

On Variance Conditions for Markov Chain CLTs

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Abstract

Central limit theorems for Markov chains are considered, and in particular the relationships between various expressions for asymptotic variance known from the literature. These turn out to be equal under fairly general conditions, although not always. We also investigate the existence of CLTs, and pose some open problems.

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1. S. Asmussen. *Applied Probability and Queues*. John Wiley & Sons, New York, 1987. [Math. Review MR1978607 \(2004f: 60001\)](#)
2. S.K. Basu. A local limit theorem for attraction to the standard normal law: The case of infinite variance. *Metrika* 31 (1984), 245--252. [Math. Review MR0754965 \(86b: 60033\)](#)
3. P. Billingsley. *Convergence of Probability Measures*. Wiley, New York, 1968. [Math. Review MR0233396 \(38 #1718\)](#)
4. M. Breth, J.S. Maritz, and E. J. Williams. On Distribution-Free Lower Confidence Limits for the Mean of a Nonnegative Random Variable. *Biometrika* 65 (1978), 529--534.
5. K.S. Chan and C.J. Geyer, Discussion paper. *Ann. Stat.* 22 (1994), 1747--1758.
6. X. Chen. Limit theorems for functionals of ergodic Markov chains with general state space. *Mem. Amer. Math. Soc.* 139 (1999). [Math. Review MR1491814 \(99k: 60170\)](#)
7. W. Feller. *An introduction to Probability Theory and its applications, Vol. II*, 2nd ed. Wiley & Sons, New York, 1971. [Math. Review MR0270403 \(42 #5292\)](#)
8. C.J. Geyer. Practical Markov chain Monte Carlo. *Stat. Sci.* 7 (1992), 473-483.
9. O. Häggström. On the central limit theorem for geometrically ergodic Markov chains. *Probab. Th. Relat. Fields* 132 (2005), 74--82. [Math. Review MR2136867 \(2005m: 60155\)](#)
10. J.P. Hobert, G.L. Jones, B. Presnell, and J.S. Rosenthal. On the Applicability of Regenerative Simulation in Markov Chain Monte Carlo. *Biometrika* 89 (2002), 731--743. [Math. Review MR1946508 \(2003m: 60200\)](#)
11. I.A. Ibragimov and Y.V. Linnik. *Independent and Stationary Sequences of Random Variables*. Wolters-Noordhoff, Groningen (English translation), 1971. [Math. Review MR0322926 \(48 #1287\)](#)
12. G.L. Jones. On the Markov chain central limit theorem. *Prob. Surveys* 1 (2004), 299--320. [Math. Review MR2068475 \(2005j: 60137\)](#)
13. C. Kipnis and S.R.S. Varadhan. Central limit theorem for additive functionals of reversible Markov processes and applications to simple exclusions. *Comm. Math. Phys.* 104 (1986), 1--19. [Math. Review MR0834478 \(87i: 60038\)](#)
14. S.P. Meyn and R.L. Tweedie. *Markov chains and stochastic stability*. Springer-Verlag, London, 1993. [Math. Review MR1287609 \(95j: 60103\)](#)
15. P.A. Mykland, L. Tierney, and B. Yu. Regeneration in Markov chain samplers. *J. Amer. Stat. Assoc.* 90 (1995), 233--241.
16. M. Peligrad. Recent advances in the central limit theorem and its weak invariance principle for mixing sequences of random variables (a survey). In *Dependence in Probability and Statistics: A Survey of Recent Results*, E. Eberlein and M.S. Taqqu, eds., Birkhäuser, Cambridge, Mass., 1986, pp. 193--223. [Math. Review MR0899991 \(88j: 60053\)](#)

17. G.O. Roberts. A note on acceptance rate criteria for CLTs for Metropolis-Hastings algorithms. *J. Appl. Prob.* 36 (1999), 1210--1217. [Math. Review](#) [MR1742161](#) (2001a:60083)
18. G.O. Roberts and J.S. Rosenthal. Geometric ergodicity and hybrid Markov chains. *Electronic Comm. Prob.* 2 (1997), 13--25. [Math. Review](#) [MR1448322](#) (99b:60122)
19. G.O. Roberts and J.S. Rosenthal. General state space Markov chains and MCMC algorithms. *Prob. Surveys* 1 (2004), 20--71. [Math. Review](#) [MR2095565](#) (2005i:60135)
20. G.O. Roberts and J.S. Rosenthal. Variance Bounding Markov Chains. Preprint, 2006.
21. J.S. Rosenthal. A review of asymptotic convergence for general state space Markov chains. *Far East J. Theor. Stat.* 5 (2001), 37--50. [Math. Review](#) [MR1848443](#) (2002m:60130)
22. W. Rudin. *Functional Analysis*, 2nd ed. McGraw-Hill, New York, 1991. [Math. Review](#) [MR1157815](#) (92k:46001)
23. L. Tierney. Markov chains for exploring posterior distributions (with discussion). *Ann. Stat.* 22 (1994), 1701--1762. [Math. Review](#) [MR1329166](#) (96m:60150)



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