Théophile Sautory

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Education

University of California, Berkeley Aug. 2021 – Exp. May 2026
PhD in Mechanical Engineering *Berkeley, CA*
Physics Informed Machine Learning & Accelerating CFD Simulations.
Advisor: Philip Marcus.

Imperial College London Oct. 2019 – Sep. 2020
MSc in Computing, Specialism AI & ML *London, UK*

Imperial College London Oct. 2015 – Jun. 2019
MEng in Mechanical Engineering *London, UK*

Experience

Imperial College London Apr. 2021 – Jul. 2021
Research Assistant in AI & ML *London, UK*

- Responsible for the R&D of AI tools to help analysts' crime linkage decision making, collaborating with Computer Science and Psychology Professors to integrate expert knowledge in algorithms.
- Implemented Siamese Autoencoders trained with Contrastive Loss to perform crime linkage in the latent space using PyTorch, reducing the number of cases to be compared by a factor of 10.
- Formalized an ordering procedure to learn weak constraints in Inductive Logic Programming to unveil the impact of situational contexts on offenders behaviours.

Scortex - Quality Intelligence Sep. 2020 – Mar. 2021
Machine Learning Research Intern *Paris, France*

- Prototyped and implemented research on semi and unsupervised deep learning models for anomaly detection on images. Focused on Autoencoders using CNNs, and Transfer Learning.
- Outperformed current literature on the MVTec unsupervised anomaly detection dataset using Python, TensorFlow and OpenCV, and produced analysis which directly allowed to gain a new client.
- Participated in weekly lab meetings to present and discuss literature, and brainstorm on new directions.

Vekia – Next Generation Supply Chain Jun. 2018 – Sep. 2018
R&D Intern in Machine Learning *Lille, France*

- Worked in hand with senior researchers to devise a statistical model to describe the consumer good demand in the context of censored sales as a left truncated negative binomial distribution, to predict past lost and future sales.
- Built an Artificial Neural Network to learn the parameters of the distribution using TensorFlow (v1).

Projects

Neuro-Symbolic AI for Video Question Answering Mar. 2020 - Nov. 2020

- Developed a neuro-symbolic model for the video question answering CLEVRER task (HySTER, 2021).
- Incorporated a Mask R-CNN for segmentation, ResNets for depth estimation, alongside an Answer Set Programming framework for natural language processing and temporal and causal reasoning.

Waymo 2D Object Detection Challenge Apr. 2020 - May. 2020

- Worked in a group of three to fine-tune an EfficientDetd4 on 700k - 1080p images using Google Cloud Platform, an NVIDIA Tesla V100 GPU, and PyTorch.
- Implemented techniques such as Test Time Augmentation, mixed precision training, and kmeans clustering for anchor priors, achieving an mAP of 0.58 on the task.

Turbulence Modelling with Artificial Neural Networks Oct. 2018 - Jun 2019

- Formulated a new turbulence model to close the filtered Navier-Stokes equations for sub-grid Large Eddy Simulation (LES) model using artificial neural networks.
- Improved model correlation coefficients when compared with classical turbulence models using the same input features on datasets from the Johns Hopkins turbulence database.
- Worked with my supervisor and classmate to publish our research (A Piori Sub-grid Modelling, 2020).

Technical Skills

Programming: Python and MATLAB (experienced), C++ and Embedded C (basics).

Libraries: PyTorch, TensorFlow, Scikit-learn, Keras, OpenCV, Matplotlib, Numpy, Scipy, Pandas.

Tools: Git, Github, LaTeX, Unix environment, CUDA GPUs, Star CCM+, Google Cloud Platform.

Leadership and Extracurricular

Vice-President of the Imperial College Basketball Society leading the 120 members society to win **Imperial Sports Club of the Year**, out of 60+ clubs for the first time in clubs' history (2019), **Team Captain** (2018), 15 years of play.

Awards

UC Berkeley **Graduate Division Block Grant Award**, Mechanical Engineering 2021

Imperial College London Engineering **Dean's List** (top 10%) 2016, 2017, 2018, 2019

Publications

[1] Pierre Gutierrez, Antoine Cordier, Thaïs Caldeira, Theophile Sautory (2021): Data augmentation and pre-trained networks for extremely low data regimes unsupervised visual inspection, Proc. SPIE 11787, Automated Visual Inspection and Machine Vision IV, 1178703, DOI: 10.1117/12.2591876.

[2] Theophile Sautory, Nuri Cingillioglu, Alessandra Russo (2021): HySTER: A Hybrid Spatio-Temporal Event Reasoner, Thirty-Fifth AAAI Conference on Artificial Intelligence Workshop on Hybrid Artificial Intelligence.

[3] Alvaro Prat, Theophile Sautory & S. Navarro-Martinez (2020): A Priori Sub-grid Modelling Using Artificial Neural Networks, International Journal of Computational Fluid Dynamics, DOI: 10.1080/10618562.2020.1789116.