Arthur **Ouaknine**

Ph.D. Student in Deep Learning

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Summary

I'm a PhD student at 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 is to use and adapt deep neural network architectures for scene understanding using automotive radar data and multi-sensor fusion. Our contributions are the following: one of the first open source radar dataset paired with a semi-automatic annotation method, deep neural network architectures with their associated loss functions for multi-view radar semantic segmentation and a new multi-modal dataset including a High Definition (HD) radar with an adapted neural network architecture. A project is still in progress: a radar and lidar fusion method propagating radar measurements though lidar point clouds to improve lidar-based scene understanding tasks.

I am currently looking for a postdoc or a ML research position on self-supervised learning and multi-modal fusion. An application of this theory would preferably be related to climate change mitigation using satellite data (forest management, deforestation detection, wildfire detection, greenhouse gas emission estimation an so on).

Education

Telecom Paris — *Palaiseau, France*

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

- Under the supervision of 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 representation, 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*

Experience

Valeo.ai — *Paris, France*

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

- Creation of CARRADA open source dataset for scene understanding application 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 radar preprocessing estimation and multi-task learning.
- Ongoing 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.
- Assistant Professor 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 apartment.

Zyl

Saint-Maur-des-Fossés, France

Computer Vision Engineer — *Oct 2016 - Jun 2017*

- 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 review of deep learning applied to image classification, object detection and model compression.

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 2016 - Sep 2016*

- Text mining analysis, database structuring and predictive modelling.

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.

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

Sports

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

Travels

Western and Eastern Europe, Canada, USA, Guatemala, Marocco, Cape Verde, Cambodia, Vietnam, Indonesia, Thailand