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Références

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About me

I have always been passionate about mathematics and computing, I am fascinated by the multiple fields of applications and their importance in all aspects of daily life. I am fortunate to have a background that has allowed me to acquire a solid background in mathematics and computer science.

Computer science

Python

C/C++

R

Matlab

SQL

Freefem++

Mohamed DOUMBOUYA

applied mathematics & high performance computing engeneer

Experiences and Projects

Scientific computing and optimization
Depuis février 2025 CS Group PAU
Optimization using python

Internship High Performance Computing Engineer
D'avril 2024 à septembre 2024 Safran Châteaufort
Parallel Algorithms for Randomized Linear Algebra on GPU/CPU

- Developed and implemented parallel algorithms for randomized linear algebra using Python and C/C++.
- Optimized matrix decomposition (RSVD, QR, CUR) and stochastic solvers for mechanics applications.
- Utilized CUDA, OpenMP, and Intel MKL for high-performance computing.
- Applied to structural mechanics, fluid dynamics, and multibody dynamics simulations.
- Achieved significant speedup in large-scale simulations through GPU-CPU hybrid computing.

Article review and defense
Mars 2024 Mines Paris PSL Nice

- Per-Gunnar Martinsson and Joel Tropp. Randomized Numerical Linear Algebra: Foundations & Algorithms. en. arXiv:2002.01387
- Riley Murray et al. Randomized Numerical Linear Algebra : A Perspective on the Field With an Eye to Software. en. arXiv:2302.11474
- Sergey Voronin and Per-Gunnar Martinsson. RSVDPACK: An implementation of randomized algorithms for computing the singular value, interpolative, and CUR decompositions of matrices on multi-core and GPU architectures. en. arXiv:1502.05366

LBM project on GPU
Mars 2024 Mines Paris Nice
To use pure CUDA/C++ to adapt the C++ serial version of Lattice Boltzmann Method for fluid flow simulation

Parallel programming project
Janvier 2024 Mines Paris Nice
Using MPI/OpenMP to process matrix-matrix and matrix-vector product
Tool: C/C++

Twitter sentiments analysis Project
Décembre 2023 Mines Paris Nice
Classification of tweets from twitter using scikit-learn

Research Internship
D'avril 2023 à septembre 2023 ONIRIS, INRAE NANTES
Influence of the host community of the tick Ixodes ricinus on the transmission of two species of Lyme disease pathogens: modeling approach.

- Development of the multi-pathogenic multi-host model applied to Lyme disease
- Calibration, validation and sensitivity analysis of the model in order to prioritize the factors involved in this dynamic. Estimation of basic reproductive number
- Testing the influence of host community structure- on pathogen dynamics. Predation effect testing
- Modeling the influence of different habitats in a landscape

Project HPC
De septembre 2022 à octobre 2022 Polytech Lyon Villeurbanne, France
Compare MPI-1 implementation efficiencies with point-to-point communications and MPI-2 with Remote Memory Access (RMA) communicationsImplement the Schwarz domain decomposition method with overlap, optimization of the GC resolution of each sub-domain by the conservation of the directions, and acceleration of the purely linear Schwarz convergence by the Aitken acceleration technique from the singular value decomposition of the traces at the interfaces of the iterated solutions.
Tools: C/C++, MPI, PETSC, KSP, SNES, 3D Fish

Languages

Anglais

Français

Centres d'intérêt

History

Politics

African Literature

Football

Cinema

Video Games

IA

Strengths

Autonomous

Dynamic

Creative

Curious

Adaptability

Social networks

@mohamed-doumbouya-941b41136

Experiences and Projects

Discontinuous Galerkin Project

Depuis octobre 2022 Polytech Lyon Villeurbanne, France

Modeling of ocean waves such as the Ianai, Kelvin, Rossby waves that are relevant to the El-Nino phenomenon.

- Choice of the digital method and a physical study of these waves
- analytical calculations to write the discrete frequencies associated with these waves
- Digital simulations
- Using **FreeFem++**

Digital Project: Image Variation by Autoencoder

De février 2022 à juin 2022 Polytech Lyon Villeurbanne

Allowing from an image by an encoding principle (neural convolution network) to reduce the number of items of information while allowing the starting image to be reconstructed. The idea is to disturb the data after the encoding phase in order to generate new images (example character of bd etc.)
Language used: python notebook

Bachelor Cycle Completion Course

De mai 2020 à juillet 2020 GIPSA-LAB Grenoble, France

Conversion of digital shapes into a finite union of balls, C++ language DGtal library, Periscope Management tools: Cmake, latex, gitlab

Diplomas and training

Post Master High Performance Computing & Artificial Intelligence

Depuis octobre 2023 Mines Paris Nice Sophia

Scientific Computing Project Management
Methods for Scientific computing
High performance architecture and programming
Machine Learning algorithm
High Performance Algorithms and Deep Learning
Numerical modelling and simulation (NMS)

Engineering Degree Applied Mathematics and Modeling

Depuis septembre 2021 Polytech Lyon Villeurbanne, France

- EDP, EDO Modeling and Resolution
- Finite Elements, Discontinuous Galerkin, Finite Volume.
- High performance computing (MPI, PETSC, openMP)
- Unsteady problems
- Hyperbolic problems
- Numerical analysis
- Optimal control
- Mathematical modeling
- **Statistics**
- Advanced regression models
- Stochastic processes
- Markov chain
- Bayesian models
- Duration patterns

-Time series

Master 2 Applied Mathematics, Biology, Medicine

Depuis septembre 2022 Université Claude Bernard Lyon 1 Villeurbanne, France

- Epidemiology
- Theoretical evolutionary biology
- Cell dynamics and complex systems
- Modeling in space ecology

Masters 1 applied mathematics and statistical data science

De septembre 2020 à mai 2021 Aix Marseille Université Marseille, France

- Statistics
- Exploratory Statistics
- Linear models
- Categorical data
- Databases
- Continuous Optimization

Bachelor's Degree in Computer Science and Mathematics

De septembre 2017 à juin 2020 Université Grenoble Alpes Saint-Martin-d'Hères, France

DEUG Mathematics and Computing

De septembre 2014 à août 2017 Université Mohamed Premier Oujda-Angad, Maroc