MATH-403

Low-rank approximation techniques

Cursus	Sem.	Type
Computational science and Engineering	MA1, MA3	Opt.
Ing.-math	MA1, MA3	Opt.
Mathématicien	MA1, MA3	Opt.
Quantum Science and Engineering	MA1, MA3	Opt.
Statistics	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Session	Winter
Semester	Fall
Exam	Oral
Workload	150h
Weeks	14
Hours	**4 weekly**
Lecture	2 weekly
Exercises	2 weekly
Number of positions	

Remark

pas donné en 2023-24

Summary

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Content

- Theoretical background of low-rank matrix approximation
- Classical algorithms for low-rank approximation
- Randomized low-rank approximation
- Low-rank approximation by deterministic column/row selection
- Low-rank approximation by randomized sampling
- Basic introduction to tensors
- Tensor rank, CP, Tucker, and TT decompositions of tensors
- Alternating least-squares algorithms
- Optional: Riemannian optimization on low-rank matrix and tensor manifolds
- Optional: Dynamical low-rank approximation
- Applications of low-rank approximation in data analysis, model and dimensionality reduction

Resources

Moodle Link

- https://go.epfl.ch/MATH-403