Rebound calculation

Formally, the homoeostatic rebound H_i of an individual i was expressed as:

$$H_i = R_i - \hat{R}_i$$
$$\hat{R}_i = \alpha + \beta B_i$$

Where,

- $\hat{R}$ is the *predicted* sleep *after* treatment ($ZT \in [0, 3]$),
- R is the *measured* sleep *after* treatment ($ZT \in [0, 3]$),
- B is the sleep measured *before* after treatment ($ZT \in [0, 3]$), and
- α and β are the coefficients of the linear regression $R_C = \alpha + \beta B_C$ on the control group C.

$$\alpha = \bar{R_C} - beta\bar{B_C}$$
$$\beta = \frac{Cov(R_C, B_C)}{Var(B_C)}$$

Relative position

$$position = \frac{X - Q_{0.01}(X)}{Q_{0.99}(X - Q_{0.01}(X))}$$

Where, Q_n it the quantile function.

First and last percentiles were used instead of minimum and maximum to avoid the possible effect of spurious artefactual detections – beyond physical limits of the tube.

Hierarchical clustering

$$D(p, q) = \frac{\sum_{t \in T} BD_t(p_t, q_t)}{|T|}$$
$$BD_t(p_t, q_t) = -\ln(BC(p_t, q_t))$$
$$BC(p_t, q_t) = \sum_{x \in X} \sqrt{p_t(x) q_t(x)}$$

Where,

- BD_t is the Bhattacharyya distance at a time interval t,

- T is the set of all tested time intervals: $T = \{[0, 0.25), [0.25, 0.5), ..., [23.75, 24)\}h$,
- BC_t is the Bhattacharyya coefficient at a time interval t,
- p and q are the observed distributions of behaviour for two different individuals, and
- X is a the set of discrete behaviours: $X = quiescent, micromovement, walking$.