ERRATUM TO "BOUNDING INFERENCES FOR LARGE-SCALE CONTINUOUS-TIME MARKOV CHAINS: A NEW APPROACH BASED ON LUMPING AND IMPRECISE MARKOV CHAINS"

ALEXANDER ERREYGERS AND JASPER DE BOCK

In [2, Section 8], we compare our methods with the existing methods of [3] and [1] by means of a numerical assessment. It has recently come to our attention that the code that we used for this numerical assessment contained a small error. Consequently, the numerical values reported in [2, Tables 1 and 2] are not all entirely correct. Fortunately, the errors in the values are so small that they do not change our analysis of the numerical assessment and the subsequent conclusion. We nevertheless give the correct values below, where we indicate the changes with respect to the original tables in red.

Table 1. Comparison of the bounds obtained by using [2, Theorems 12 and 13] with those obtained by the method presented in [3, Section 3.2]. Model parameters: $K = 4$, $N = 5$, $\mu = 1$, $\lambda_1 = 1$, $\lambda_2 = 1.01$. Computation parameters: $\hat{\mathcal{A}}_1$ consists of all the singletons, $\hat{\mathcal{A}}_2$ consists of all the singletons and their complements.

				[2, Theorem 12]				[2, Theorem 13]			
		[3, Table 2]		$\delta = 1.8/\|Q\|$		$\delta = 0.9/\|Q\|$		$\hat{\mathcal{A}}_1$		$\hat{\mathcal{A}}_2$	
	Exact	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
POP	3.7266	3.6141	3.7493	3.7196	3.7336	3.7196	3.7336	3.6162	3.7487	3.7113	3.7414
TP	0.9828	0.9676	0.9835	0.9826	0.9831	0.9826	0.9831	0.9679	0.9835	0.9823	0.9834

References

[1] Peter Buchholz. "An improved method for bounding stationary measures of finite Markov processes". In: *Performance Evaluation* 62.1 (2005), pp. 349–365. DOI: 10.1016/j.peva.2005.07.002.

[2] Alexander Erreygers and Jasper De Bock. "Bounding inferences for large-scale continuous-time Markov chains: A new approach based on lumping and imprecise Markov chains". In: *International Journal of Approximate Reasoning* 115 (2019), pp. 96–133. DOI: j.ijar.2019.09.003.

[3] G. Franceschinis and Richard R. Muntz. "Bounds for quasi-lumpable Markov chains". In: *Performance Evaluation* 20.1 (1994), pp. 223–243. DOI: 10.1016/0166-5316(94)90015-9.

TABLE 2. Comparison of the bounds obtained on the throughput by using [2, Theorems 12 and 13] with those obtained by the method presented in [1, Section 4]. Model parameters: $\mu = 5$, $\lambda_1 = 1$, $\lambda_2 = \lambda_1 + \epsilon$. Computation parameters: $\hat{\mathcal{A}}_1$ consists of all the singletons, $\hat{\mathcal{A}}_2$ consists of all the singletons and their complements.

							[2, Theorem 12]				[2, Theorem 13]			
					[1, Figure 3]		$\delta = 1.8/\lVert Q \rVert$		$\delta = 0.9/\lVert Q \rVert$		$\hat{\mathcal{A}}_1$		$\hat{\mathcal{A}}_2$	
K	N	$\lvert\mathscr{X}\rvert$	$\lvert\hat{\mathscr{X}}\rvert$	Exact	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
							$\epsilon = 0.1$							
4	6	336	45	2.611	2.509	2.730	2.522	2.714	2.522	2.713	1.928	3.181	2.401	2.820
4	8	825	91	2.892	2.784	3.028	2.799	3.004	2.800	3.004	1.982	3.633	2.582	3.171
4	10	1716	165	3.090	2.973	3.239	2.995	3.208	2.995	3.208	2.002	3.961	2.670	3.435
6	8	4719	108	3.486	3.365	3.624	3.372	3.614	3.372	3.613	2.068	4.188	3.069	3.846
6	10	13 013	215	3.802	3.675	3.984	3.689	3.931	3.689	3.931	2.083	4.515	3.191	4.244
8	10	68 068	232	4.202	4.087	4.327	4.093	4.320	4.093	4.320	2.111	4.736	3.542	4.595
							$\epsilon = 0.01$							
4	6	336	45	2.520	2.509	2.532	2.511	2.530	2.511	2.530	2.428	2.591	2.500	2.541
4	8	825	91	2.793	2.780	2.806	2.783	2.803	2.783	2.803	2.655	2.894	2.764	2.821
4	10	1716	165	2.984	2.971	2.998	2.974	2.996	2.974	2.996	2.802	3.116	2.948	3.020
6	8	4719	108	3.378	3.365	3.392	3.366	3.391	3.366	3.391	3.121	3.488	3.340	3.416
6	10	13 013	215	3.689	3.675	3.704	3.677	3.702	3.677	3.702	3.336	3.821	3.639	3.738
8	10	68 068	232	4.100	4.087	4.113	4.088	4.113	4.088	4.113	3.609	4.213	4.047	4.151