MATTHIEU DAGOMMER

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Education

Columbia University — New York, NY
MS Biomedical Engineering, GPA: 4.08/4.33 — Dec 2023
Research Assistantship: Small Animal Imaging Laboratory (SAIL), Zuckerman Institute. Supervisor: Jia Guo.

ESPCI Paris-PSL — Paris, France
MEng Physics, GPA: 3.9/4.0 — Sep 2022

Universite de Lille — Villeneuve-d'Ascq, France
Associate's Degree, Applied Physics, GPA: 4.0/4.0 — Sep 2019

Programming Skills

Python (Numpy, Pandas, Scikit-Learn, Tensorflow, Keras, Pytorch, PyG, PyMC, Pyro, RDKit), MATLAB, C/C++, R, Git, Bitbucket, MySQL, Bash, AWS (S3, EC2, SageMaker), Docker, VSCode, Confluence, Jira.

Experience

Moderna — Cambridge, MA
Data Science and Artificial Intelligence Co-op — Jul 2023 - Dec 2023
- Designed a data-driven molecule discovery pipeline to improve mRNA product quality with the computational chemistry team.
- Deployed XGBoost, graphNN and VAE models for molecule property prediction and guided generation of new compounds.

Harvard Medical School — Boston, MA
Research Assistant — Apr 2022 - Jul 2022
- Developed a deep learning framework for estimation of skull bone porosity from clinical MRI T1-weighted images.
- Proposed an original numerical method (backpropagation in the mask) increasing performance of existing algorithms by 11%.
- Presented study results at ISMRM and NIH workshop on MRI of neuromodulation (October 2022, Bethesda, MD).

EssilorLuxottica — Creteil, France
R&D Intern — Jul 2021 - Dec 2021
- Enhanced software for predicting dye combinations that achieve color targets (sunglasses tinting) using genetic algorithms.
- Set up a tinting test protocol to assess quality of prediction provided by data-driven, computational and hybrid methods.
- Increased compliance rate of produced lenses after visual inspection by color technicians by 18%.

Geosophy — Paris, France
R&D Engineer — Oct 2020 - Dec 2020
- Programmed a finite-element method (FEM) simulation software to compute power output from geothermal installations.
- Demonstrated reliability of simulation software over a period of 1 year using data from existing installations.

Projects

MEGA-PRESS Signal Denoising, *Small Animal Imaging Laboratory*, Columbia University — Sep 2022 – Dec 2022
- Adapted an FFT-based convolutional neural network (AFT-Net) from image-denoising to 1D complex signal denoising.
- Achieved significantly better reconstructions with proposed approach compared to spectroscopy-standard Gaussian-line broadening.

Multimodal cell trajectory inference, *Statistical Machine Learning*, Columbia University — Jan 2023 – Apr 2023
- Combined existing libraries CellRank and MultiVelo to achieve cell trajectory inference with ATAC-seq and RNA-seq data.
- Identified cell-differentiation lineages and corresponding biological pathways on 10x mouse brain dataset.

Gene Essentiality Prediction, *Machine Learning for Functional Genomics*, Columbia University — Sep 2022 – Dec 2022
- Predicted genes essential to the cell survival in cancer cell lines using graph models and protein-protein interaction networks.

Publications

(under review) **Dagommer, M.**, Guerin B., Daneshzand, M. & Nummemnaa, A. (2023). Deep learning estimation of cortical bone porosity from MR T1-weighted images for individualized transcranial focused ultrasound navigation.

(preprint: arXiv:2312.10892) Yang, Y., **Dagommer, M.** & Guo, J. (2023). Deep learning-based accelerated Human MRS reconstruction with artificial Fourier transform network (AFT-Net) (submitted for ISMRM 2024 annual meeting, Singapore).