticity estimation, commercial visit optimisation)
- Text mining analysis to target clients discontent.
- Machine learning for attrition prediction: churn probability prediction covering a large part of sale revenues, churn cause analysis.

Enedis
Paris, France

Data Analyst — *Apr 2015 - Sep 2015*

- Text mining analysis, database structuring and predictive modelling.

Education

Institut Polytechnique de Paris - Telecom Paris
Palaiseau, France

Ph.D. in Deep Learning — *2019 - 2022*

- Supervised by P. Pérez (valeo.ai), F. Tupin (Telecom Paris) and A. Newson (Telecom Paris).
- *Subject*: "Scene understanding using deep learning algorithms applied to radar data for autonomous driving".
- Accepted articles at ICPR 2020, ICCV 2021 and CVPR 2022. See publications section for further details.
- *Keywords*: deep learning algorithms, signal processing, computer vision, Range-Angle-Doppler representations, semantic segmentation.

Telecom Paris
Palaiseau, France

Post M.Sc. Machine Learning (with Highest Honors) — *2017- 2018*

- *Keywords*: Machine Learning, Big Data and Distributed Systems (Spark, Hadoop).
- *Data Science Project*: "Active learning for facial keypoint detection using deep learning".

Paris Pantheon-Sorbonne University
Paris, France

M.Sc. Statistical Modelling (with Honors) — *2014 - 2016*

Paris Diderot University
Paris, France

B.S. Applied Mathematics — *2011 - 2014*

Publications

Thesis

- **A. Ouaknine**, **Deep Learning for Radar Data Exploitation of Autonomous Vehicle**, 2022.

Conferences

- J. Rebut, **A. Ouaknine**, W. Malik and P. Pérez, **Raw High-Definition Radar for Multi-Task Learning**, CVPR 2022.
- **A. Ouaknine**, A. Newson, P. Pérez, F. Tupin and J. Rebut, **Multi-View Radar Semantic Segmentation**, ICCV 2021.
- **A. Ouaknine**, A. Newson, J. Rebut, F. Tupin and P. Pérez, **CARRADA: Camera and Automotive Radar Dataset with Semi-Automatic Range-Angle-Doppler Annotations**. ICPR 2020.

Under review

- N. I. Bountos, **A. Ouaknine**, D. Rolnick, **FoMo-Bench: a multi-modal, multi-scale and multi-task forest monitoring benchmark for remote sensing foundation models**, ArXiv 2024.
- **A. Ouaknine**, T. Kattenborn, E. Laliberté, D. Rolnick, **OpenForest: A data catalogue for machine learning in forest monitoring**, ArXiv 2023.

Blog Posts

- A. Ouaknine, **Review of Deep Learning Algorithms for Image Semantic Segmentation**, *Medium*, *December 2018*.
- A. Ouaknine, **Deep Learning Model Compression for Image Analysis: Methods and Architectures**, *Medium*, *March 2018*.
- A. Ouaknine, **Review of Deep Learning Algorithms for Object Detection**, *Medium*, *February 2018*.
- A. Ouaknine, **Review of Deep Learning Algorithms for Image Classification**, *Medium*, *January 2018*.

Skills

Languages

French (native), English (fluent)

Software Languages

Python, Java, R, javascript, SQL, NoSQL, C++, Scala, VBA

Frameworks

Deep Learning: PyTorch, Tensorflow, Keras

Software Development: Linux, Docker, Github, CircleCI, Sphinx

Interests

Research community

Reviewer in machine learning conferences (CVPR, NeurIPS, ICML, ICRA).

Volunteering

Volunteer as a core team member of Climate Change AI, a non-profit organisation disseminating impactful work at the intersection of climate change and artificial intelligence.

Sports

Running (10 Km, half-marathon, marathon), Bouldering, Hiking, English Boxing.

Travels

Western and Eastern Europe, Canada, USA, Guatemala, Argentina, Bolivia, Colombia, Peru, Marocco, Cape Verde, Cambodia, Vietnam, Indonesia, Thailand.