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Xavier Bou

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`.