Corrections for the book NONLINEAR PROGRAMMING: 3RD EDITION, Athena Scientific, 2016, by Dimitri P. Bertsekas

Last updated: 1/10/2017

Corrections to the 1ST PRINTING

p. 196 (14) "in the case" is repeated twice.

p. 216 (-4) Add $+\nabla^2_{uu} L\big(\phi(u), u, p(u)\big)'$ at the end of Eq. (2.193).

p. 418 (-4) Rewrite the last sentence as follows:
The optimal solution is $x^* = (0, 0)$, and again it can be seen that there is no Lagrange multiplier λ^* such that

$$\big(\nabla f(x^*) + \lambda^* \nabla h(x^*)\big)'(x - x^*) = x_1 + \lambda^* x_2 \geq 0, \qquad \forall\, x \in X.$$

Here, condition (2) of Prop. 4.3.18 is satisfied, but condition (1), is violated.

p. 456 (-7) The first equation of the proof of Prop. 5.1.4 is flawed. Replace the first 7 lines of the proof with the following:

Proof: Let $\lambda_{\bar{X},\bar{\epsilon}}$ and $\lambda_{\bar{X},\epsilon}$ correspond to $(\bar{x}, \bar{\epsilon})$ and $(\bar{x}, \epsilon)$ via Eq. (5.7), so that from Eqs. (5.5)-(5.6), we have

$$q(\bar{x}, \bar{\epsilon}) = \frac{\bar{X}(c - \lambda_{\bar{X},\bar{\epsilon}})}{\bar{\epsilon}} - e, \qquad q(\bar{x}, \epsilon) = \frac{\bar{X}(c - \lambda_{\bar{X},\epsilon})}{\epsilon} - e.$$

Denoting $\theta = \delta n^{-1/2}$ and using the minimization property of the second equation in p. 455, we have

$$\begin{aligned}
\big\|q(\bar{x}, \bar{\epsilon})\big\| &\leq \left\| \frac{\bar{X}(c - \lambda_{\bar{X},\epsilon})}{\bar{\epsilon}} - e \right\| \\
&= \left\| \frac{\bar{X}(c - \lambda_{\bar{X},\epsilon})}{(1-\theta)\epsilon} - e \right\| \\
&= \frac{1}{1-\theta} \left\| \frac{\bar{X}(c - \lambda_{\bar{X},\epsilon})}{\epsilon} - (1-\theta)e \right\| \\
&\leq \frac{1}{1-\theta} \left(\left\| \frac{\bar{X}(c - \lambda_{\bar{X},\epsilon})}{\epsilon} - e \right\| + \theta\|e\| \right) \\
&= \frac{1}{1-\theta} \big(\big\|q(\bar{x}, \epsilon)\big\| + \theta\|e\| \big) \\
&= \frac{1}{1-\theta} \big(\big\|q(\bar{x}, \epsilon)\big\| + \theta n^{1/2} \big)
\end{aligned}$$

$$
\begin{aligned}
&\leq \frac{1}{1-\theta}\big(\|q(x,\epsilon)\|^2 + \delta\big) \\
&\leq \frac{\gamma^2 + \delta}{1-\theta}.
\end{aligned}
$$