$$A_{ij} = \frac{\sum_{k=1}^{M}(x_{ik}-2p_k)(x_{jk}-2p_k)}{2p_k q_k}$$

A is $n \times n$ matrix.

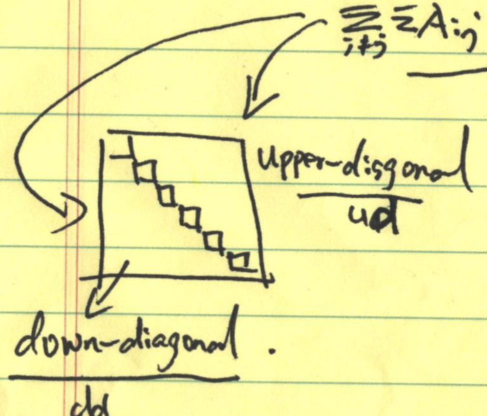
~~Diag (A) ≈ 1.~~ $A_{ii} \approx 1$. — an individual is identical to itself

So. $\mathrm{trace}(A) \approx n$.

$$E(A) = \frac{\sum_i \sum_j A_{ij}}{n^2} = 0.$$

$$E(A) = \frac{\sum_i A_{ii} + \sum_{i \neq j}\sum A_{ij}}{n^2} = \frac{n + \sum_{i\neq j}\sum A_{ij}}{n^2} = 0.$$

$$\sum_{i \neq j}\sum A_{ij} = -n$$



$ud + dd = -n.$

$$\frac{n(n-1)}{2} \underset{i<j}{E(A_{ij})} + \frac{n(n-1)}{2} \underset{i>j}{E(A_{ij})} = -n.$$

$n(n-1)E(A_{ij}) = -n.$

Eq 1 $\boxed{E(A_{ij}) = \frac{-1}{n-1}.}$

以上结论仅限n个无关联样本。若有关联发生，Eq 1中的n就不是n.

则可定义 n_e, $n_e = \frac{-1}{E(A_{ij})} + 1$。如果原来样本够大，$n_e \approx \frac{-1}{E(A_{ij})}$