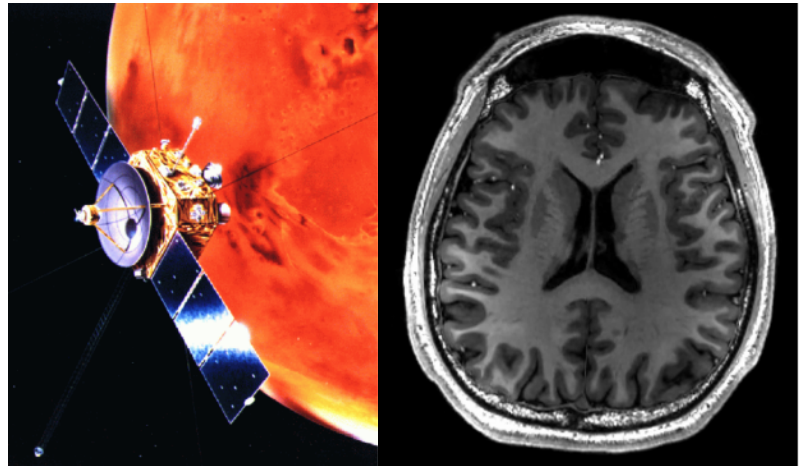


Internship proposal

Scientific calculus applied to low-rank matrices

About Inria

Inria Grenoble is a research center at the forefront of computer science and digital technology research, driving innovation and breakthroughs in various domains. Our diverse teams of researchers, engineers, and scientists collaborate on projects, spanning artificial intelligence, data science, cybersecurity, and more. With a deep commitment to excellence and a focus on bridging the gap between research and practical applications, Inria Grenoble is dedicated to shaping the future of digital technology and its impact on society.



Application example for the method

Internship Overview

Recently Inria's Statify research team has developed a scientific library based on the GLLiM (Gaussian Locally-Linear Mapping) method applied to physical model inversion (<https://gitlab.inria.fr/kernelo-mistis/kernelo-gllim-is>). The approach leverages the covariance matrices associated with the GLLiM model. However, a notable drawback of this approach is the considerable computational time required when dealing with high dimensions. It is worth noting that the covariance matrices of the GLLiM model are low-rank. The idea is to exploit this property to devise more efficient algorithms.

The goal of this internship is to investigate the current state of the art in algorithms for low-rank matrix calculations, including inversion, determinant computation, matrix multiplication, and log density estimation. You will conduct comparative analyses of these algorithms, assessing their efficiency, accuracy, and scalability. The goal is to improve the performance of the GLLiM model in two specific domains: space remote sensing in high-dimensional settings, and medical imaging analysis, with a particular emphasis on Functional Magnetic Resonance Imaging (fMRI).

Qualifications

- Currently pursuing a M1 or M2 degree in computer science, electrical engineering, robotics, or a related field.
- Good programming skills in C++
- Familiarity with computational statistics
- Solid understanding of mathematics, especially linear algebra and statistics.
- Strong problem-solving skills and the ability to work both independently and in a collaborative team environment.

What We Offer

- A challenging and rewarding internship experience in a dynamic and innovative environment.
- Mentorship from experts with a wealth of knowledge in applied mathematics
- Opportunity to work on a real-world application: space remote sensing and medical imaging
- Potential for a future full-time position.
- Great working conditions in our offices located in Montbonnot
- Internship duration and scope adapted to the time allocated by your school.
- Internship stipend.

How to Apply

Interested candidates are invited to submit their resume, and any relevant work samples (if available) to: luc.meyer@inria.fr