

## COMPLETE MOMENT CONVERGENCE FOR $(\alpha, \beta)$ -MIXING RANDOM VARIABLES AND ITS APPLICATION

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*Abstract.* In this paper, the complete moment convergence for weighted sums of  $(\alpha, \beta)$ -mixing random variables is investigated. The result improves and extends the corresponding one of Wu et al. (2017). As a corollary, the complete convergence for weighted sums of  $(\alpha, \beta)$ -mixing random variables is obtained, which is applied to establish the complete consistency for the P-C estimator in a nonparametric regression model.

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### REFERENCES

- [1] BAI Z.D., CHENG P.E., *Marcinkiewicz strong laws for linear statistics*, Statistics & Probability Letters, 46(2), 2000, 105–112.
- [2] BAUM L.E., KATZ M., *Convergence rates in the law of large numbers*, Transactions of the American Mathematical Society, 120(1), 1965, 108–123.
- [3] BENEDETTI J.K., *On the nonparametric estimation of regression functions*, Journal of the Royal Statistical Society: Series B (Statistical Methodology), 39, 1977, 248–253.
- [4] BRADLEY R.C., BRYC W., *Multilinear forms and measures of dependence between random variables*, Journal of Multivariate Analysis, 16, 335–367.
- [5] CAI Z.W., *Strong consistency and rates for recursive nonparametric conditional probability density estimates under  $(\alpha, \beta)$ -mixing conditions*, Stochastic Processes and Their Applications, 38, 1991, 323–333.
- [6] CHEN P.Y., BAI P., SUNG S.H., *The von Bahr-Esseen moment inequality for pairwise independent random variables and applications*, Journal of Mathematical Analysis and Applications, 419(2), 1290–1302.
- [7] CHEN P.Y., SUNG S.H., *On complete convergence and complete moment convergence for weighted sums of  $\rho^*$ -mixing random variables*, Journal of Inequalities and Applications, Volume 2018, Article ID 121, 2018, 16 pages.
- [8] CHOW Y.S., *Delayed sums and Borel summability of independent, identically distributed random variables*, Bulletin of the Institute of Mathematics, Academia Sinica, 1(2), 1973, 207–220.
- [9] CHOW Y.S., *On the rate of moment convergence of sample sums and extremes*, Bulletin of the Institute of Mathematics, Academia Sinica, 16(3), 1988, 177–201.
- [10] ERDÖS, P., *On a theorem of Hsu and Robbins*, The Annals of Mathematical Statistics, 20(2), 1949, 286–291.
- [11] GAO P., *Strong stability of  $(\alpha, \beta)$ -mixing sequences*, Applied Mathematics-A Journal of Chinese Universities, 31(4), 2016, 405–412.
- [12] HSU P.L., ROBBINS H., *Complete convergence and the law of large numbers*, Proceedings of the National Academy of Sciences U.S.A., 33, 1947, 25–31.
- [13] LIANG H.Y., JING B.Y., *Asymptotic properties for estimates of nonparametric regression models based on negatively associated sequences*, Journal of Multivariate Analysis, 95, 2005, 227–245.
- [14] LIANG H.Y., LI D.L., ROSALSKY A., *Complete moment and integral convergence for sums of negatively associated random variables*, Acta Mathematica Sinica, English Series, 26(3), 2010, 419–432.

- [15] LU C.R., LIN Z.Y., *Limit Theory for Mixed Dependent Variables*, Beijing, Science Press of China, 1997.
- [16] PRIESTLEY M.B., CHAO M.T., *Non-parametric function fitting*, Journal of the Royal Statistical Society: Series B (Statistical Methodology), 34, 1972, 385–392.
- [17] SAMURA S.K., WANG X.J., WU Y., *Consistency properties for the estimators of partially linear regression model under dependent errors*, Journal of Statistical Computation and Simulation, 89(13), 2019, 2410–2433.
- [18] SHAO Q.M., *Limit theorems for the partial sums of dependent and independent random variable*, Hefei, University of Science and Technology of China, 1989, 1–309.
- [19] SHEN A.T., *Complete convergence for weighted sums of END random variables and its application to nonparametric regression models*, Journal of Nonparametric Statistics, 28(4), 2016, 702–715.
- [20] SHEN A.T., XUE M.X., VOLODIN A., *Complete moment convergence for arrays of rowwise NSD random variables*, Stochastics: An International Journal of Probability and Stochastic Processes, 88 (4), 2016, 606–621.
- [21] SHEN Y., ZHANG Y.J., *Strong limit theorems for  $(\alpha, \beta)$ -mixing random variable sequences*, Journal of University of Science and Technology of China, 41(9), 2011, 778–795.
- [22] SUNG S.H., *Complete convergence for weighted sums of  $\rho^*$ -mixing random variables*, Discrete Dynamics in Nature and Society, Volume 2010, Article ID 630608, 2010, 13 pages.
- [23] SUNG S.H., *On the strong convergence for weighted sums of  $\rho^*$ -mixing random variables*, Statistical Papers, 54, 2013, 773–781.
- [24] WANG X.J., HU S.H., *Complete convergence and complete moment convergence for martingale difference sequence*, Acta Mathematica Sinica, English Series, 30, 2014, 119–132.
- [25] WANG X.J., SHEN A.T., CHEN Z.Y., HU S.H., *Complete convergence for weighted sums of NSD random variables and its application in the EV regression model*, TEST, 24(1), 2015, 166–184.
- [26] WU Q.Y., *Probability Limit Theory for Mixing Sequences*, Beijing, Science Press of China.
- [27] WU Y., WANG X.J., HU S.H., *Complete moment convergence for weighted sums of weakly dependent random variables and its application in nonparametric regression model*, Statistics & Probability Letters, 127, 56–66.
- [28] WU Y., WANG X.J., *Equivalent conditions of complete moment and integral convergence for a class of dependent random variables*, RACSAM, 112, 2018, 575–592.
- [29] WU Y., WANG X.J., BALAKRISHNAN N., *On the consistency of the P-C estimator in a nonparametric regression model*, Statistical Papers, 61, 2020, 899–915.
- [30] WU Y.F., CABREA M.O., VOLODIN A., *Complete convergence and complete moment convergence for arrays of rowwise END random variables*, Glasnik Matematički, 49(69), 2014, 449–468.
- [31] YANG S.C., WANG Y.B., *Strong consistency of regression function estimator for negatively associated samples*, Acta Mathematicae Applicatae Sinica, 22(4), 1999, 522–530.
- [32] YU C.Q., *Convergence theorems of weighted sum for  $(\alpha, \beta)$ -mixing sequences*, Journal of Hubei University (Natural Science), 38(6), 2016, 477–487.