Supplemental Digital Content 2

As mentioned in the manuscript, we were interested to enhance our previous method (1,2) by optimizing the detection algorithm and testing it on the different studied parameters from the monitors that were employed in the experiments. The original detection algorithm of this method was the following:

1. The mean of the individual walking speed (IWS) and its standard deviation (SD) were computed from the first walking bout.
2. A low pass filter was applied to remove artifact having values >2*IWS.
3. A high pass filter was performed to replace all values < IWS - K*SD by 0. K being determined from the coefficient of variation of the IWS (CV_{IWS}) as follows
$K = \begin{cases} 5, if\ CV_{IWS} < 15\% \\ 2,\ otherwise \end{cases}$, with $CV_{IWS} = \frac{SD}{IWS} \times 100$.
4. An artifact management was handled to remove short walking and stopping bouts that have duration < 2 * recording epoch (<4s for a recording frequency of 0.5 Hz).

This method was validated on GPS data in healthy participants (1,2) and then applied for the identification of walking and stopping bouts in participants with PAD during outdoor walking (3,4).

Nevertheless, it highly depends on the IWS and SD computed from the first walking bout, which might create inaccurate identification in case of high variability of walking speed. It also has fixed values of K, which were tested and validated previously for GPS data. Therefore, we proposed to enhance this method to test it on the parameters obtained from all the monitors, as following

1. Computing the mean and SD of parameters for walking bouts:

   a. The watershed algorithm was first applied to preliminary discriminate walking and stopping bouts.
   b. The IWS was replaced by the mean of the outputs of the different monitors tested ($GS^{1s,\ scapula}$ speed, $QS^{0.1s,\ hip/wrist/scapula}$ speed, $QS^{1s,\ hip/wrist/scapula}$ speed, $AG^{0.033s,\ hip/wrist}$ VM raw data, $AG^{1s,\ hip/wrist}$ VM counts and steps, and $SW^{3s/10s,\ ankle}$ steps), and was computed along with its SD from all the identified walking bouts for a given subject to take into consideration all the paces performed over a given walking session and thus the measure variability.
2. The low pass filter was applied as in the initial algorithm.
3. The high pass filter was optimized. Instead of having fixed values of K, we have proposed to optimize these values (k_1, k_2) for each studied parameter using a leave one out cross validation (LOOCV) as follows:
   a. From the training set, the CV were computed over the walking bouts of each subject. Then, the CV_{median} was computed.
   b. The optimization of (k_1, k_2) was performed by minimizing the error rate of the algorithm on the training set using a grid search on $k_1, k_2 = \{1, 1.5, \ldots, 7\}$.
   c. For a test subject, the CV_s was computed from the walking data of the subject.
   d. The high pass filter was then applied to replace all values < IWS - K*SD by 0, with $K = \begin{cases} k_1, if\ CV_s < CV_{median} \\ k_2, \quad otherwise \end{cases}$
4. The step of artifact management was omitted from this part of analysis due to the presence of very short duration events in the PWPs.

References

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