

A Study of Khintchine Type Inequalities for Random Variables

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1 An Overview of Sharp Khintchine Type Inequalities

2 Khintchine Type Inequalities for Classes of Random Variables

- General Form

2.1 Random Signs

- Definition
- Haagerup's Approach
- Variations: Dependent random signs.

file:///C:/Users/Alex/Downloads/Haagerup

2.2 The Classical Vector Setting

- Definitions
- Khintchine Kahane

2.3 Ultra Sub Gaussian Random Variables

- Definitions
- Log Concavity
- Khintchine Results
- Examples
- Connection to Strong Concavity

2.4 Type L Random Variables

- Definitions
- Khintchine Results
- Examples: Polya, Newman, Renyi etc
- Connection to Strong Concavity and Ultra Sub Gaussianity

2.5 Generalized Random Signs

- Definitions
- Khintchine Results
- Connection to Type L

<https://www.math.cmu.edu/~ttkocz/mypapers/mathematics/khinchin-disc-unif.pdf>

2.6 Vectors on Spheres

- Results in the Uniform Case
- Majorization
- Bisubharmonicity
- Uniform Result on Sphere for Bisubharmonic Functions
- Results with Rotational Invariance

https://www.researchgate.net/publication/226779758_Best_Khintchine_Type_I_inequalities_for_sums_of_independent_vectors

<https://www.mimuw.edu.pl/~rlatala/papers/cm6826.pdf>

<https://pdfs.semanticscholar.org/30af/d8b3a15c3b180e94f8d39c3cdfd90540bba5.pdf>

2.7 Gaussian Mixtures

- Mixtures
- Results for Gaussian Mixtures

<https://arxiv.org/pdf/1611.04921.pdf>

2.8 The Exponential Family

- Definitions
- Results for Exponential Family

<https://arxiv.org/abs/1801.07597>

3 Applications

- Littlewood-Paley Decomposition
- Banach Space Type
- Grothendieck Inequality
- Projections of Cross-Polytopes

Banach space: absolute convergence of series. Reimann's theorem: series is unconditionally convergent if absolutely. But if not absolutely converging then not unconditionally converging

Banach: Permutation invariant, iff converging absolutely: If $+$ and $-$ is converging: Classical absolute convergence is too strong

References

<https://arxiv.org/pdf/1611.04921.pdf> https://www.researchgate.net/publication/226779758_Best_Khintchine_Type_Inequality
<https://pdfs.semanticscholar.org/30af/d8b3a15c3b180e94f8d39c3cdfd90540bba5.pdf> https://www.math.cmu.edu/~ttkocsi/papers/2017/11/17_khintchine-disc-unif.pdf <http://math.iisc.ac.in/~khare/papers/khinchin-kahane.pdf> https://www.mimuw.edu.pl/~rlatala/papers/2017/07/17_haagerup.pdf <https://arxiv.org/abs/1801.07597>