Comments and Corrections

Corrections on "Failure Transition Distance-Based Importance Sampling Schemes for the Simulation of Repairable Fault-Tolerant Computer Systems"

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***Index Terms*—Fault-tolerant computer systems, importance sampling, Markov models, rare event simulation, steady-state availability, variance reduction.**

The following corrections are to be made to [1]. The corrections do not propagate to any other part of the paper and do not affect the correctness of the experimental results reported in the paper.

- The definition of repair transition on page 208, right column should be:

  repair transition — a transition (x, y) of $X(\Pi)$ is a repair transition if $F(y) \subset F(x)$

- The definition of $f_{x,y}$, $d_{x,y}$ in page 209, left column should be:

  $f_{x,y}$, $d_{x,y}$ — failure transitions $(x, y) \in T_F$ are modeled as $\lambda_{x,y} = r_{\min} f_{x,y} \varepsilon^{d_{x,y}}$, where $d_{x,y}$ is the minimum integer ≥ 1 such that $f_{x,y} \gg \varepsilon$

- The definition of $o(\varepsilon^d)$ in page 209, right column should be:

  $o(\varepsilon^d)$ — a function $f(\varepsilon)$, $\varepsilon > 0$ is said to be $o(\varepsilon^d)$ (written $f(\varepsilon) = o(\varepsilon^d)$), where d is an integer ≥ 0, if $\lim_{\varepsilon \to 0} f(\varepsilon)/\varepsilon^d = 0$

- The definition of $\Theta(\varepsilon^d)$ in page 209, right column should be:

  $\Theta(\varepsilon^d)$ — a function $f(\varepsilon)$, $\varepsilon > 0$ is said to be $\Theta(\varepsilon^d)$ (written $f(\varepsilon) = \Theta(\varepsilon^d)$), where d is an integer ≥ 0, if $f(\varepsilon) = c\varepsilon^d + o(\varepsilon^d)$ for some constant $c > 0$

- In page 211, right column, lines 27–28

  "& repair transitions (x, y), characterized by $F(y) \subseteq F(x)$"

  should be

  "& repair transitions (x, y), characterized by $F(y) \subset F(x)$"

- In page 212, left column, lines 22–24

  "will model failure transition rates as $\lambda_{x,y} r_{\min} f_{x,y} \varepsilon^{d_{x,y}}$, $f_{x,y} \in (0, 1]$, $f_{x,y} \gg \varepsilon$, $d_{x,y} \geq 1$"

  should be

  "will model failure transition rates as $\lambda_{x,y} = r_{\min} f_{x,y} \varepsilon^{d_{x,y}}$, where $d_{x,y}$ is the minimum integer ≥ 1 such that $f_{x,y} \gg \varepsilon$"

- In page 217, left column, lines 13–15

  "i.e. $\{(r, y) \in T_F(r), y \in D\} \neq \emptyset$ & $d_{r,y} = 1$ for every $(r, y) \in T_F(r)$, $y \in D$"

  should be

  "i.e. $\{(r, y) \in T_F(r), y \in D\} \neq \emptyset$ & $d_{r,y} = 1$ for some $(r, y) \in T_F(r)$, $y \in D$"

- The second paragraph in page 230, left column should be

  "Discarding minimal failure covers of cardinality $> M$ could allow us to deal with very large systems when M is small. Thus, for instance, for $M = 2$, the number of minimal failure covers of cardinality $\leq M$ of a system having NC component classes with an instance of each class and with failure bags of cardinality 1 is roughly bounded from above by $NC^2/2$, and a budget of 50,000 minimal failure covers would allow us to deal with systems with at least 316 components, and often many more. For $M = 3$, the number of minimal failure covers with cardinality $\leq M$ is roughly bounded from above by $NC^3/6$, and a budget of 50,000 minimal failure covers would allows us to deal with systems with at least 66 components, and often many more."

- In page 232, right column, line 5

  "Proof of Theorem 6"

  should be

  "Proof of Theorem 1"

REFERENCES

[1] J.A. Carrasco, "Failure transition distance-based importance sampling schemes for the simulation of repairable fault-tolerant computer systems," *IEEE Trans. Reliability*, vol. 55, no. 2, pp. 207–236, June 2006.

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Erratum

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In [1], $\Gamma(n_0)$ in the denominator of (6) should be replaced by $\Gamma(n_0 - x_0)$. Otherwise, this typo causes $\Gamma(n_0)$ to cancel in the numerator and the denominator of the mentioned equation. Thus, (6) in [1] should have appeared as

$$f(\lambda) = t \frac{\Gamma(n_0)}{\Gamma(x_0)\Gamma(n_0 - x_0)} \left[z^{n_0 - x_0} (1 - z)^{x_0 - 1} \right],$$

where $z = e^{-t\lambda}$ and $\lambda > 0$, and the respective expression for the expectation as

$$E(\lambda) = t \frac{\Gamma(n_0)}{\Gamma(x_0)\Gamma(n_0 - x_0)} \int_0^\infty \lambda \left[e^{-(n_0 - x_0)\lambda t} (1 - e^{-\lambda t})^{x_0 - 1} \right] d\lambda.$$

REFERENCES

[1] M. P. Kaminskiy and V. V. Krivtsov, "A simple procedure for Bayesian estimation of the Weibull distribution," *IEEE Trans. Reliability*, vol. 54, pp. 612–616, 2005.

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