1 Sets and Counts

$$N = L + H \qquad n = l + h \tag{1}$$

$$H = B + C \qquad h = b + c \tag{2}$$

2 Maximum Degree

$$d = \max\left(d_k\right), k \in \{1, \ldots, n\} = N \tag{3}$$

$$M = \left\{d_k\right\}, d_k = d \qquad m = \#d_k, d_k = d \tag{4}$$

3 Coordinates

$$x_t = \frac{d_t}{n_t} \qquad y_t = \frac{h_t}{n_t} \tag{5}$$

4 Probabilities

$$p_d = P\left[x_{t+1} = \frac{d_t + 1}{n_t + 1}\right]; 1 - p_d = P\left[x_{t+1} = \frac{d_t}{n_t + 1}\right] \tag{6}$$

$$p_h = P\left[y_{t+1} = \frac{h_t + 1}{n_t + 1}\right]; 1 - p_h = P\left[y_{t+1} = \frac{h_t}{n_t + 1}\right] \tag{7}$$

5 Expected Values

$$x_{t+1} = p_d \cdot \left(\frac{d_t + 1}{n_t + 1}\right) + (1 - p_d) \cdot \left(\frac{d_t}{n_t + 1}\right) = \frac{d + p_d}{n + 1} \tag{8}$$

$$y_{t+1} = p_h \cdot \left(\frac{h_t + 1}{n_t + 1}\right) + (1 - p_h) \cdot \left(\frac{h_t}{n_t + 1}\right) = \frac{h + p_h}{n + 1} \tag{9}$$

6 Expected Shifts and Coefficients

$$\Delta_d = x_{t+1} - x_t = \frac{n \cdot p_d - d}{n \cdot (n + 1)} \qquad \rho = \frac{n \cdot p_d - d}{d \cdot (n + 1)} \tag{10}$$

$$\Delta_h = y_{t+1} - y_t = \frac{n \cdot p_h - h}{n \cdot (n + 1)} \qquad \mu = \frac{n \cdot p_h - h}{h \cdot (n + 1)} \tag{11}$$

7 Models

7.1 NR: No Redirection

$$p_d = \frac{1}{n} \cdot m \qquad \Delta_d = \frac{m - d}{n \cdot (n + 1)} \tag{12}$$

$$p_h = \frac{1}{n} \cdot l \qquad \Delta_h = \frac{l - h}{n \cdot (n + 1)} \tag{13}$$

7.2 XR: Cross Redirection

$$p_d = \frac{1}{n} \cdot \frac{m \cdot l}{h} \qquad \Delta_d = \frac{\frac{m \cdot l}{h} - d}{n \cdot (n + 1)} \tag{14}$$

$$p_h = \frac{1}{n} \cdot h \qquad \Delta_h = 0 \tag{15}$$

7.3 HR: Hub Redirection

$$p_d = \frac{1}{n} \cdot m \cdot \left(\frac{l}{h} + \frac{h-1}{n-1} \right) \qquad \Delta_d = \frac{m \cdot \left(\frac{l}{h} + \frac{h-1}{n-1} \right) - d}{n \cdot (n+1)} \tag{16}$$

$$p_h = \frac{1}{n} \cdot \frac{h \cdot l}{n-1} \qquad \Delta_h = \frac{\frac{h \cdot l}{n-1} - h}{n \cdot (n+1)} = -\frac{h \cdot (n-l-1)}{n \cdot (n+1) \cdot (n-1)} \leq 0 \tag{17}$$

7.4 FR: Fuzzy Redirection

$$p_d = \frac{1}{n} \cdot \sum_{k \in M} \left(\frac{l}{b} \mathbf{1}_B + \frac{b - \mathbf{1}_B}{n-1} + \frac{c - \mathbf{1}_C}{h-1} \right) \qquad \Delta_d = \frac{\sum_{k \in M} \left(\frac{l}{b} \mathbf{1}_B + \frac{b - \mathbf{1}_B}{n-1} + \frac{c - \mathbf{1}_C}{h-1} \right) - d}{n \cdot (n+1)} \tag{18}$$

$$p_h = \frac{1}{n} \cdot \frac{b \cdot l}{n-1} \qquad \Delta_h = \frac{\frac{b \cdot l}{n-1} - h}{n \cdot (n+1)} = \frac{b \cdot l - h \cdot (n-1)}{n \cdot (n+1) \cdot (n-1)} \leq 0 \tag{19}$$

7.5 CR: Complete Redirection

$$p_d = \frac{1}{n} \cdot \sum_{j \in M} \sum_{k \in Ne(j)} \frac{1}{d_k} \qquad \Delta_d = \frac{\sum_{j \in M} \sum_{k \in Ne(j)} \frac{1}{d_k} - d}{n \cdot (n+1)} \tag{20}$$

$$p_h = \frac{1}{n} \cdot \sum_{k \in H} \frac{d_k^l}{d_k} \qquad \Delta_h = \frac{\sum_{k \in H} \frac{d_k^l}{d_k} - h}{n \cdot (n+1)} \tag{21}$$