Comments and Corrections

Corrections to: "Estimator Design for Discrete-Time Switched Neural Networks With Asynchronous Switching and Time-Varying Delay"

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***Abstract*— This note aims to point out one typographical error and one calculation error in [1].**

***Index Terms*— Asynchronous switching, average dwell time, state estimation, switched neural networks, time-varying delay.**

I. Corrigendum

This note provides some corrections on the typographical and calculation errors in [1], i.e., the time-varying delay $d(k)$ should satisfy

$$0 < d(k) \leq d \tag{1}$$

which makes the Lyapunov funtional (17) and (18) meaningful. The calculation error appears in (11), i.e., (11) should be

$$\begin{cases} P_{ij} \leq \mu P_j, & (b/a)^{d-1} Q_{ij} \leq \mu Q_j, \\ (b/a)^{d-1} Z_{ij} \leq \mu Z_j, & \forall i \in \mathrm{M}, j \in \mathrm{M}, i \neq j. \end{cases} \tag{2}$$

In the derivation of [1, eq. (30)], (11) cannot guarantee $V_{\sigma(k_l)\rho(k_{l-1}+t_{l-1})}(k_l) \leq \mu V_{\sigma(k_{l-1})}(k_l)$ to hold. By introducing (2) in this paper, this relation is hold. Following (2), one can obtain Theorem 1 by using the rest proof in [1]. Corresponding changes are also applied to the numerical example. Consider the system in [1], we choose $a = 0.95, b = 1, c = 1.05, \mu = 1.08$, thus, one has $T_a^* = (\ln[(b/a)^{T_{\max}} \mu^2])/\ln c = 5.2574$. Solving the optimization problem (16) in [1] yields $\gamma^* = 2.25$, the corresponding estimator gains are

$$A_{f1} = \begin{bmatrix} -0.0996 & -0.1630 & -0.6490 \\ -0.1974 & 0.3880 & -0.3258 \\ -0.0540 & 0.0521 & 0.2604 \end{bmatrix}$$

$$B_{f1} = \begin{bmatrix} -0.4597 \\ -0.3126 \\ -0.1124 \end{bmatrix}, \quad C_{f1} = \begin{bmatrix} -0.6712 \\ -0.7996 \\ -0.7647 \end{bmatrix}^T$$

$$A_{f2} = \begin{bmatrix} 0.1907 & -0.5229 & -0.7933 \\ -0.2823 & 0.4011 & -0.3456 \\ -0.1617 & 0.1916 & 0.3749 \end{bmatrix}$$

$$B_{f2} = \begin{bmatrix} -0.5094 \\ -0.3469 \\ -0.0393 \end{bmatrix}, \quad C_{f2} = \begin{bmatrix} -0.6890 \\ -0.8126 \\ -0.7723 \end{bmatrix}^T.$$

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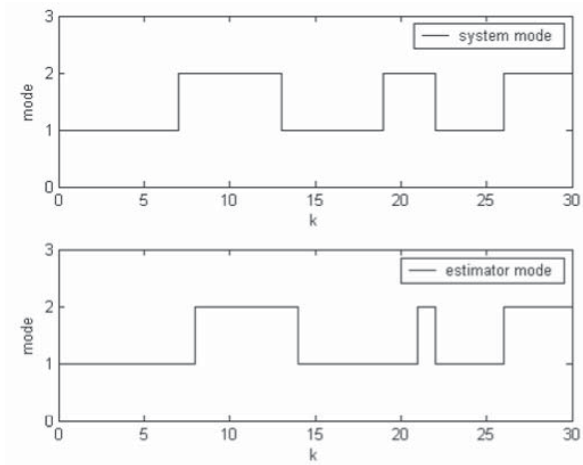

Fig. 1. Switching signals.

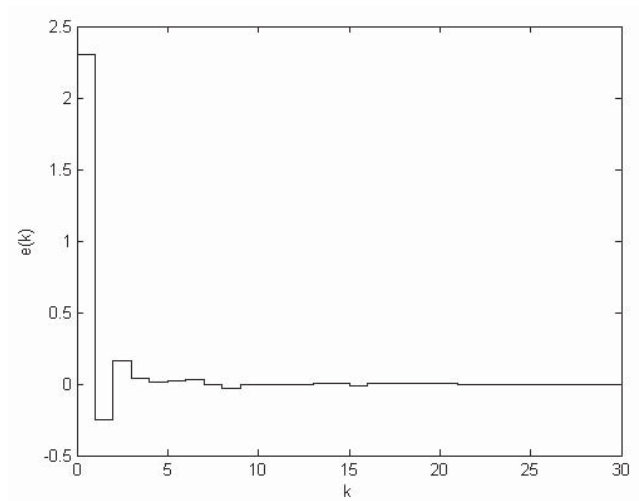

Fig. 2. Estimation error.

In the simulation setup, the switching signals are shown in Fig. 1. Choosing the same initial conditions as in [1], the trajectory of the estimation error is depicted in Fig. 2.

References

[1] D. Zhang, L. Yu, Q. G. Wang, and C. J. Ong, "Estimator design for discrete-time switched neural networks with asynchronous switching and time-varying delay," *IEEE Trans. Neural Netw. Learn. Syst.*, vol. 23, no. 5, pp. 827–834, May 2012.

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