

Loic Landrieu

Email:

loic.landrieu
@ign.fr

Website:

loiclandrieu.com

Github:

loicland

ORCID:

0000-0002
7738-8141

Phone number:

(+33)6 77 18 92 53

Address

15 rue Paul Bert
Paris, 75011
France

Loic Landrieu

Structured machine learning for remote sensing

Summary I am a researcher at IGN—the French Mapping Agency—in the machine learning team STRUDEL. I develop graph-structured optimization and learning algorithms leveraging the structure of real-life problems (be it spatial, temporal, spectral, or modal) for improved precision and efficiency. I have a special interest for large-scale remote sensing applications. I am also a course instructor in machine learning at ENSG (IGN's school of geomatics) and ENPC.

Positions and Research Experience

2015–present : *Researcher, MATIS, IGN*

Structured learning for multi-source remote sensing.

2010–present: *Ingénieur des ponts, des eaux et des forêts, MEEDEEM*

2012 : *Research Assistant, INRIA*

Land cover prediction with continuously indexed Markov random fields.

Advisor: Guillaume Obozinski

2011 : *Research Assistant, INRIA*

Weakly supervised part-of-speech tagging in natural languages.

Advisor: Guillaume Obozinski

2011 : *Research Assistant, ENPC ParisTech*

Reviewer recommendations system from the citation graph.

Advisor: Jean-Yves Audibert

Teaching

- 2019 : AIMS, Master AMMI, *Teaching assistant*
Probabilistic Graphical Models.
- 2019 : EUROS DR with EduSERV, *Course instructor*
Deep learning for remote sensing.
- 2018–present : ENPC, Master IMI, *Teaching assistant*
Introduction to machine learning.
- 2017–present : ENSG, Master PPMD, *Course instructor*
Structured classification.
- 2016–2017 : ENSG, Master DesiGeo, *Course instructor*
Introduction to machine learning.
- 2014 : ENS Cachan, *Teaching assistant*
Probabilistic graphical models.

Education

2012 - 2016, ENPC ParisTech - INRIA - ENS Ulm, PhD

PhD in computer science / machine learning: *Learning structured models on weighted graphs, with applications to spatial data analysis.*

Advisors: Francis Bach and Guillaume Obozinski

2011 - 2012, ENS Cachan, MSc

Master MVA, machine learning and computer vision.

2011 - 2012, ENPC ParisTech, MSc

Master IMI, computers science and applied mathematics.

2007 - 2011, Ecole Polytechnique, MSc

Algorithmic and applied mathematics.

Loic Landrieu

Email:

loic.landrieu
@ign.fr

Website:

loiclandrieu.com

Github:

loicland

ORCID:

0000-0002
7738-8141

Phone number:

(+33)6 77 18 92 53

Address

15 rue Paul Bert
Paris, 75011
France

Main Publications

Journal papers

- **2017, ISPRS:** Loic Landrieu, Hugo Raguét, Bruno Vallet, Clément Mallet, and Martin Weinmann, *A Structured Regularization Framework for Spatially Smoothing Semantic Labelings of 3D Point Clouds*.
- **2017, SIIMS/SIAM:** Loic Landrieu and Guillaume Obozinski, *Cut Pursuit: Fast Algorithms to Learn Piecewise Constant Functions on General Weighted Graphs*.
- **2015, SIIMS/SIAM:** Hugo Raguét and Loic Landrieu, *Preconditioning of a Generalized Forward-Backward Splitting and Application to Optimization on Graphs*.

Conferences

- **2019, ICML Workshop:** Loic Landrieu and Mohammed Boussaha, *Supervised Segmentation with Graph-Structured Deep Metric Learning*.
- **2019, ICML Workshop:** Hugo Raguét and Loic Landrieu, *Parallel Cut Pursuit For Minimization of the Graph Total Variation*.
- **2019, IGARSS:** Vivien Sainte Fare Garnot, Loic Landrieu, Sebastien Giordano, Nesrine Chehata, *Time-Space Tradeoff in Deep Learning Models for Crop Classification on Satellite Multi-Spectral Image Time Series*.
- **2019, CVPR:** Loic Landrieu and Mohammed Boussaha, *Point Cloud Oversegmentation with Graph-Structured Deep Metric Learning*.
- **2019, ISPRS Workshop:** Stéphane Guinard, Loic Landrieu, and Bruno Vallet *Piecewise-planar Approximation Of Large 3d Data As Graph-Structured Optimization*.
- **2018, ICML:** Hugo Raguét and Loic Landrieu, *Cut-Pursuit Algorithm for Regularizing Nonsmooth Functionals with Graph Total Variation*.
- **2018, IGARSS:** Sébastien Giordano, Simon Bailly, Landrieu, Loic, and Nesrine Chehata, *Temporal Structured Classification of Sentinel 1 and 2 Time Series for Crop Type Mapping*.
- **2018, CVPR:** Loic Landrieu and Martin Simonovski, *Large-scale Point Cloud Semantic Segmentation with Superpoint Graphs*.
- **2017, IGARSS:** Loic Landrieu, Clément Mallet, and Martin Weinmann, *Comparison of Belief Propagation and Graph-Cut Approaches for Contextual Classification of 3D LiDAR Point Cloud Data*.
- **2017, ISPRS:** Stéphane Guinard and Loic Landrieu, *Weakly Supervised Segmentation-Aided Classification of Urban Scenes From 3D LiDAR Point Clouds*.
- **2016, AISTATS:** Loic Landrieu and Guillaume Obozinski, *Cut Pursuit: Fast Algorithms to Learn Piecewise Constant Functions*.
- **2014, UAI:** Loic Landrieu and Guillaume Obozinski, *Continuously Indexed Potts Models on Unoriented Graphs*.

