Francesco **Cappio Borlino**

PhD student at Politecnico di Torino

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Summary

I am a Ph.D. student in Computer And Control Engineering at Politecnico di Torino. I work on Deep Learning based techniques for Computer Vision tasks, mainly visual object recognition and detection. My research focus is on robustness of models across semantic and visual domain shifts: I work on semantic anomaly detection and visual domain adaptation and generalization. My purpose is to build models that are ready for real world applications.

Skills

Programming Languages	Python, Java, C, C++, Bash, SQL, Javascript, PHP
Technologies and Frameworks	Linux, PyTorch, Jax+Flax, Hadoop, Spark, Android Studio
Languages	Italian: Native | English: level B2-C1 (First CE)| French level: B2-C1
Interests	Technology | Deep/Machine Learning | Free Software | Hiking | Cooking | Reading

Education

Politecnico di Torino — *Turin, Italy*

PhD in Computer and Control Engineering — *May, 2020 - Ongoing*

- Research in Deep Learning for Computer Vision

4th International School on Deep Learning — *Las Palmas de Gran Canaria, Spain*

DeepLearn 2021 Summer — *July 26-30, 2021*

Politecnico di Torino — *Turin, Italy*

Master's Degree in Computer Engineering — *Oct. 2017 - Dec. 2019*

- **Thesis:** "Visual object detection across different domains by solving self supervised tasks".
  Abstract: *Deep Neural Network models based on convolutions need a large dataset to be trained successfully. In the Computer Vision context this implies that a lot of labeled images have to be collected in order to obtain a model with good performances. A trained model is then often unusable when exploited in a visual domain which is different from the training one; moreover the data collection and labeling process can be physically or economically impossible in some visual domains. From these considerations the need to develop algorithms robust to visual domain shifts. Self supervised tasks have shown a great potential as a strategy to learn useful features from unlabeled images. They can therefore be used in cross domain analysis as a method to obtain feature alignment between different domains. The purpose of this thesis is to study how self supervised tasks can be used to develop well performing visual object detection models in various cross domain analysis settings: Domain Generalization, Domain Adaptation and a new more general and challenging setting called One-Sample adaptation.*
  Supervisors: Barbara Caputo, Tatiana Tommasi, Antonio D'Innocente.
- **Final mark**: 110L/110

Politecnico di Torino — *Turin, Italy*

Bachelor's Degree in Computer Engineering — *Oct. 2014 - Sept. 2017*

- **Final Mark:** 107/110

Publications

One-shot unsupervised cross-domain detection — *2020*

Authors: Antonio D'Innocente, Francesco Cappio Borlino, Silvia Bucci, Barbara Caputo, and Tatiana Tommasi — *Link*

In: European Conference on Computer Vision, ECCV 2020

Domain Generalization vs Data Augmentation: An Unbiased Perspective *2020*

Authors: Francesco Cappio Borlino, Antonio D'Innocente, and Tatiana Tommasi. *Link*

In: Computer Vision – ECCV 2020 Workshops

Rethinking Domain Generalization Baselines *2021*

Authors: Francesco Cappio Borlino, Antonio D'Innocente, and Tatiana Tommasi. *Link*

In: 25th International Conference on Pattern Recognition, ICPR 2020

Distance-based Hyperspherical Classification for Multi-source Open-Set Domain Adaptation *2022*

Authors: Silvia Bucci*, Francesco Cappio Borlino*, Barbara Caputo, and Tatiana Tommasi *Link*

In: Winter Conference on Applications of Computer Vision, WACV 2022

Contrastive Learning for Cross-Domain Open World Recognition *2022*

Authors: Francesco Cappio Borlino, S. Bucci, T. Tommasi *Link*

In: The 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022)

Semantic Novelty Detection via Relational Reasoning *2022*

Authors: Francesco Cappio Borlino*, S. Bucci*, T. Tommasi *Link*

In: European Conference on Computer Vision, ECCV 2022

Self-Supervision & Meta-Learning for One-Shot Unsupervised Cross-Domain Detection *2022*

Authors: Francesco Cappio Borlino, S. Polizzotto, B. Caputo, T. Tommasi *Link*

In: Computer Vision and Image Understanding Journal (CVIU)

3DOS: Towards 3D Open Set Learning – Benchmarking and Understanding Semantic Novelty Detection on Point Clouds *2022*

Authors: A. Alliegro*, Francesco Cappio Borlino*, T. Tommasi *Link*

In: Proceedings of the Neural Information Processing Systems (NeurIPS) Track on Datasets and Benchmarks, 2022
*equal contributions

Work Experience

Politecnico di Torino *Turin, Italy*

PhD student *May. 2020 - Ongoing*

- **Teaching Assistant**:
  - 2020-2021: master course on Artificial Intelligence and Machine Learning
  - 2021-2022: master course on Advanced Machine Learning
  - 2022-2023: master course on Advanced Machine Learning
- **Reviewer**: ECCV 2020, TASKCV 2020, NeurIPS 2020, ICRA 2021, CVPR 2021, ICCV 2021, WACV 2022, Pattern Recognition Journal, ICPR 2022, Robotics and Automation Letters (RAL) Journal, NeurIPS Datasets and Benchmarks track 2022, International Journal of Computer Vision (IJCV), CVPR 2023.
  I have been named one of **CVPR 2023 outstanding reviewers** CVPR

Italian Institute of Technology *Turin, Italy*

Researcher *Feb. 2020 - Apr. 2020*

- Further development of my Master's Degree Thesis project in visual object detection across domains.

Feedback Italia Srl *Moncalieri, TO | Italy*

Software Developer *Mar. 2017 - Jan. 2019*

- I did a curricular Internship and I was then offered a job as a software developer that I kept while studying for my Master's Degree. I worked almost two years developing a messaging application for Android and a C/C++ based service for a Linux embedded system. I left this position to work on my Master's Degree thesis.