Hugues de Laroussilhe

Research Engineer

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SUMMARY

Research engineer with experience in physics, computer science and deep learning. I am enthusiastic about the advancements that machine learning allows in science and engineering. I was involved on several projects applying deep learning solutions to control, enhance or accelerate scientific codes on high-performance computing platforms.

EXPERIENCE

Research Engineer

INRIA/ATOS

02/2022 - Ongoing | Grenoble, France

This position is part of the joint laboratory between the Atos Ai4Sim R&D team, working on the use of AI for scientific simulations and the INRIA AIRSEA research group, working on the modeling of geophysical flows.

- Run, calibrated and analyzed simulations to generate high fidelity training datasets
- Developed, tested and benchmarked deep neural network architectures (MLP, CNN and GNN) and training strategies (supervised, unsupervised and reinforcement learning) for processing 3D simulation data
- Designed efficient communication between parallel simulation solvers and ML inference engines
- Contributed to use cases of the methodology applied to fluid dynamics, ocean-atmosphere interactions and operational weather forecasts
- Supervised a master student thesis
- Organized and nurtured collaboration between industry and academia through presentations, workshops

PhD Student

University of Zurich - Institute for Computational Science

10/2019 - 01/2022 | Zurich, Switzerland

Supervision: Prof. R. Teyssier (Princeton University)
Subgrid models in astrophysical simulations:

- Generated, combined and analyzed large amounts of unstructured 3D simulation data
- Calibrated and compared different turbulence models based on observational data and theoretical constraints
- Developed analysis tools for data processing and visualization
- Applied computer vision methods (super-resolution, image-to-image translation) to 3D simulation data

Teaching Assistant

Unversity of Zurich

10/2019 - 01/2022 | Zurich, Switzerland

Prepared, presented and graded exercises and projects in courses at the University of Zurich

- Advanced High Performance Computing
- Computational Physics
- Theoretical Astrophysics

MSc Thesis

ETH Zurich- CSElab

01/2019 - 07/2019 | Zurich, Switzerland

Supervision: Prof. P. Koumoutsakos (Harvard University) and Dr. G. Novati (Deepmind)
Automating turbulence modelling by multi-agent reinforcement learning:

- Trained distributed deep reinforcement learning agents to provide for numerically stable and accurate turbulence models in large eddy simulations
- Publication in Nature Machine Intelligence

LANGUAGES

French

English

SKILLS

Computer Science

Python **C++** **Fortran** **MPI**

OpenMP **CUDA** **OpenACC**

Docker **Git** **CI/CD**

Deep Learning

Pytorch **Tensorflow**

3D Deep Learning

Reinforcement Learning

Generative Models

Science

Physics **Fluid Dynamics** **Simulations**

Mathematics **Statistics**

EDUCATION

MSc in Physics

Ecole Normale Supérieure de Lyon

2017 - 2019

- Theoretical Physics

BSc in Physics

Université Grenoble Alpes

2016 - 2017

- Physics - Computer Science

BSc in Engineering

Institut National Polytechnique PHELMA

2013 - 2016

- Physics - Electronics - Material Science - Computer Science