

Erratum to: A new measure of divergence with its application to multi-criteria decision making under fuzzy environment

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The original article has been published online with some errors. The errors are corrected with this erratum.

1. In Eq. (12) and in all other places, where the factor $\frac{1}{\sqrt{e-1}}$ occurs, it is in error. The correct factor is $\frac{1}{\sqrt{e-1}}$.
2. Just before Eq. (18), there is in error. It has ‘-’ sign. The correction is for the sign to be ‘+’.
3. Equation (20) should be:

The online version of the original article can be found under
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$$= \frac{1}{n(\sqrt{e}-1)} \left[\sum_{x_j \in X_1} \left\{ \left\{ \begin{aligned} & \left(\frac{\mu_A(x_j) + \mu_B(x_j)}{2} \right) \exp\left(\frac{2 - \mu_A(x_j) - \mu_B(x_j)}{2}\right) \\ & + \left(\frac{2 - \mu_A(x_j) - \mu_B(x_j)}{2} \right) \exp\left(\frac{\mu_A(x_j) + \mu_B(x_j)}{2}\right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{(\mu_A(x_j) \exp(1 - \mu_A(x_j)) + (1 - \mu_A(x_j)) \exp(\mu_A(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{(\mu_B(x_j) \exp(1 - \mu_B(x_j)) + (1 - \mu_B(x_j)) \exp(\mu_B(x_j)))}{2} \right\} \right\} \\ + \sum_{x_j \in X_2} \left\{ \left\{ \begin{aligned} & \left(\frac{\mu_A(x_j) + \mu_A(x_j)}{2} \right) \exp\left(\frac{2 - \mu_A(x_j) - \mu_A(x_j)}{2}\right) \\ & + \left(\frac{2 - \mu_A(x_j) - \mu_A(x_j)}{2} \right) \exp\left(\frac{\mu_A(x_j) + \mu_A(x_j)}{2}\right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{(\mu_A(x_j) \exp(1 - \mu_A(x_j)) + (1 - \mu_A(x_j)) \exp(\mu_A(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{(\mu_A(x_j) \exp(1 - \mu_A(x_j)) + (1 - \mu_A(x_j)) \exp(\mu_A(x_j)))}{2} \right\} \right\} \right].$$

4. The expression following Eq. (21) is in error, the correct form is as follows:

$$= \frac{1}{n(\sqrt{e}-1)} \sum_{j=1}^n \left[\left[\left\{ \begin{aligned} & \left(\frac{\mu_A(x_j) + 1 - \mu_B(x_j)}{2} \right) \exp\left(\frac{1 - \mu_A(x_j) + \mu_B(x_j)}{2}\right) \\ & + \left(\frac{1 - \mu_A(x_j) + \mu_B(x_j)}{2} \right) \exp\left(\frac{\mu_A(x_j) + 1 - \mu_B(x_j)}{2}\right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{(\mu_A(x_j) \exp(1 - \mu_A(x_j)) + (1 - \mu_A(x_j)) \exp(\mu_A(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{((\mu_B(x_j)) \exp(1 - \mu_B(x_j)) + (1 - \mu_B(x_j)) \exp(\mu_B(x_j)))}{2} \right\} \right] \\ - \left[\left\{ \begin{aligned} & \left(\frac{1 - \mu_A(x_j) + \mu_B(x_j)}{2} \right) \exp\left(\frac{1 + \mu_A(x_j) - \mu_B(x_j)}{2}\right) \\ & + \left(\frac{1 + \mu_A(x_j) - \mu_B(x_j)}{2} \right) \exp\left(\frac{1 - \mu_A(x_j) + \mu_B(x_j)}{2}\right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{((1 - \mu_A(x_j)) \exp(\mu_A(x_j)) + \mu_A(x_j) \exp(1 - \mu_A(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{((1 - \mu_B(x_j)) \exp(\mu_B(x_j)) + (\mu_B(x_j)) \exp(1 - \mu_B(x_j)))}{2} \right\} \right] \right].$$

