Activity classification using the GENEA: optimum sampling frequency and number of axes


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Previous analysis has shown that the GENE A shows high classification accuracy of sedentary, house, walking and running activities when sampled at 80Hz. This paper compares the classification rate of activities on the basis of data from single axis, two axes and 3 axes, sampling rates ranging from 5 to 80 Hz (5, 10, 20, 40 and 80 Hz). Ten to twelve activities were completed by 60 subjects whilst wearing a GENE A accelerometer on the right wrist. Mathematical models were built based on features extracted from the mean, SD, fast Fourier transform and wavelet decomposition, which combined with one of the sampling rates to classify physical activities into sedentary, household, walking and running. Classification accuracy was high, irrespective of number of axes at 80, 40, 20 and 10 Hz but dropped for data collected at 5Hz (94.98%).

Lower sampling rates and measurement of a single axis would result in lower data load (and hence, higher efficiency of data processing), and longer battery life. Sampling frequencies greater than 10Hz and one / more axis of measurement were not associated with greater classification accuracy.

The complete abstract can be viewed or publication purchased by following the link:

http://journals.lww.com/acsm-msse/Abstract/2012/11000/Activity_Classification_Using_the_GENA_Optimum.24.aspx