Hoeffding inequality for bounded independent random variables

Canonical name	HoeffdingInequalityForBoundedIndependentRandomVariables
Date of creation	2013-03-22 17:46:02
Last modified on	2013-03-22 17:46:02
Owner	kshum (5987)
Last modified by	kshum (5987)
Numerical id	8
Author	kshum (5987)
Entry type	Theorem
Classification	msc 60E15
Related topic	ChernoffCramerBound
Defines	Hoeffding's inequality

Let X_1, $X_2, \ldots, X_n$ be independent random variables, such that $\Pr(a_k \leq X_k \leq b_k) = 1$ for all k, where a_k and b_k are constant, $a_k < b_k$. Let S_n be the sum $X_1 + \ldots + X_n$. Then

$$\Pr(S_n - E[S_n] > \epsilon) \leq \exp\Big(- \frac{2\epsilon^2}{\sum_{k=1}^n (b_k - a_k)^2}\Big),$$

$$\Pr(|S_n - E[S_n]| > \epsilon) \leq 2\exp\Big(- \frac{2\epsilon^2}{\sum_{k=1}^n (b_k - a_k)^2}\Big).$$

References

[1] W. Hoeffding, "Probability inequalities for sums of bounded random variables", *J. Amer. Statist. Assoc.*, vol. 58, pp.13-30, 1963.