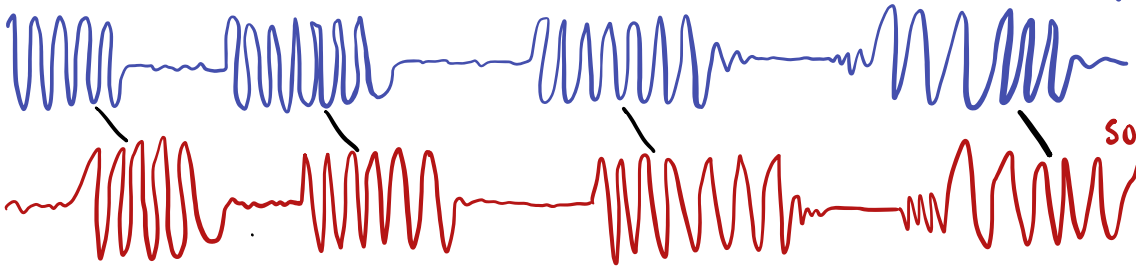
ALIGNING SIGNALS

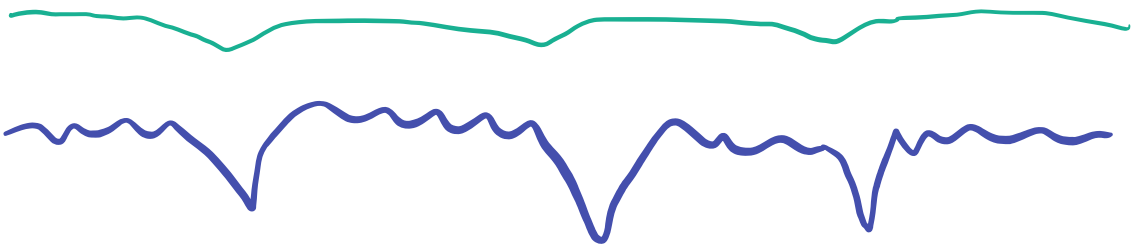
~ configuring the data ~



① align BM/MC w/ somnostar using chest impedance data ↓ find apneic episodes

② shift BM/MC signal BACK by ~5 hours
- account for time zone differences
- account for machine drift differences

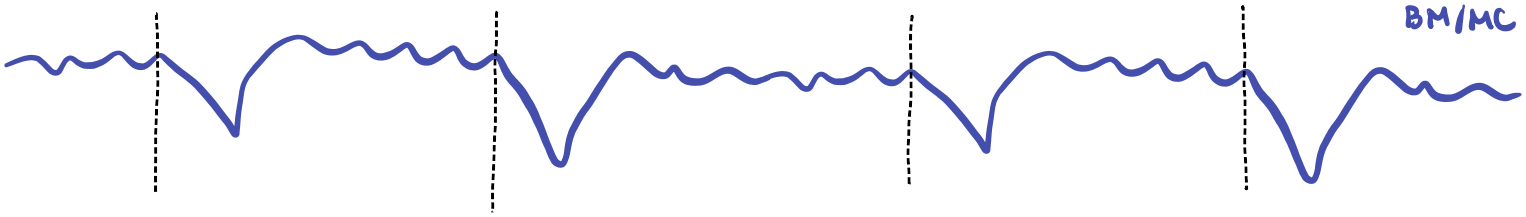
* these signals are within a minute of one another.



