

Summary

PhD Candidate in Computer Vision working on change detection in video and satellite imagery. My research mainly focuses on remote sensing applications for object and change detection in low-annotation regimes, including few-shot, weakly supervised, and self-supervised learning. Additionally, I actively collaborate on real-world problems with both private and public organizations.

Education

- 2022–Present **PhD in Applied Mathematics, Computer Vision**, *ENS Paris-Saclay*, Gif-sur-Yvette, France.
Change detection in video and satellite imagery. Funded by the French Defense Ministry. Supervised by Rafael Grompone and Thibaud Ehret. Also advised by Jean-Michel Morel and Gabriele Facciolo. Activities and collaborations on real-world problems with other institutions:
- French military: Change detection on very high resolution satellite imagery.
 - IGN: Weakly supervised semantic change detection on remote sensing data.
 - Kayrros: Detection of rare events/objects, e.g. detection of methane-emitting biogas plants.
 - Vizzia: Identification of littering in street-level surveillance cameras with low temporal resolution.
 - Teaching: Supervised interns and MVA master students on their remote sensing course project.
- 2020–2022 : **Master of Science in Computer Science**, *Université Paris-Saclay*, Gif-sur-Yvette, France.
Focus on artificial intelligence. Carried out as part of the double-master program *EIT Digital Master*.
- 2020–2022 : **Master of Science in Computer Science**, *Eindhoven University of Technology*, Eindhoven, NL.
Focus on data science and AI. Carried out as part of the double-master program *EIT Digital Master*.
- 2015–2018 : **Bachelor of Science in Electrical Engineering**, *Drexel University*, Philadelphia, United States.
Focus on digital signal processing, Division 1 Athlete (Soccer).

Experience

- 2021 **Research Internship**, *Kayrros*, Paris, France.
Joined the Remote Sensing team to develop deep learning methods for thin cloud detection and removal on low-resolution satellite imagery (Sentinel-2).
- 2018–2020 **Software Engineer**, *Mobile Knowledge*, Barcelona, Spain.
Mobile and embedded software development for wireless communications applications, e.g. Near Field Communication (NFC), Ultra-Wideband (UWB) or Bluetooth.

Skills

Languages

- Native in Catalan and Spanish
- Proficient in English and French
- Beginner in Italian

Software

- Programming**: Python, C/C++, Matlab, Java
- AI**: Pytorch, JAX
- Other**: Linux, Git, OpenCV, SSH, Jean-Zay

Scholarships and awards

- Full individual PhD scholarship awarded by **Agence de l'Innovation de Défense (AID)**, **Ministère des Armées**, with a total value of 120,000 €.
- Full individual scholarship awarded by the **EIT Digital Master Program**, covering the tuition fees for both universities in the double master's program.
- Full individual Athletic scholarship awarded by **Drexel University** for the entire bachelor degree.

References (upon request)

Prof. Rafael Grompone von Gioi, *Professor, ENS Paris-Saclay*.
Prof. Gabriele Facciolo, *Professor, ENS Paris-Saclay*.
Prof. Jean-Michel Morel, *Chair Professor, City University of Hong Kong*.

Publications

- 2024 Xavier Bou, Gabriele Facciolo, Rafael Grompone von Gioi, Jean-Michel Morel, and Thibaud Ehret. Structure tensor representation for robust oriented object detection, 2024.
- 2024 Xavier Bou, Gabriele Facciolo, Rafael Grompone Von Gioi, Jean-Michel Morel, and Thibaud Ehret. Exploring robust features for few-shot object detection in satellite imagery. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, pages 430–439, 2024.
- 2024 Xavier Bou, Thibaud Ehret, Rafael Grompone Von Gioi, and Jérémy Anger. Portraying the need for temporal data in flood detection via sentinel-1. In *IGARSS 2024 - 2024 IEEE International Geoscience and Remote Sensing Symposium*, pages 3930–3934, 2024.
- 2023 Xavier Bou, Aitor Artola, Thibaud Ehret, Gabriele Facciolo, Jean-Michel Morel, and Rafael Grompone von Gioi. Reducing false alarms in video surveillance by deep feature statistical modeling, 2023.
- 2022 Xavier Bou, Thibaud Ehret, Gabriele Facciolo, Jean-Michel Morel, and Rafael Grompone von Gioi. Reviewing ViBe, a Popular Background Subtraction Algorithm for Real-Time Applications. *Image Processing On Line*, volume 12, pages 527–549, 2022. <https://doi.org/10.5201/ipol.2022.434>.
- 2022 Xavier Bou. A Study of RobustNet, a Domain Generalization Method for Semantic Segmentation. *Image Processing On Line*, volume 12, pages 469–479, 2022. <https://doi.org/10.5201/ipol.2022.433>.