Node-Density Regression Equations

Abbreviations

- n : the number of nodes
- x : total path lengths
- β : the rate of change between the number of nodes and total path lengths
- δ : node-density parameter

Eq. 1

$$\boldsymbol{n = \beta x^{\delta}}$$
$$log(n) = log(\beta x^{\delta})$$
$$log(n) = log(\beta x^{\delta})$$
$$log(n) = log(\beta) + log(x^{\delta})$$
$$\boldsymbol{log(n) = log(\beta) + \delta log(x)}$$

Eq. 2

$$n = \beta x^{\delta}$$
$$x^{\delta} = \frac{n}{\beta}$$
$$x^{\delta} = \beta^{-1} n$$
$$(x^{\delta})^{\frac{1}{\delta}} = (\beta^{-1} n)^{\frac{1}{\delta}}$$
$$\boldsymbol{x = \beta^{-\frac{1}{\delta}} n^{\frac{1}{\delta}}}$$
$$log(x) = log\left(\beta^{-\frac{1}{\delta}} n^{\frac{1}{\delta}}\right)$$
$$log(x) = log\left(\beta^{-\frac{1}{\delta}}\right) + log\left(n^{\frac{1}{\delta}}\right)$$
$$\boldsymbol{log(x) = log\left(\beta^{-\frac{1}{\delta}}\right) + \frac{1}{\delta} log(n)}$$

References

Venditti C., Meade A., Pagel M. 2006. Detecting the node-density artifact in phylogeny reconstruction. Syst. Biol. 55:637–643.