CSE 8331 SDB
Example 4.9

$$\phi(\text{Gender}) = 2\left(\tfrac{6}{15}\right)\left(\tfrac{9}{15}\right)\sum_{i=1}^{3} |P(C_i|t_L) - P(C_i|t_R)|$$

$$= 2\left(\tfrac{6}{15}\right)\left(\tfrac{9}{15}\right)\left(\left|\left(\tfrac{1}{6} - \tfrac{3}{9}\right)\right| + \left|\left(\tfrac{2}{6} - \tfrac{6}{9}\right)\right| + \left|\left(\tfrac{3}{6} - 0\right)\right|\right)$$

Note: C_1 is short, C_2 is medium, C_3 is Tall
t_L is male, t_R is female

$$= 2\left(\tfrac{6}{15}\right)\left(\tfrac{9}{15}\right)(0.167 + 0.333 + 0.5)$$
$$= 2 \cdot 0.4 \cdot 0.6 \cdot 1 = 0.48$$

$\phi(1.6)$ = (Here t_L are nodes where height ≤ 1.6)

$$= 2 \cdot \left(\tfrac{2}{15}\right)\left(\tfrac{13}{15}\right)\left(\left|1 - \tfrac{2}{13}\right| + \left|0 - \tfrac{8}{13}\right| + \left|0 - \tfrac{3}{13}\right|\right)$$
$$= 2 \cdot 0.133 \cdot 0.867 \cdot 1.692 = 0.39$$

$$\phi(1.7) = 2 \cdot \left(\tfrac{4}{15}\right) \cdot \left(\tfrac{11}{15}\right) \cdot \left(\left|1 - 0\right| + \left|0 - \tfrac{8}{11}\right| + \left|0 - \tfrac{3}{11}\right|\right)$$
$$= 2 \cdot 0.267 \cdot 0.733 \cdot 2$$
$$= 0.783$$

$$\phi(1.8) = 2 \cdot \left(\tfrac{7}{15}\right) \cdot \left(\tfrac{8}{15}\right) \cdot \left(\left|\tfrac{4}{7} - 0\right| + \left|\tfrac{3}{7} - \tfrac{5}{8}\right| + \left|0\tfrac{7}{7} - \tfrac{3}{8}\right|\right)$$
$$= 2 \cdot 0.467 \cdot 0.533 \cdot (0.571 + 0.196 + 0.375)$$
$$= 2 \cdot 0.467 \cdot 0.533 \cdot 1.142$$
$$= 0.569$$

$$\phi(1.9) = 2 \cdot (11/15) \cdot (4/15) \cdot (|4/11 - 0| + |7/11 - 1/4| + |9/11 - 3/4|)$$

$$= 2 \cdot 0.733 \cdot 0.267 \cdot (0.364 + 0.386 + 0.75)$$
$$= 2 \cdot 0.733 \cdot 0.267 \cdot 1.5$$
$$= 0.587$$

$$\phi(2) = 2 \cdot (13/15) \cdot (2/15) \cdot (|4/13 - 0| + |8/13 - 0| + |1/13 - 1|)$$

$$= 2 \cdot 0.867 \cdot 0.133 \cdot (0.308 + 0.615 + 0.923)$$

$$= 2 \cdot 0.867 \cdot 0.133 \cdot 1.846$$
$$= 0.426$$