Yubo Cai

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LANGUAGES/COMPUTER SKILLS

- **Computer Skills**: Python, C++, SQL, R, STATA, Julia, Coq, Linux, MATLAB, OCaml, JavaScript, PHP, LaTex
- **Languages**: Chinese - Native, English - Professional in Working (C2 Level), French - Intermediate (B2 Level)
- **Tools**: Numpy, Pandas, Scikit-Learn, Tensorflow, PyTorch, Gurobi, Cplex, Rstudio, MySQL, Matplotlib, Spyder, Jupyter Notebook, Overleaf

EDUCATION

- **École Polytechnique(X)** — Paris, France
  Bachelor of Science - GPA: 3.86/4.00 — *Aug. 2021 - Jul. 2024*
  - **Major**: Double major in Applied Mathematics and Computer Sciences
  - **Courses**: Numerical Linear Algebra, Real Analysis, Complex Analysis, Fourier Analysis, Numerical Analysis, Numerical Optimization, Optimization and Control, Asymptotics statistics, Numerical ODE, Hibert Space, Quadratic Forms, Machine Learning, Functional Programming, Complier, Computer Architecture.
- **University of Cambridge - Cambridge Centre for AI in Medicine** — Cambridge, UK
  AI and Machine Learning in Healthcare Summer School — *Aug. 2022 - Sep. 2022*
  - **Content**: Analysis of genomic data and clinical trial data through biostatistics and machine learning. Topics about biostatistics, Machine Learning in Medical Imaging.
  - **Honor**: With full financial scholarship provided by Cambridge University

RESEARCH INTERNSHIP

- **Center for Research in Economics and Statistics (CREST)/LIX** — Palaiseau, France
  Poject Research Intern — *September. 2023 - Present*
  - **Research Topics**: Analysis of city composition based on basic amenities including public transport, BATO-MOUCHE Project between CREST and LIX.
  - **Supervisor**: Sarah J. Berkemer - (LIX Aimbio Team)
- **HEC Montréal/Université de Montréal** — Montréal, Canada
  Visiting Researcher (Phd Level) — *June. 2023 - October. 2023*
  - **Research Topics**: Robust Optimization of Fixed-Job Scheduling Problem.
  - **Supervisor**: Maryam Daryalal
  - **Department**: Department of Decision Sciences and Operation Research
  - **Award**: Mitacs Globalink Research Scholarship
- **CNRS and LIX** — Palaiseau, France
  Summer Intern — *June. 2023 - August. 2023*
  - **Research Topics**: Dissipative quadratizations of polynomial ODE systems. [Paper] submitted to 30th International Conference on Tools and Algorithms for the Construction and Analysis of Systems, TACAS 2024.
  - **Software**: DQbee, a python package for computing the dissipative quadratization of polynomial ODE system.
  - **Supervisor**: Gleb Pogudin
  - **Team**: MAX - Algebraic modeling and symbolic computation (Joint Team with CNRS)
- **Laboratoire d'Informatique de l'Ecole Polytechnique (LIX)** — Palaiseau, France
  Poject Research Intern — *December. 2022 - June. 2023*
  - **Research Topics**: Application of combinatorial algorithms in nonlinear dynamical systems and tweak the system produced by a combinatorial algorithm to make it more stable and thus get more accurate results for the reachability analysis. [link to the page]
  - **Supervisor**: Gleb Pogudin
  - **Team**: Max (Joint Team with CNRS)

PUBLICATIONS

1. Yubo Cai and Gleb Pogudin. Dissipative quadratizations of polynomial ode systems. *submitted to 30th International Conference on Tools and Algorithms for the Construction and Analysis of Systems*, 2023, (https://yubocai-poly.github.io/files/quadratization_paper.pdf)

PROJECTS

- **DQbee**: DQode is a Python Library to compute the optimal inner-quadratic quadratization and dissipative quadratization of a given polynomial ODE system.
- **Chinese OCR based on CNN and CRNN**: Using CNN for recognition of individual handwritten Chinese characters and CRNN for OCR of lengthy passages of Chinese. The project is sponsored by Intel API
- **Reachability Problem of Nonlinear System with quadratization method**: Research Project on find the optimal quadratization method which fit the reachability error bound function
- **PaperFriend Desktop Application**: A smart journaling desktop application to help you track your mood and take better care of your mental health. The application is accomplished in C++ and Qt application. Working on the frontend work of creating the main window and functions of the application
- **Algorithms for Numerical Analysis of Catalan Numbers**: Implement the algorithms for numerical analysis of Catalan numbers and Motzkin Numbers in Jupyter Notebook with Python. The project includes asymptotic analysis, numerical analysis, mathematical modeling, etc. Apply the Catalan in the problem like binary trees, Paths of Triangle and dynamic programming.
- **Nim game with Coq**: This project is using the language **Coq** to prove the winning strategy of Nim Game.
- **Lossy Image Cpmpression**: More advanced level programming in python. Programs about data struction, algrothims and Computer Vision, also conclude basic knowledge about cryptography.The goal of this project is to develop a lossy image compression format close to JPEG. Lossy compression algorithms allow to greatly reduce the size of image files at the price of loosing some data from the original image.
- **Pricing an option with binomial models**: Using the binomial models in the pricing of options with different time period

TEACHING EXPERIENCE

- **HEC Montreal**: MATH 20604A - Linear Optimisation Models.

HONORS AND AWARD

1. **INFORMS Undergraduate Scholar** (Unable to attend the meeting due to schedule conflict)
2. **Mitacs Globalink Research Scholarship**