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Cumulant Estimation in Bi-Additive Models: Controlling Heteroscedasticity

Communication Info

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Abstract

Variance stabilization transforms data so that the variance becomes approximately constant across the parameter space, enabling more reliable statistical inference. For fourth-order cumulant estimators, the variance depends critically on the eighth cumulant, creating severe heteroscedasticity that compromises the validity of inference. We provide a comprehensive treatment of variance stabilization theory for cumulant estimators, grounded in contemporary statistical literature.

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References

- [1] Zhang, A.R. and Xia, D. (2023). Tensor SVD: Statistical and computational limits. *IEEE Transactions on Information Theory*, 69 (2), 953-972.
- [2] Withers, C.S. and Nadarajah, S. (2021). Formulae for moments and cumulants. *Communications in Statistics - Theory and Methods*, 50 (24), 5889-5901.
- [3] Speed, T.P. and Silcock, H.L. (2020). Cumulants and partition lattices. *Australian & New Zealand Journal of Statistics*, 62 (1), 1-22.