Schema on the pipeline of Melomind

Fanny GROSSELIN

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During Calibration

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During Calibration

Raw data sent on the smartphone 1s by 1s

Add the 1s data on a matrix initCalibrationData for JsonFile

We don't receive anything (packet lost)

1s
no

yes

Linear interpolation of possible missing values (1s by 1s)

1s

DC removal (1s by 1s)
+
Remove the powerline noise (notch at 50 and 100Hz) (1s by 1s)

1s

Quality Checker (1s by 1s)

Add the quality data on a matrix qualityCalibration which holds one quality value by second for the JsonFile

Add 0 in qualityCalibration which holds one quality value by second for the JsonFile

Add 250 data points with NaN values in rawCalibrationData
(If we don't do that there will be a time lag in rawCalibrationData and SNR will not be computed on 4 consecutive seconds)

Add the 1s interpolated data on a matrix rawCalibrationData. rawCalibrationData can have NaN values if the quality is bad.

Replace bad quality data of rawCalibrationData by NaN values(1s by 1s)
(+ Correct artifacts online (for the future))

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During Calibration

What is keep in memory in the smartphone?

This is **rawCalibrationData** (array of 2 rows) which is used in the next pipelines → keep it in memory of the smartphone until the end of the processes which are done at the end of calibration.

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At the end of the Calibration

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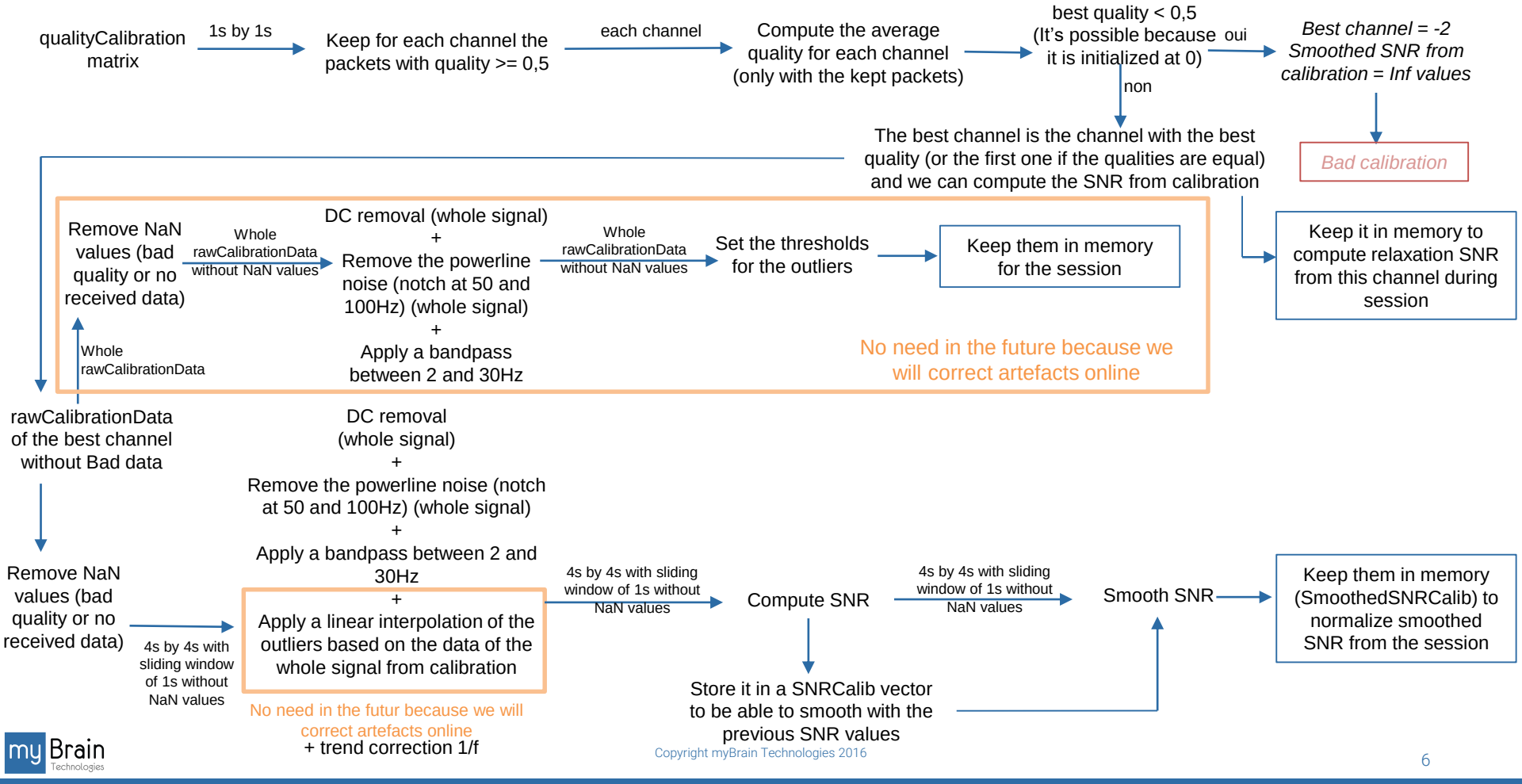
At the end of the Calibration



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At the end of the Calibration

What we sent to the server ?

initCalibrationData is sent to the server with the **qualityCalibration** on a Json file. initCalibrationData is without any process in order to have the original data for a possible work offline.

