OUTLINE OF PARIS LECTURES ON LE CAM THEORY
MARCH–JUNE 2001
by
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Prerequisites: *Knowledge of measure-theoretic probability (including the classical weak convergence theory, at least for Euclidean spaces), and some small acquaintance with concepts such as compactness.*

Detailed notes will be placed at the web site: www.stat.yale.edu/~pollard

Some tools of asymptotic theory

(i) outline of some classical arguments

(ii) contiguity

(iii) Hellinger differentiability and information (possibly with some discussion of Le Cam 1970 and Le Cam & Yang 1988)

Efficiency

(i) the classical concept, and its defects

(ii) local asymptotic normality

(iii) various modern interpretations, including Bahadur's method, the convolution theorem, and the asymptotic minimax theorem

Geometry of minimax rates

(i) ideas flowing from Le Cam (1973)

(ii) role of total variation and Hellinger distance

Le Cam's distance

(i) simplified setting using Markov kernels; connection with problem of conditioning and coupling; some important classical calculations; meaning of Blackwell/Le Cam equivalence

(ii) reinterpretation of efficiency arguments

(iii) abstractions (Le Cam 1964, Le Cam 1972, Le Cam 1986, Le Cam & Yang 2000, Torgersen 1991): meaning of a probability model; choice of sample space; advantages and disadvantages of generalized randomizations and procedures

Recent work

(i) discussion of results of Nussbaum (1996), with reinterpretation and simplifications due to Andrew Carter; distance between multinomial and multinormal models; the Hungarian construction as a Le Cam randomization

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Le Cam, L. (1970), 'On the assumptions used to prove asymptotic normality of maximum likelihood estimators', *Annals of Mathematical Statistics* **41**, 802–828.

Le Cam, L. (1972), Limits of experiments, *in* L. Le Cam, J. Neyman & E. L. Scott, eds, 'Proceedings of the Sixth Berkeley Symposium on Mathematical Statistics and Probability', Vol. I, University of California Press, Berkeley, pp. 245–261.

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Nussbaum, M. (1996), 'Asymptotic equivalence of density estimation and gaussian white noise', *Annals of Statistics* **24**, 2399–2430.

Pollard, D. (2001), *A User's Guide to Measure Theoretic Probability*, Cambridge University Press. (Some samples at http://www.stat.yale.edu/~pollard).

Torgersen, E. (1991), *Comparison of Statistical Experiments*, Cambridge University Press.

van der Vaart, A. W. (1998), *Asymptotic Statistics*, Cambridge University Press.