Distances summary

Let $X_u =$ uth Allele frequency from the first population

Let $Y_u =$ uth Allele frequency from the second population

Euclidean distance D_{EU}

$$D_{EU} = \sqrt{\sum_u (X_u - Y_u)^2}$$

Shared allele distance D_{SA}

$$D_{SA} = \frac{\sum_l m_l}{2l}$$

Cavalli-Sforze and Edwards chord distance (1967) D_{CH}

$$D_{CH} = \frac{2}{\pi}\sqrt{2(1 - \sum_u \sqrt{X_u . Y_u})}$$

Bhattacharyya and Nei distance(1987) θ^2

$$\theta^2 = (\arccos \sum_u \sqrt{X_u . Y_u})^2$$

Sanghvi distance (1953) X^2

$$X^2 = 2\sum_u \frac{(X_u - Y_u)^2}{(X_u + Y_u)}$$

Rogers distance (1972) D_R

$$D_R = \sqrt{\frac{\sum_u (X_u - Y_u)^2}{2}}$$

Prevosti distance (1975) O_p

$$O_p = \sum_u \frac{|X_u - Y_u|}{2}$$

Nei distance (1983) D_A

$$D_A = 1 - \sum_u \sqrt{X_u Y_u}$$

Cavalli-Sforze chord distance (1969) f_v

$$f_v = \sqrt{\frac{\sum_l (1 - \sum_u \sqrt{X_u Y_u}}{\sum_l (a_l - 1)}}$$, where a_l is the allele number of the lth loci

Reynolds distance (1983) θ_w

$$\theta_w = \sqrt{\frac{\sum_l \sum_u (X_u - Y_u)^2}{2\sum_l (1 - \sum_u X_u Y_u)}}$$

Let $r = \#$ of loci

Let $J_X = \sum_l \sum_u X_u^2 / r$

Let $J_Y = \sum_l \sum_u Y_u^2 / r$

Let $J_{XY} = \sum_l \sum_u X_u Y_u / r$

Nei standard distance (1972) D_a

$$D_a = -\ln(J_{XY} / \sqrt{J_X J_Y})$$

Nei minimum distance (1973) D_m

$$D_m = (J_X + J_Y)/2 - J_{XY}$$

Latter distance (1972) ϕ_s

$$\phi_s = \frac{(J_X + J_Y) - J_{XY}}{1 - J_{XY}}$$

Latter distance (1973) D_L

$$D_L = -\ln(1 - \phi_s)$$

Goldstein distance (1995) $(\delta\mu)^2$

$$(\delta\mu)^2 = (\mu_X - \mu_Y)^2$$

Slatkin(1995) ASD

$$ASD = \sum_{i,j} (i-j)^2 X_i Y_j$$

Shriver(1995) D_{SW}

$$D_{SW} = W_{XY} - (W_X + W_Y)/2$$

$$W_X = \sum_{i \neq j} |i-j| X_i X_j, W_Y = \sum_{i \neq j} |i-j| Y_i Y_j, W_{XY} = \sum_{i \neq j} |i-j| X_i Y_j$$