What is keep in memory in the smartphone?

The **best channel** (with the best quality) (int = 0 or 1) and a vector which holds all the **Smoothed SNR values from the calibration** (vector of float) → keep it in memory of the smartphone until the end of the processes which are done at the end of session. We have also to keep in memory the **bounds of the outliers** (vector of 2 floats).

What is remove from memory of the smartphone?

rawCalibrationData

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During Session

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During Session

Raw data sent on the smartphone 1s by 1s

1s

We don't receive anything (packet lost)

1s

no

Linear interpolation of possible missing values (1s by 1s)

1s

DC removal (1s by 1s) + Remove the powerline noise (notch at 50 and 100Hz) (1s by 1s)

1s

Quality Checker (1s by 1s)

Add the quality data on a matrix qualitySession which holds one quality value by second for the JsonFile

Add the 1s data on a matrix initSessionData for JsonFile

yes

Add 0 in qualitySession which holds one quality value by second for the JsonFile

Add 250 data points with NaN values in rawSessionData *(If we don't do that there will be a time lag in rawSessionData and SNR will not be computed on 4 consecutive seconds)*

Replace bad quality data of rawSessionData by NaN values(1s by 1s) (+ Correct artifacts online (for the future))

Add the 1s interpolated data on a matrix rawSessionData. rawSessionData can have NaN values if the quality is bad.

Each second, fill in a buffer of 4s from the rawSessionData of the best channel (see calibration)

4s by 4s with sliding window of 1s

Remove NaN values (bad quality or no received data)

4s by 4s with sliding window of 1s without NaN values

DC removal (whole signal) + Remove the powerline noise (notch at 50 and 100Hz) (whole signal) + Apply a bandpass between 2 and 30Hz + Apply a linear interpolation of the outliers based on the data of the whole signal from calibration

No need in the futur because we will correct artefacts online + trend correction 1/f

4s by 4s with sliding window of 1s without NaN values

Compute SNR

1 value by second

Smooth SNR

1 value by second

Normalize Smoothed SNR with mean and std of smoothed SNR from calibration

1 value by second

Transform into volum value If normalized smoothed SNR value = NaN, volum = 0,5 or previous value

Store it in a SNRSession vector to be able to smooth with the previous SNR values

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During Session

What is keep in memory in the smartphone?

- This is **rawSessionData** (array of 1 row of float) which is used to compute the relaxation index and statistics about relaxation state. The NaN values correspond to bad quality values or data no received → keep it in memory of the smartphone until the end of the processes which are done at the end of session.
- Keep also in memory the **normalized smoothed SNR values** from the session to draw some plots at the end of the session.

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At the end of the Session

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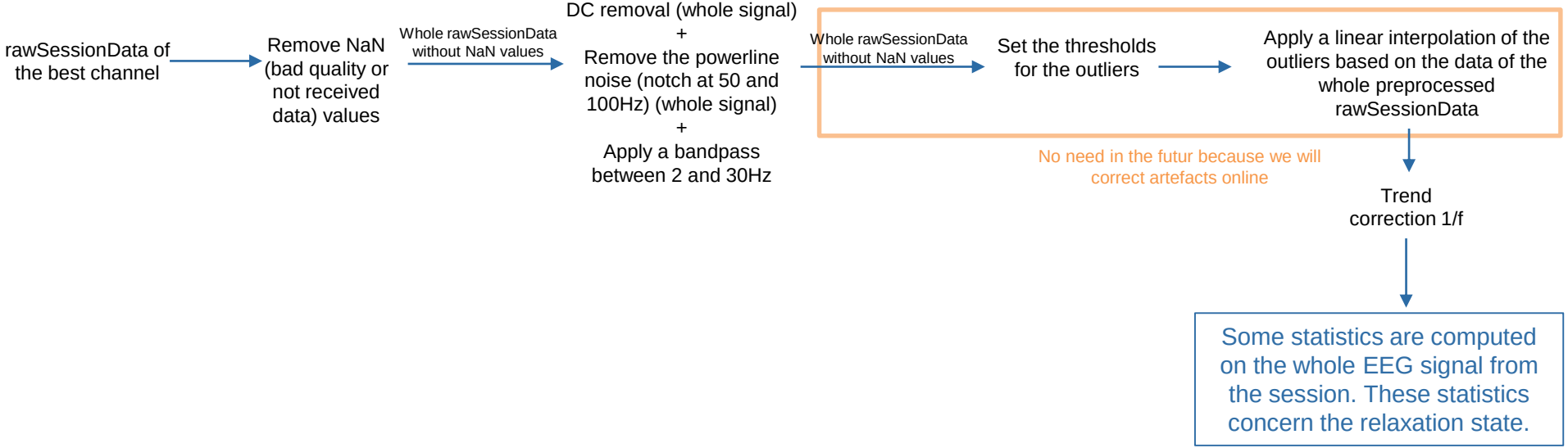
At the end of the Session



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At the end of the Session

What we sent to the server ?

- initSessionData is sent to the server with the **qualitySession** on a Json file. initSessionData is without any process in order to have the original data for a possible work offline.

- Statistics.

What is keep in memory in the smartphone?

Nothing.

What is remove from memory of the smartphone?

rawSessionData

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