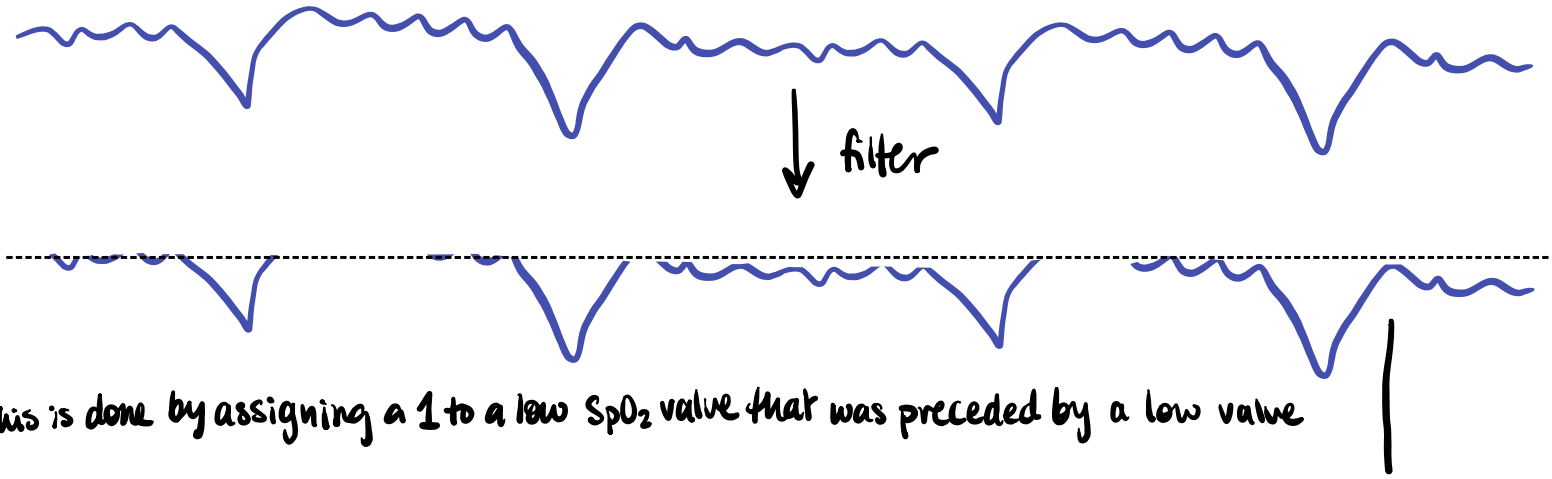
③ put NIRS and BM/MC signals onto the same time zone
- NIRS sampling rate = 15 points / minute ∴ every 4 seconds
- BM/MC sampling rate = 60 points / minute ∴ every 1 second

FINDING HYPOXIC EPISODES

~ extracting useful information from data ~



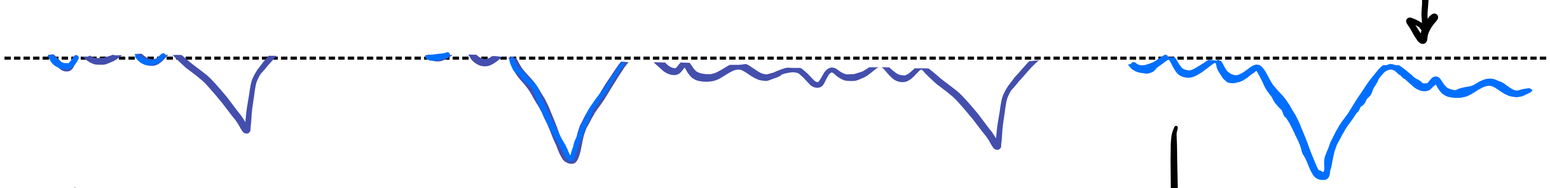
④ Get the start of each hypoxic episode by identifying them in the SpO_2 signal
- to do this, though, I filtered SpO_2 values to retrieve all those $\leq 80\%$



this is done by assigning a 1 to a low SpO_2 value that was preceded by a low value

a break in a sequence of 1s indicates the end of an episode

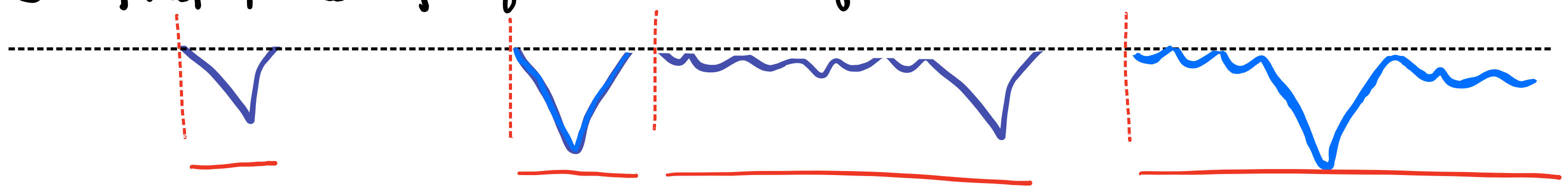
distinguish



and you can count the # of 1s to determine episode length
(because the sampling rate of the SpO_2 signal is 1 point/second)

