SAMUEL HURAULT

PhD student (2nd year)

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Research Interests

Computer Vision | Machine Learning | Mathematical Image Processing | Inverse Problems | Sport Video Processing | Optimization

Education

PhD in Image Processing

Institut de Mathématiques de Bordeaux

Since October 2020 — Bordeaux, France

Supervisors : Prof. Nicolas Papadakis, Prof. Arthur Leclaire

- Plug-and-Play methods for image restoration: new performant algorithms with theoretical convergence guarantees.
- Solving inverse problems with GAN and VAE priors.

Master's degree "MVA" Mathematics, Vision, Learning

Paris-Saclay University

2018 – 2019 — Paris, France

Deep Learning | 3D Vision | Object Recognition | Reinforcement Learning | Natural Language Processing | Kernel methods in ML

Master's degree in Applied Mathematics

Ecole Normale Superieure Paris-Saclay

2017 – 2018 — Cachan, France

Image Processing | Optimization | Probability | Statistical Learning | Spectral Theory | Network Theory

Bachelor in Mathematics

Ecole Normale Superieure Paris-Saclay

Sept 2016 – 2017 — Cachan, France

Probability | Analysis | Algebra | Topology | Numerical methods | Differential Calculus

Research Experiences

Research internship in Image and Sport Video Processing

Image Processing Group, University Pompeu Fabra

November 2019 – July 2020 — Barcelona, Spain

Supervisors : Prof. Coloma Ballester, Prof. Gloria Haro

- Self-supervision and domain adaptation for small soccer player detection and tracking. Improved by $\sim 15\%$ the AP for small player detection compared to baseline human detector.
- Augmentation and application of the VQ-VAE networks for image restoration

Research internship in Deep Learning

Ministère des Armées

April – September 2019 — Paris, France

Review and performance comparison of acceleration and compression methods for deep neural networks : network pruning, quantization and distillation.

Research Internship in 3D Vision

Computer Science Department, Otago University

May – September 2018 | Dunedin, New-Zealand

Supervisor : Prof. Steven Mills

Development of a mixed reality system to assist pool players with the Microsoft Hololens (C++ via DirectX).

Research Internship in Image Restoration

CMLA (Research Center for Applied Mathematics)

January – July 2017 | Cachan, France

Supervisors : Prof. Jean-Michel Morel, Prof. Pablo Arias, Dr. Thibaud Ehret

Analysis, optimization and extension to color of the EPLL image denoising algorithm.

Publications

Proximal denoiser for convergent plug-and-play optimization with nonconvex regularization
S Hurault, A Leclaire, N Papadakis
International Conference of Machine Learning (ICML) (2022)

Gradient Step Denoiser for convergent Plug-and-Play
S Hurault, A Leclaire, N Papadakis
International Conference on Learning Representations (ICLR) (2022)

Self-Supervised Small Soccer Player Detection and Tracking
S Hurault, C Ballester, G Haro
3rd International Workshop on Multimedia Content Analysis in Sports, 9-18 (2020)

EPLL: an image denoising method using a Gaussian mixture model learned on a large set of patches
S Hurault, T Ehret, P Arias
Image Processing On Line 8, 465-489 (2018)

Talks

SIAM Conference on Imaging Science 2022

Gradient Step Denoiser for convergent Plug-and-Play

March 2022 | Virtual conference

Teaching

Assistant Professor, Numerical Methods for Mathematics (3rd year of Bachelor)

University of Bordeaux (64 hours)

2020/2021/2022 | Bordeaux, France

Computer Skills

Python | PyTorch | PyTorch-Lightning | Basics of C++ | Cython | Linux | GIT | Latex | SSH

Languages

English : Writing and Speaking | Spanish : Writing and Speaking | French : Native

Extra-professional life

Friends and family | Reading | Football | Running | Hiking | Traveling | Saxophone