

Analyzing longitudinal activity data collected from wearable devices

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Abstract: Fitness trackers have become a popular device for researching associations between physical activity and health status. We will present challenges in curating and analyzing data from wearable devices.

Data visualizations were key in this process to detect data anomalies, plot activity trends, and understand complex relationships amongst variables. Since many activity studies only collect data 2-7 days, one question in particular we investigated is how long to track free-living individuals to derive reliable estimates of their usual physical activity levels. This was done using changepoint detection techniques on long data streams of activity data. The data are from a 6-month workplace study with 431 healthy volunteers that collected minute-by-minute activity from a wearable device along with biometric and cardiometabolic measures at the start and end of study. Tracker data included heart rate, steps, body states (sleep, inactive, light activity, moderate activity, and off wrist), and sleep metrics.