filter

⑤ only keep episode lengths of 20 seconds or longer

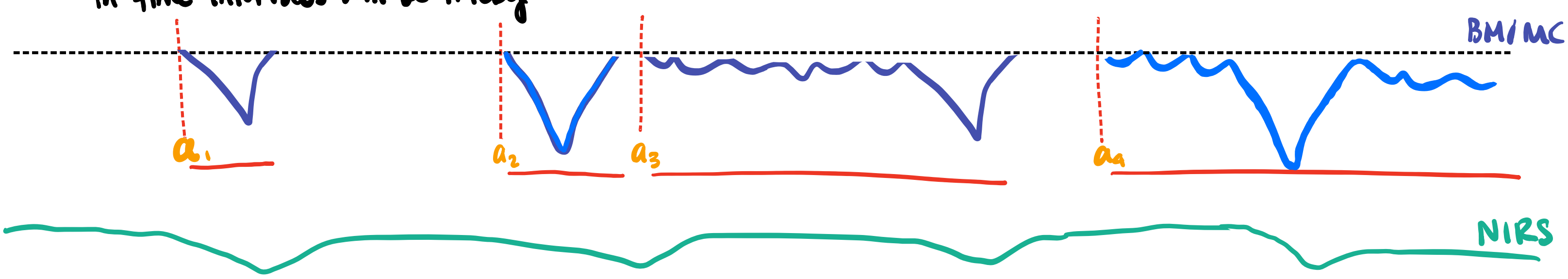


and store the start of each hypoxic episode & its duration (in seconds)

GET SpO_2 & rSO_2 DATA DURING HYPOXIAS

~ matching the datasets ~

⑥ the signals generated for the rSO_2 data is at a lower sampling rate, so obtaining a match in time intervals will be tricky



for each of the hypoxia start times (a_1, a_2, a_3, a_4) get the absolute value difference in times between it and every single recorded time in the NIRS signal

EXAMPLE

↓ matrix form

$[\, b_1 \; b_2 \; b_3 \; b_4 \; b_5 \; b_6 \cdots b_{i-1} \; b_i \,]$

time points w/ difference of 4 seconds between consecutive points

$[\, b_1 \; b_2 \; b_3 \; b_4 \; b_5 \; b_6 \cdots b_{i-1} \; b_i \,]$

$-[\, a_1 \; a_1 \; a_1 \; a_1 \; a_1 \; a_1 \cdots a_1 \; a_1 \,]$

↓ is essentially subtracting a row matrix by a scalar to produce a row matrix of durations

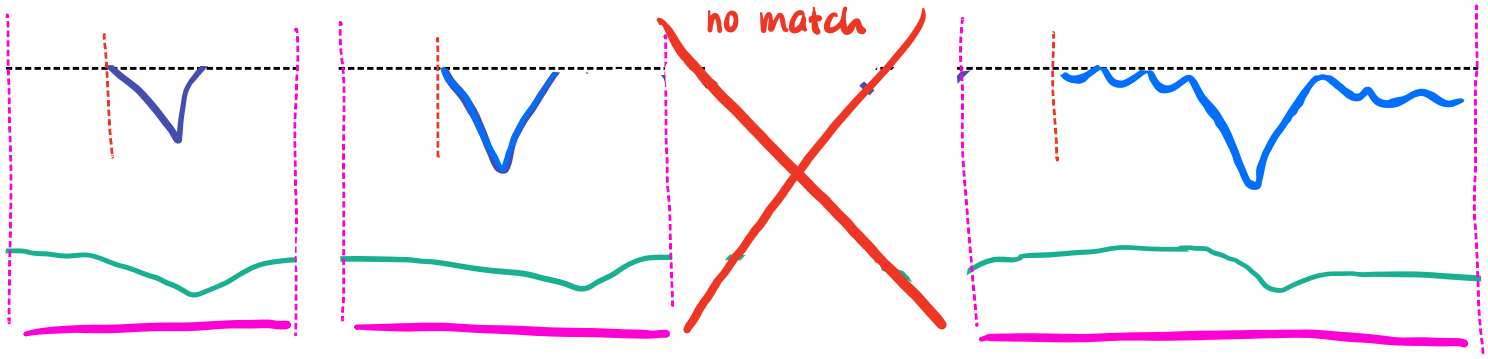
$[\, |b_1 - a_1| \; |b_2 - a_1| \; |b_3 - a_1| \cdots \,]$

and get the smallest value in this matrix

if this value $|b_k - a_1| \leq 4$ seconds, then we've found a match

→ if this value were >4 seconds, that means we don't have NIRS data captured during the hypoxic episode, so we'll "discard" it

⑦ we'll keep ±1 minute before the start and after the end of the hypoxia for context



⑧ plot each of the hypoxia intervals