0.40 –C–A–T–

0.35 –A–C–T–

0.25 –A–A–A–

C   A   T

A   C   A

0.40   0.65   0.75

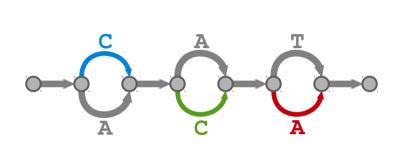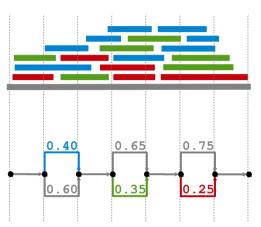0.60   0.35   0.25

$$\vec{q} = \underset{q}{argmin} \sum_{i=0}^{|E|} \left(f_i - \sum_{\substack{j=0, \\ if\ e_i \in h_j}}^{|H|} q_j \right)^2 + \alpha \sum_{j=0}^{|H|} (q_i \neq 0)$$

haplotype (h_i)	frequency (q_i)
–C–A–T–	q_{CAT}
–C–A–A–	q_{CAA}
–C–C–T–	q_{CCT}
–C–C–A–	q_{CCA}
–A–A–T–	q_{AAT}
–A–A–A–	q_{AAA}
–A–C–T–	q_{ACT}
–A–C–A–	q_{ACA}

$$\delta_1 = (0.40 - q_{CAT} - q_{CAA} - q_{CCT} - q_{CCA})^2$$
$$\delta_2 = (0.60 - q_{AAT} - q_{AAA} - q_{ACT} - q_{ACA})^2$$
$$\delta_3 = (0.65 - q_{CAT} - q_{CAA} - q_{AAT} - q_{AAA})^2$$
$$\delta_4 = (0.35 - q_{CCT} - q_{CCA} - q_{ACT} - q_{ACA})^2$$
$$\delta_5 = (0.75 - q_{CAT} - q_{CCT} - q_{AAT} - q_{ACT})^2$$
$$\delta_6 = (0.25 - q_{CAA} - q_{CCA} - q_{AAA} - q_{ACA})^2$$

$$\vec{q} = \underset{q}{argmin} \sum_{i=0}^{6} \delta_i + 0.3 \sum_{j=0}^{8} (q_i \neq 0)$$

$$\Rightarrow \vec{q} = \begin{pmatrix} 0.40 \\ 0.00 \\ 0.00 \\ 0.00 \\ 0.00 \\ 0.00 \\ 0.35 \\ 0.25 \end{pmatrix}$$