5. The expression following Eq. (22) is in error, the correct form is as follows:

$$= \frac{1}{n(\sqrt{e}-1)} \left[\sum_{x_j \in X_1} \left\{ \left\{ \begin{aligned} & \left(\frac{\mu_B(x_j) + \mu_C(x_j)}{2} \right) \exp\left(\frac{2 - \mu_B(x_j) - \mu_C(x_j)}{2}\right) \\ & + \left(\frac{2 - \mu_B(x_j) - \mu_C(x_j)}{2} \right) \exp\left(\frac{\mu_B(x_j) + \mu_C(x_j)}{2}\right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{(\mu_B(x_j) \exp(1 - \mu_B(x_j)) + (1 - \mu_B(x_j)) \exp(\mu_B(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{(\mu_C(x_j) \exp(1 - \mu_C(x_j)) + (1 - \mu_C(x_j)) \exp(\mu_C(x_j)))}{2} \right\} \right\} \\ + \sum_{x_j \in X_2} \left\{ \left\{ \begin{aligned} & \left(\frac{\mu_A(x_j) + \mu_C(x_j)}{2} \right) \exp\left(\frac{2 - \mu_A(x_j) - \mu_C(x_j)}{2}\right) \\ & + \left(\frac{2 - \mu_A(x_j) - \mu_C(x_j)}{2} \right) \exp\left(\frac{\mu_A(x_j) + \mu_C(x_j)}{2}\right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{(\mu_A(x_j) \exp(1 - \mu_A(x_j)) + (1 - \mu_A(x_j)) \exp(\mu_A(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{(\mu_C(x_j) \exp(1 - \mu_C(x_j)) + (1 - \mu_C(x_j)) \exp(\mu_C(x_j)))}{2} \right\} \right\} \right].$$

6. Equation (24) is in error, the correct form is as follows:

$$= \frac{1}{n(\sqrt{e}-1)} \left[\sum_{x_j \in X_1} \left\{ \left\{ \begin{aligned} &\left(\frac{\mu_B(x_j) + \mu_C(x_j)}{2} \right) \exp\left(\frac{2 - \mu_B(x_j) - \mu_C(x_j)}{2} \right) \\ &+ \left(\frac{2 - \mu_B(x_j) - \mu_C(x_j)}{2} \right) \exp\left(\frac{\mu_B(x_j) + \mu_C(x_j)}{2} \right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{(\mu_B(x_j) \exp(1 - \mu_B(x_j)) + (1 - \mu_B(x_j)) \exp(\mu_B(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{(\mu_C(x_j) \exp(1 - \mu_C(x_j)) + (1 - \mu_C(x_j)) \exp(\mu_C(x_j)))}{2} \right\} \right\} \\ + \sum_{x_j \in X_2} \left\{ \left\{ \begin{aligned} &\left(\frac{\mu_A(x_j) + \mu_C(x_j)}{2} \right) \exp\left(\frac{2 - \mu_A(x_j) - \mu_C(x_j)}{2} \right) \\ &+ \left(\frac{2 - \mu_A(x_j) - \mu_C(x_j)}{2} \right) \exp\left(\frac{\mu_A(x_j) + \mu_C(x_j)}{2} \right) \end{aligned} \right\} \right. \\ \left. - \left\{ \frac{(\mu_A(x_j) \exp(1 - \mu_A(x_j)) + (1 - \mu_A(x_j)) \exp(\mu_A(x_j)))}{2} \right. \right. \\ \left. \left. + \frac{(\mu_C(x_j) \exp(1 - \mu_C(x_j)) + (1 - \mu_C(x_j)) \exp(\mu_C(x_j)))}{2} \right\} \right\} \right].$$

- 7. In Eqs. (28) and (29), $\frac{1}{n}$ should be replaced by $\frac{1}{n(\sqrt{e}-1)}$.
- 8. The correct forms of Tables 1, 2 and 3 are as follows:
- 9. In Step 1 of numerical example, first expression for M^+ is correct, and the error is the next line. It gives in fact M^- . Thus, Step 1 in corrected form is to be:

Step 1 Obtaining the M^+ and M^- given by

$$M^+ = \{ \langle C_1, 0.8 \rangle, \langle C_2, 0.7 \rangle, \langle C_3, 0.7 \rangle, \langle C_4, 0.6 \rangle \},$$

$$M^- = \{ \langle C_1, 0.5 \rangle, \langle C_2, 0.4 \rangle, \langle C_3, 0.3 \rangle, \langle C_4, 0.2 \rangle \}.$$

Table 1 Values of FJED($M^+|M_i$)

FJED($M^+ M_1$)	FJED($M^+ M_2$)	FJED($M^+ M_3$)	FJED($M^+ M_4$)	FJED($M^+ M_5$)
0.1018	0.0121	0.0293	0.0797	0.0340

Table 2 Values of FJED($M^-|M_i$)

FJED($M^- M_1$)	FJED($M^- M_2$)	FJED($M^- M_3$)	FJED($M^- M_4$)	FJED($M^- M_5$)
0.0095	0.0797	0.0533	0.0317	0.0629

Table 3 Values of FJED(M_i)

FJED(M_1)	FJED(M_2)	FJED(M_3)	FJED(M_4)	FJED(M_5)
0.9146	0.1318	0.3547	0.7154	0.3509