Spectral and fractal analyses of accelerometer data

Accelerometers are widely used for human activity monitoring. These devices register the frequency of body movements and their acceleration force (intensity). A voltage signal with magnitude proportional to the acceleration force is produced and this is then converted to a scalar value. Accelerometers are increasingly used in large-scale public health studies to collect data on physical activity behaviours in children. Typically, data are sampled at a fine temporal resolution during the day (e.g., every 10 or 15 seconds) and for several days. Daily trajectories are characterized by temporal non-linearity and by many peaks representing short bursts of intense activity (bouts). Methods for time series analysis can provide useful information to characterize daily patterns (Berman et al., 1998). In particular, fractal analysis (Gneiting et al., 2012) has been successfully employed in a number of applications, including, for example, cardiovascular studies (Liebovitch, 1999).

This MSc dissertation project’s objectives are:

1. To carry out spectral and fractal analyses of accelerometer data obtained from children of the Millennium Cohort Study;
2. To interpret the results of the analyses;
3. To elaborate guidelines on how to use the proposed methods in studies of physical activity in young children.

REFERENCES


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