Software Development

I have an active github profile github.com/loicland, with several open-source repositories:

- [🔗]/[superpoint-graph](https://github.com/loicland/superpoint-graph) 298 ★ 93 🍷
- [🔗]/[cut-pursuit](https://github.com/loicland/cut-pursuit) 31 ★ 11 🍷
- [🔗]/[point-cloud-regularization](https://github.com/loicland/point-cloud-regularization) 11 ★ 8 🍷

Loic Landrieu

Email:

loic.landrieu
@ign.fr

Website:

loiclandrieu.com

Github:

loicland

ORCID:

0000-0002
7738-8141

Phone number:

(+33)6 77 18 92 53

Address

15 rue Paul Bert
Paris, 75011
France

Talks in Conferences and Invited Talk

2019

- Journées Nationales de la Recherche en Robotique, France ,keynote 🔍
Deep Learning for Point Cloud Semantic Segmentation.
- ICML Graph Reasoning Workshop, Long Beach, USA , poster 📄
Supervised Segmentation with Graph-Structured Deep Metric Learning.
- ICML Graph Reasoning Workshop, Long Beach, USA , poster 📄
Parallel Cut Pursuit For Minimization of the Graph Total Variation
- CVPR, Long Beach, USA , poster 📄
Point Cloud Oversegmentation with Graph-Structured Deep Metric Learning.
- CVPR 3D Scene Understanding, Long Beach, USA, poster 📄
Point Cloud Oversegmentation with Graph-Structured Deep Metric Learning.
- ISPRS Geospatial week, Univ. of Twente, Netherlands, tutorial 🎓
Deep Learning for Point Clouds Semantic Segmentation.
- Univ. Montpellier, France, invited talk 🗣️
Cut Pursuit for Optimizing with Graph-Structured Regularizers.
- Facebook AI Research, Paris, invited talk 🗣️
Optimization and Learning with Graph Sparsity
- JURSE 2019, Vannes, France, tutorial 🎓
Deep Learning for Point Clouds Semantic Segmentation.
- Univ. Paris-Est, France, invited talk 🗣️
Deep Learning for 3D Point Cloud Semantic Segmentation.
- Conference on IGN Research, France, organizer ⚙️
- EuroSDR Barcelona, Spain, lecturer 🎓
Deep Learning for 3D Point Clouds Analysis.

2018

- Univ. of Erlangen, Germany, invited talk 🗣️
Deep Metric Learning on Point Clouds.
- Optimization in Image Analysis Summer School by DTU and DIKU, Copenhagen, lecturer 🎓
- ICML, Stockholm, Sweden, poster 📄
Cut-Pursuit Algorithm for Regularizing Non smooth Functionals with Graph Total Variation.
- RFIAP, ENSG, France, oral 🗣️
Large-scale Point Cloud Semantic Segmentation with Superpoint Graphs.
- CVPR, Salt lake City, USA, poster 📄
Large-scale Point Cloud Semantic Segmentation with Superpoint Graphs.
- IGN Research Conference, ENSG, France, oral 🗣️
Large-scale Point Cloud Semantic Segmentation with Superpoint Graphs.
- SIAM symposium in Bologna, Italy, invited talk 🗣️
Cut Pursuit for Optimizing with Graph-Structured Regularizers.
- NoMADS, Politecnico di Milano, Italy, invited talk 🗣️
Cut Pursuit for Optimizing with Graph-Structured Regularizers.
- FOSS-4G, ENSG, France, oral 🗣️
Presentation of the SuperPointGraph Repository.

2017

- IGN, 3D Analysis Symposium, France, organizer ⚙️
Deep Learning for 3D Point Clouds.
- Polytechnique Data Science Summer School, France, poster 📄
Structured Optimization for Remote Sensing Applications.

Loic Landrieu

Email:

loic.landrieu
@ign.fr

Website:

loiclandrieu.com

Github:

loicland

ORCID:





0000-0002
7738-8141

Phone number:

(+33)6 77 18 92 53

Address

15 rue Paul Bert
Paris, 75011
France

- IGN Research Conference, France, oral 
Structured Optimization for Remote Sensing Applications.
2016
- GDR ISIS, Paris, France, oral 
 ℓ_0 -cut pursuit algorithm for graph-structured greedy optimization.
- AISTATS, Cádiz, Spain, poster 
Cut Pursuit: Fast Algorithms to Learn Piecewise Constant Functions.
2015
- UAI, Quebec City, Canada, poster 
Continuously Indexed Potts Models.

Supervision and Community

Supervision

- 3 Interns: Stephane Guinard, Simon Bailly, Omar Lahbib.
- 4 PhDs: Stephane Guinard, Vivien Sainte Fare-Garnot, Mohamed Bous-saha, Raphael Sulzer.

Organization

- Organizer of the 2019 Conference on IGN Research, 250+ participants.
- Organizer of the STRUDEL reading group on machine learning for remote sensing, 6 presentations / years, 20-30 participants.
- Organizer of the *Deep Learning for 3D Point Cloud* Seminar at IGN, 25 participants.

Reviewing

I review or have reviewed for: ICML, NIPS, ICCV, CVPR, IJDSA, ANR Grants, ISPRS, and others.

Projects and Grants

I am a participant of the BIOM ANR Project.

Skills

Machine learning

- functional optimization
- deep learning
- LiDAR data
- superspectral imagery
- graphical models
- signal processing
- graph theory
- time-sequences

Computer science

- C++
- Matlab
- Python
- PyTorch
- OpenMP
- Tensorflow
- Java
- \LaTeX