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Corrigendum: Degenerate Beta autoregressive model for proportion time-series with zeros or ones: an application to antimicrobial resistance rate using R shiny app

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KEYWORDS

Beta distribution, time-series model, mixture distribution, rates, proportions, inflated distribution, AMR, resistance

A corrigendum on
Degenerate Beta autoregressive model for proportion time-series with zeros or ones: an application to antimicrobial resistance rate using R shiny app

by Lobo, J., Kamath, A., and Kalwaje Eshwara, V. (2023). *Front. Public Health* 10:969777. doi: 10.3389/fpubh.2022.969777

In the published article reference 14 was not cited in the article and an additional citation for reference 11 was missed. The citations have now been inserted in **Material and Methods**, ***Degenerate Beta Autoregressive (Deβ AR) model***, ***Parameter estimation*** and should read:

"Here, let $x_t^* = log(\frac{x_t}{1-x_t})$ if $x_t \epsilon (0,1)$ else $x_t^* = 0$ (11, 14) and $\psi(\mu_t\zeta) - \psi((1-\mu_t)\zeta) = \mu_t^*$, where $\psi(.)$ is a digamma function."

In the published article, there was an error. Inbetween steps of likelihood derivation was missed.

A correction has been made to **Material and Methods**, ***Degenerate Beta Autoregressive (Deβ AR) model***, ***Parameter estimation***. "This sentence previously stated:"

$$L(\boldsymbol{\theta}; x) = \prod_{t=p+1}^{n} f_{X_t}(x_t|\mathcal{F}_{t-1})$$

The likelihood function for the parameters of Degenerate Beta AR model is given by,

$$L(\boldsymbol{\theta}; x) = \prod_{t=p+1}^{n} \{\omega \mathcal{I}_{x_t=c} + \mathcal{I}_{x_t\epsilon(0,1)}(1-\omega)\frac{\Gamma(\zeta)}{\Gamma(\mu_t\zeta)\Gamma((1-\mu_t)\zeta)} x_t^{\mu_t\zeta-1}(1-x_t)^{(1-\mu_t)\zeta-1}\}$$

"The corrected sentence appears below:"

$$L(\boldsymbol{\theta}; x_t) = \prod_{t=p+1}^{n} f_{X_t}(x_t|\mathcal{F}_{t-1})$$

$$L(\boldsymbol{\theta}; x_t) = \prod_{t=p+1}^{n} bi_c(z_t; \omega, \mu_t, \zeta) = L_1(\omega)L_2(\mu_t, \zeta)$$

where,

$$L_1(\omega) = \prod_{t=p+1}^{n} \omega^{\mathcal{I}_{x_t=c}}(1-\omega)^{\mathcal{I}_{x_t\epsilon(0,1)}}$$

$$L_2(\mu_t, \zeta) = \prod_{t=p+1}^{n} \{\frac{\Gamma(\zeta)}{\Gamma(\mu_t\zeta)\Gamma((1-\mu_t)\zeta)} x_t^{\mu_t\zeta-1}(1-x_t)^{(1-\mu_t)\zeta-1}\}^{\mathcal{I}_{x_t\epsilon(0,1)}}$$

The likelihood function for the parameters of Degenerate Beta AR model is given by,

$$L(\boldsymbol{\theta}; x_t) = \prod_{t=p+1}^{n} \{\omega\mathcal{I}_{x_t=c} + \mathcal{I}_{x_t\epsilon(0,1)}(1-\omega) \frac{\Gamma(\zeta)}{\Gamma(\mu_t\zeta)\Gamma((1-\mu_t)\zeta)} x_t^{\mu_t\zeta-1}(1-x_t)^{(1-\mu_t)\zeta-1}\}$$

In the published article, there was an error. Limitation of the model has been added and reference 19 has been added.

A correction has been made to **Material and Methods**, ***Degenerate Beta Autoregressive (DeβAR) model***, ***Parameter estimation***. "This sentence previously stated:"

Large sample inference: If the model specified by Equation (5) follows the regularity condition of maximum likelihood estimation (MLE) then, MLEs of $\boldsymbol{\theta}$ and $J(\boldsymbol{\theta})$ (Fisher information matrix) are consistent. Assuming that $I(\boldsymbol{\theta}) = \lim_{n\to\infty}\{n^{-1}J(\boldsymbol{\theta})\}$ exists and is non-singular, we have $\sqrt{n}(\hat{\boldsymbol{\theta}} - \boldsymbol{\theta})$ converges in distribution to $N(0, I(\boldsymbol{\theta})^{-1})$.

"The corrected sentence appears below:"

Large sample inference: If the model specified by **Equation (5)** follows the regularity condition of maximum likelihood estimation (MLE) then, MLE of $\boldsymbol{\theta}$ and $J(\boldsymbol{\theta})$ (Fisher information matrix) are consistent. Assuming that $I(\boldsymbol{\theta}) = \lim_{n\to\infty}\{n^{-1}J(\boldsymbol{\theta})\}$ exists and is nonsingular, we have $\sqrt{n}(\hat{\boldsymbol{\theta}} - \boldsymbol{\theta})$ converges in distribution to $N(0, I(\boldsymbol{\theta})^{-1})$.

Note: The proposed DeβAR model is applicable when x_t^* is converted to 0 as mentioned above. To overcome with this limitation Bayer et al. (19) proposed Inflated beta autoregressive moving average models, which are more suitable when interval data includes 0 or 1.

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher's note

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