Here Signal 1 is the signal recorded first before the device shutdown Signal 2 is the recording after the shutdown. It is assumed that some amount of data between the first and the second recording are missing. This code re-aligns Signal 2 with the help of Signal Template. Signal template is a synchronization signal that has the missing synchronization information between Signal 1 and Signal 2. The template signal can be either previously recorded, intact synchronization signal with the same sampling frequency (e.g., synchronization signal of another trial), OR it can be a synchronization signal recorded by another device. In the latter case, the signal should be resampled to match the sampling frequency as Signal 1 and Signal 2. It is highly recommended to use the template that has as high sampling frequency as the signals to be fixed in order to achieve an optimal performance and signal re-alignment.

Variables

PermutationMatrix - Permutation matrix that contains the permutations in order

Time_1 - Time variable of Signal 1

Sync_1 - Synchronization signal of Signal 1

Data_1 - Signal 1 data

Time_2, Sync_2, Data_2 - Signal 2 variables

Time_Template, Sync_Template - Template variables

1. Find the permutation sequence of the last intact cycle of Signal 1 using ***Sync_1*** – ***Permu_Sig1_Last*** – and locate the starting point of the next incomplete cycle using ***Time_1*** – ***Sig1_End***
2. Find the permutation sequence of the first intact cycle of Signal 2 using ***Sync_2*** – ***Permu_Sig2_First*** – and locate its start point using Time_2 – ***Sig2_Start***
3. Locate ***Permu_Sig1_Last*** within ***Sync_Template*** and find the end point of the cycle using ***Time_Template*** – ***Temp_Sig1_End***
4. Locate ***Permu_Sig2_First*** within ***Sync_Template*** and find the start point of the cycle using ***Time_Template*** – ***Temp_Sig2_Start***
5. Calculate
   Offset_Temp = ***Sig1_End*** - ***Temp_Sig1_End***
6. Calculate
   Offset_Sig2 = (***Sig1_End*** - ***Sig2_Start***) + (***Temp_Sig2_Start*** - ***Temp_Sig1_End***)
7. Crop Signal 1 to get ***Segment_Sig1*** by remove from ***Sig1_End*** to the end of Signal 1
8. Crop Template to get ***Segment_Temp*** by removing from ***Temp_Sig1_End*** to ***Temp_Sig2_Start*** and adding ***Offset_Temp***. For data, create an array of zeros with the equivalent size
9. Crop Signal 2 to get ***Segment_Sig2*** by removing from the start of the signal to ***Sig2_Start*** and adding ***Offset_Sig2***
10. Concatenate ***Segment_Sig1***, ***Segment_Temp***, and ***Segment_Sig2***.