

$$\cos(r_x, r_y) = \frac{r_x \cdot r_y}{\|r_x\| \cdot \|r_y\|} = \sum_{s \in S_{xy}} \frac{r_{xs} r_{ys}}{\sqrt{\sum_s r_{xs}^2} \sqrt{\sum_s r_{ys}^2}} \quad (1)$$

When we normalize the vectors by subtracting their means, equation (1) becomes:

$$\sum_{s \in S_{xy}} \frac{(r_{xs} - \bar{r}_x)(r_{ys} - \bar{r}_y)}{\sqrt{\sum_{s \in S_{xy}} (r_{xs} - \bar{r}_x)^2} \sqrt{\sum_{s \in S_{xy}} (r_{ys} - \bar{r}_y)^2}} \quad (2)$$

Which is the Pearson correlation.