

Applying RR algorithm to the whole PPG data

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I. OBJECTIVE

- 1) To debug the coding and eliminate the error when applying RR algorithm to PPG signal.

II. DETAILS

A. Datasets and respiratory signal

The method to analyze whether the datasets are good when extracting RR using Marco's algorithm is as the following: (1) Run 100% SQI on all the datasets which contain PPG signals, (2) run respiratory rate algorithm for data of which have median SQI > 0.8, and (3) identify any errors in detecting RIIV, RIAV and RIFV when running the algorithm to the whole data. In progress report 20, an error described as 'the grid vectors are not strictly monotonic increasing' is found. It happens only during detecting the PPG 'peak' when running the RIIV algorithm. The coding has been debugged and it is true that it was detecting the same PPG peak twice, at least 2 different places in a single recorded patient PPG signal. Figure 1 shows the peak detected which lead to the error of not monotonic increasing. This error will be detected using interpolation process. To solve this error, the difference of two consecutive data is set to be non-zero value. As the result, shown in Table I, there are zero error when applying the RR algorithm to MIMIC-II and CapnoBase, only one data consists error each for Dialysis1 and Dialysis2. Dialysis3 has 2 data which show error. Calms-2 still has about 9.2% data with error, Picram Oxford has 9.5% and Picram Reading has 9.1%. Further analysis will be done to solve Calms-2 and Picram dataset. From next week, RR estimation process will be carried out, and comparison to the reference RR will be done.

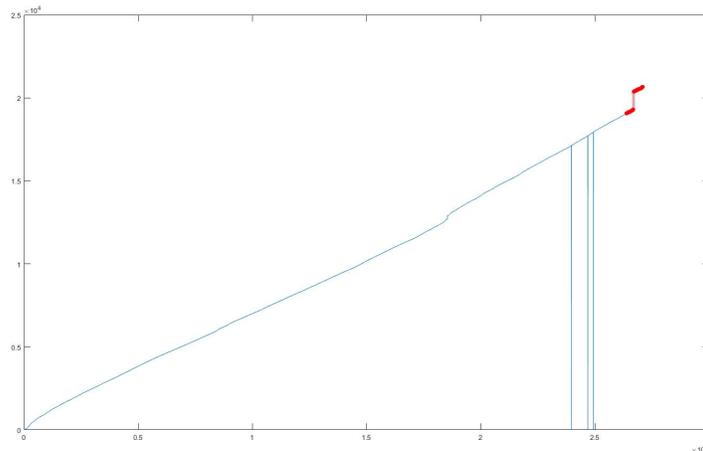


Fig. 1. Graph showing the same PPG peaks have been detected, marked in red

TABLE I
PHOTOPLETHYSMOGRAPHY DATA ANALYSIS

Name	MIMICII	CapnoBase	Dialysis 1	Dialysis 2	Dialysis 3	Calms-2	Picram
PPG Data Available	✓	✓	✓	✓	✓	✓	✓
PPG Data ↑ 'bsp\projects9\OURR'	✓	✓	✓	✓	✓	✓	Ox: ✓ Rd: ✓
PPG Records (based on IDs)	954	42	96	574	374	336	Ox: 199 , Rd: 68
Reference Resp	950	42	96	574	374	(getting info)	Ox: 0, Rd: 0
Recording time	8 m	8 m	4.9~5.2 h	2.3~4.4 h	0.8~6.0 h	0.2 h~30.9 d	Ox: max single 75.2 days
Sampling Frequency (Hz)	125	300	75	75	256	75	75
Median PPG SQI > 0.8	839 (88%)	42 (100%)	93 (97%)	527 (91%)	300 (80%)	332 (99%)	Ox: 105 (53%) Rd: 33 (49%)
Resp. Signal Extraction Done	✓	✓	✓	✓	✓	✓	✓
Data shown errors when processing	0 (0.0%)	0 (0%)	1 (0%)	1 (0.2%)	2 (0.7%)	32 (9.6%)	Ox: 10 (9.5%), Rd: 3 (9.1%)