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Robust deep learning from strongly mixing observations

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We consider robust deep learning from strongly mixing observations, with unbounded loss function and unbounded input/output. It is only assumed that the output variable has a finite r order moment, with $r > 1$. Non asymptotic bounds for the expected excess risk of the deep neural network estimator is established under subexponential strong mixing assumptions on the observations. We derive a relationship between these bounds and r, and when the data have moments of any order (that is $r = \infty$), the convergence rate is close to some well-known results. When the target predictor belongs to the class of Hölder smooth functions with sufficiently large smoothness index, the rate of the expected excess risk for subexponentially strongly mixing data is close to that obtained with i.i.d. samples. Application to robust nonparametric regression with heavy-tailed errors shows that, robust estimators with absolute loss and Huber loss outperform the least squares method

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