Errata sheet for :

Geometric Ergodicity in Hidden Markov Models

François LeGland and Laurent Mevel

Publication Interne IRISA 1028 / Rapport de Recherche INRIA 2991

available at URL's

ftp://ftp.irisa.fr/techreports/1996/PI-1028.ps.gz

ftp://ftp.inria.fr/INRIA/publication/RR/RR-2991.ps.gz

The following errors / misprints have been found :

- In the statement of Assumption C on page 18, one should read :

$$\textit{for any } p, p' \in \mathcal{P}(S) \qquad \text{instead of :} \qquad \textit{for any } p, p' \in S$$

and the definition of $\mathrm{K}(u_n, y)$ should read :

$$\mathrm{K}(u_n, y) = \sup_{p \in \mathcal{P}(S)} \| u_n[y,p] \| \qquad \text{instead of :} \qquad \mathrm{K}(u_n, y) = \sup_{p \in S} \| u_n[y,p] \| \; .$$

- Similarly, in the statement of Assumption C (revisited) on page 19, one should read :

$$\textit{for any } p, p' \in \mathcal{P}(S) \qquad \text{instead of :} \qquad \textit{for any } p, p' \in S$$

and the definition of $\mathrm{K}(u, y)$ (not $\mathrm{K}(r, y)$) should read :

$$\mathrm{K}(u, y) = \sup_{p \in \mathcal{P}(S)} \| u[y,p] \| \qquad \text{instead of :} \qquad \mathrm{K}(r, y) = \sup_{p \in S} \| u[y,p] \| \; .$$

- In the statement of Definition 4.2 on page 20, one should read :

$$b^i_\bullet(y)\, \lambda(dy) \qquad \text{instead of :} \qquad b^i_\bullet(dy)\, \lambda(dy)$$

in the definition of $\mathrm{Lip}(u)$, $\mathrm{K}(u)$ and $[\Delta \cdot \mathrm{K}](u)$.

- The statements and computations in Example 4.3 on page 20 could be improved as follows :

Example 4.3 If Δ is finite, then the function u defined by

$$u[y,p] = \frac{\partial Q^* \, B(y)\, p}{b^*(y)\, p} \; ,$$

for any $y \in \mathbf{R}^d$, and any $p \in \mathcal{P}(S)$, satisfies Assumption C, and moreover $\mathrm{Lip}(u)$ and $[\Delta \cdot \mathrm{K}](u)$ are finite. Indeed, for any $y \in \mathbf{R}^d$, and any $p \in \mathcal{P}(S)$

$$\| \frac{\partial Q^* \, B(y)\, p}{b^*(y)\, p} \| \leq \max_{i \in S} \sum_{j \in S} |\partial q^{i,j}| \; ,$$

whereas for any $y \in \mathbf{R}^d$, and any $p, p' \in \mathcal{P}(S)$

$$\frac{\partial Q^*\, B(y)\, p}{b^*(y)\, p} - \frac{\partial Q^*\, B(y)\, p'}{b^*(y)\, p'} = \frac{\partial Q^*\, B(y)\, (p-p')}{b^*(y)\, p} - \frac{b^*(y)\, (p-p')}{b^*(y)\, p}\; \frac{\partial Q^*\, B(y)\, p'}{b^*(y)\, p'} \;,$$

hence

$$\| \frac{\partial Q^*\, B(y)\, p}{b^*(y)\, p} - \frac{\partial Q^*\, B(y)\, p'}{b^*(y)\, p'} \| \leq 2\, [\max_{i \in S} \sum_{j \in S} |\partial q^{i,j}|\,]\; \delta(y)\; \|p - p'\| \;.$$

- On the 15th line from top of page 22, one should read : *It has already been proved ...* instead of *It as already been proved ...*
- The bound in the estimate following the statement of Theorem 5.4 on page 25 should read :

$$2\, \Delta_2\, \|F[y,p,w]\,\| + \mathrm{K}(u) \qquad \text{instead of :} \qquad 2\, \Delta_2\, \|F[y,p,w]\,\| + \mathrm{K}(u,y) \;.$$

Consequently, the estimate in Corollary 5.5 should read :

$$|\Pi^n\, g(z) - \lambda| \leq C\, \varepsilon^{-6r}\, [\,\mathrm{Lip}(g) + \mathrm{K}(g)\,]\; (1 + \|F[y,p,w]\|\,)\; \frac{\rho^n}{1-\rho} \;.$$

- On the 3rd line from the top of page 33, one should read :

$$\prod_{k=m}^{n} \tau_{\mathrm{B}}(A_k) \leq \prod_{k=m}^{n} \frac{1-\delta_k^{-1}}{1+\delta_k^{-1}} \qquad \text{instead of :} \qquad \prod_{k=m}^{n} \tau_{\mathrm{B}}(A_k) = \prod_{k=m}^{n} \frac{1-\delta_k^{-1}}{1+\delta_k^{-1}}$$

similarly on the 4th line from the bottom of page 33, one should read :

$$\tau_{\mathrm{B}}(Q_n) \leq \frac{1-\varepsilon_n}{1+\varepsilon_n} \qquad \text{instead of :} \qquad \tau_{\mathrm{B}}(Q_n) = \frac{1-\varepsilon_n}{1+\varepsilon_n}$$

and similarly on the 11th line from the top of page 34, one should read :

$$\cdots \leq \frac{1-\varepsilon^r\, [\,\delta_{n+1}^B \cdots \delta_{n+r-1}^B\,]^{-1}}{1+\varepsilon^r\, [\,\delta_{n+1}^B \cdots \delta_{n+r-1}^B\,]^{-1}} \qquad \text{instead of :} \qquad \cdots = \frac{1-\varepsilon^r\, [\,\delta_{n+1}^B \cdots \delta_{n+r-1}^B\,]^{-1}}{1+\varepsilon^r\, [\,\delta_{n+1}^B \cdots \delta_{n+r-1}^B\,]^{-1}}$$

i.e. in all three places, equality should be replaced with the corresponding inequality. This does not affect the results.

- On the 1st line above Example 1 on page 33, the reference to Lemma A.1 (which does not exist) should be replaced by a reference to Proposition A.1.
- On the 13th line from the top of page 44, one should read :

$$\|p - p'\| \qquad \text{instead of :} \qquad \|p - q\| \;.$$

February 25, 1998