

**Supplementary Figure 1.** Diagram of EMG activity detection. First, each pre-processed frame was determined to be either active (1) or resting (0) after the EAD algorithm. However, there would sometimes be misclassifications, as we can see some outliers in the middle of the figure. Therefore, a 5-frame post-processing method was applied as a smoothing function to calibrate the baseline results. We can see that the two outliers were correctly identified and rectified. These frames with the activity label (1) were used for classification.

**Supplementary Table 1.** The Number of Activity Frames in Each Session for Each Subject

|  |  |  |
| --- | --- | --- |
| **Session** | **Subject S1** | **Subject S2** |
| Session 1 | 2033 | 5318 |
| Session 2 | 2379 | 5029 |
| Session 3 | 2127 | 5047 |
| Session 4 | 2059 | 5056 |
| Session 5 | 1842 | 5484 |
| Session 6 | 1723 | 4910 |
| Session 7 | 1837 | 4552 |
| In total | 14000 | 35396 |

**Supplementary Table 2.** Accuracy and Time Cost of Different Models on The Baseline Dataset

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Models** | **Subject S1** | | **Subject S2** | |
| **Accuracy** | **Time Cost** | **Accuracy** | **Time Cost** |
| KNN | 65.35% | 0s | 85.31% | 0s |
| MLP | 72.51% | 9s | 90.94% | 30.5s |
| LGBM | 66.91% | 3s | 89.43% | 7.5s |
| XGBoost | 66.48% | 7s | 89.10% | 25.75s |
| **SVM** | **75.37%** | **2s** | **90.71%** | **6s** |