

Correction

Correction: Kolchinsky, A. and Tracey, B.D. Estimating Mixture Entropy with Pairwise Distances. *Entropy* 2017, 19, 361

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Following the publication of our paper [1], we uncovered a mistake in the derivation of two formulas in the manuscript. This error does not affect any of the empirical results or conclusions of the article.

The following incorrect text on Page 9 should be replaced:

These bounds have particularly simple forms when all of the mixture components have equal covariance matrices, i.e., $\Sigma_i = \Sigma$ for all i . In this case, the lower bound of Equation (10) can be written as

$$\hat{H}_{C_\alpha} = \frac{d}{2} - \sum_i c_i \ln \sum_j c_j [p_j(\mu_i)]^{\alpha(1-\alpha)}.$$

This is derived by combining the expressions for C_α , Equation (14), the entropy of a Gaussian, Equation (13), and the Gaussian density function. For a homoscedastic mixture, the tightest lower bound among the Chernoff α -divergences is given by $\alpha = 0.5$, corresponding to the Bhattacharyya distance,

$$\hat{H}_{BD} = \frac{d}{2} - \sum_i c_i \ln \sum_j c_j [p_j(\mu_i)]^{\frac{1}{4}}.$$

(This is derived above in Section 3.2.)

The replacement text should read:

These bounds have simple forms when all of the mixture components have equal covariance matrices; i.e., $\Sigma_i = \Sigma$ for all i . First, define a transformation in which each Gaussian component p_j is mapped to a different Gaussian $\tilde{p}_{j,\alpha}$, which has the same mean but where the covariance matrix is rescaled by $\frac{1}{\alpha(1-\alpha)}$,

$$p_j := \mathcal{N}(\mu_j, \Sigma) \mapsto \tilde{p}_{j,\alpha} := \mathcal{N}\left(\mu_j, \frac{1}{\alpha(1-\alpha)}\Sigma\right).$$

Then, the lower bound of Equation (10) can be written as

$$\hat{H}_{C_\alpha} = \frac{d}{2} + \frac{d}{2} \ln(\alpha(1-\alpha)) - \sum_i c_i \ln \sum_j c_j \tilde{p}_{j,\alpha}(\mu_i).$$

This is derived by combining the expressions for C_α , Equation (14), the entropy of a Gaussian, Equation (13), and the Gaussian density function. For a homoscedastic

mixture, the tightest lower bound among the Chernoff α -divergences is given by $\alpha = 0.5$, corresponding to the Bhattacharyya distance,

$$\hat{H}_{\text{BD}} = \frac{d}{2} + \frac{d}{2} \ln \frac{1}{4} - \sum_i c_i \ln \sum_j c_j \tilde{p}_{j,0.5}(\mu_i).$$

(This is derived above in Section 3.2.)

Reference

1. Kolchinsky, A.; Tracey, B.D. Estimating Mixture Entropy with Pairwise Distances. *Entropy* **2017**, *19*, 361, doi:10.3390/e19070361.



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