LIMITS OF TRUNCATION EXPERIMENTS

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Abstract: Given \( n \) i.i.d. copies \( X_1, \ldots, X_n \) of a random variable \( X \) with distribution \( P_{\vartheta} \), \( \vartheta \in \Theta \subset \mathbb{R}^k \), we are only interested in those observations that fall into some set \( D = D(n) \subset \mathbb{R}^d \) having but a small probability of occurrence. The truncation set \( D \) is assumed to be known and non-random. Denoting the distribution of the truncated random variable \( X D(\vartheta) \) by \( P_{n\vartheta} \) we consider the triangular array of experiments \((\mathbb{R}^d, \mathcal{B}^d, (P_{n\vartheta})_{\vartheta \in \Theta})\), \( n \in \mathbb{N} \), and investigate the asymptotic behavior of the \( n \)-fold products \( ((\mathbb{R}^d)^n, (\mathcal{B}^d)^n, (P_{n\vartheta})_{\vartheta \in \Theta}) \). Under a suitable density expansion, Gaussian shifts as well as Poisson experiments occur in the limit, where the latter case typically occurs when the number of expected observations falling in \( D \) is bounded. Finally, we investigate invariance properties of the occurring Poisson limits.

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