

# Format of the Datasets for Respiratory Rate Estimation

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## I. OBJECTIVE

To store all available datasets in our OURR folder using the same data structure as was used in 'Oxford Respiratory Rate Toolbox.'

## II. COMPLETED TASKS

### A. Shared folder

The location of the new OURR shared folder which will be used for this project is 'bspprojects9'. All members of this project can have access to this folder by now. It consists of two subfolders which are 'OURR' and 'OURR\_results'. Some members have read only access for the 'OURR' folder<sup>1</sup>. The 'OURR\_results' is -rw for the group members. As of today, 6 Mar, 3 datasets (MIMICII, CapnoBase and Fantasia) have been formatted into the structure shown in Table I and uploaded to 'bspprojects9/OURR'. The remaining PICRAM, CALMS2, and Dialysis (1,2,3) will be done on the week beginning 9 Mar 2015.

### B. Data Structure

A meeting on the proposed data format has been done with MP<sup>2</sup> on the 26 Feb, 5 and 6 Mar. A discussion with AJ<sup>3</sup> on the conversion of the current MIMICII dataset to CapnoBase-like structure has been done. On 2 Mar 2015, AJ has demonstrated the execution of the scripts which extract and convert MIMICII matched subset (waveform matched with the clinical database) to a format shown in Table II. This format will be used across all datasets. The extraction consort diagram which starts from 4492 records to the final 989 is explained in Fig.II-C. The data of ventilation mode for this new MIMICII records will be done on 9 Mar. Ventilation mode for CapnoBase is 'spontaneous' and 'controlled' while for Fantasia is 'spontaneous'. The annotation for Fantasia will be updated and will be available on 9 Mar. I would really like to thank AJ and MP for helping me extracting the new MIMICII dataset which consist of respiratory reference data, PPG and ECG from a larger MIMICII matched dataset as well as converted it in the agreed format.

### C. Datasets

The IBME IT department was very supportive on creating new shared folder and giving permissions to access the other datasets in the shared folder. The updates and summary of the datasets which will be used is demonstrated in Table I. For MIMICII, CapnoBase and Fantasia, the datasets has been structured into a format as shown in Table II. For LISTEN and VORTAL, the data is only available after 6 months and 3 months, respectively. The dataset for CALMS2 and PICRAM datasets can now be accessed via 'bspprojects5' and 'bspprojects7' of the shared folder. Further discussion will be done on the approval of relocation these datasets into OURR. The work on DIALYSIS 1,2,3 datasets will begin immediately after access to bspprojects7 is granted. Note that 'IP' is for Impedance pneumography, and 'nurse' means nurse observations

## III. PREVIOUS REPORTS

All the progress reports are stored in <http://goo.gl/5yASrs>

- 20 Feb 2015 - Datasets for respiratory estimation
- 06 Mar 2015 - Format of the Datasets for Respiratory Rate Estimation

<sup>1</sup>David Clifton -rw, Marco Pimentel -rw, Tingting Zhu -ro, Peter Charlton -ro, Drew Birrenkott -ro, Syed Ahmar Shah -ro, Nazrul Anuar Nayan -rw

<sup>2</sup>Marco Pimentel

<sup>3</sup>Alistair Johnson

TABLE I

DATABASES	Records	layer 1	layer 2
Dataset1 (MIMIC II) ∨	record (1) ∨	- age - data - Fs - gender - header - ventilation mode - location <sup>a</sup> - annotation <sup>b</sup> - weight <sup>c</sup>	→ <i>int</i>  → 'M' or 'F' <i>char</i>  → 'spontaneous', 'controlled', 'ventilated' → 'ccu', 'icu', 'micu', 'sicu' → artif, startexp, startinp, peak → <i>int</i>
	record(2) > record(3) > • • • record(N) >		
Dataset2 (CapnoBase) > Dataset3 (Fantasia) > Dataset4 (CALMS2) > Dataset5 (PICRAM) > Dataset6 (Dialysis 1) > Dataset7 (Dialysis 2) > Dataset5 (Dialysis 3) > Dataset6 (Listen) > Dataset7 (Vortal) >			

<sup>a</sup>MIMICII only  
<sup>b</sup>CapnoBase only  
<sup>c</sup>CapnoBase only

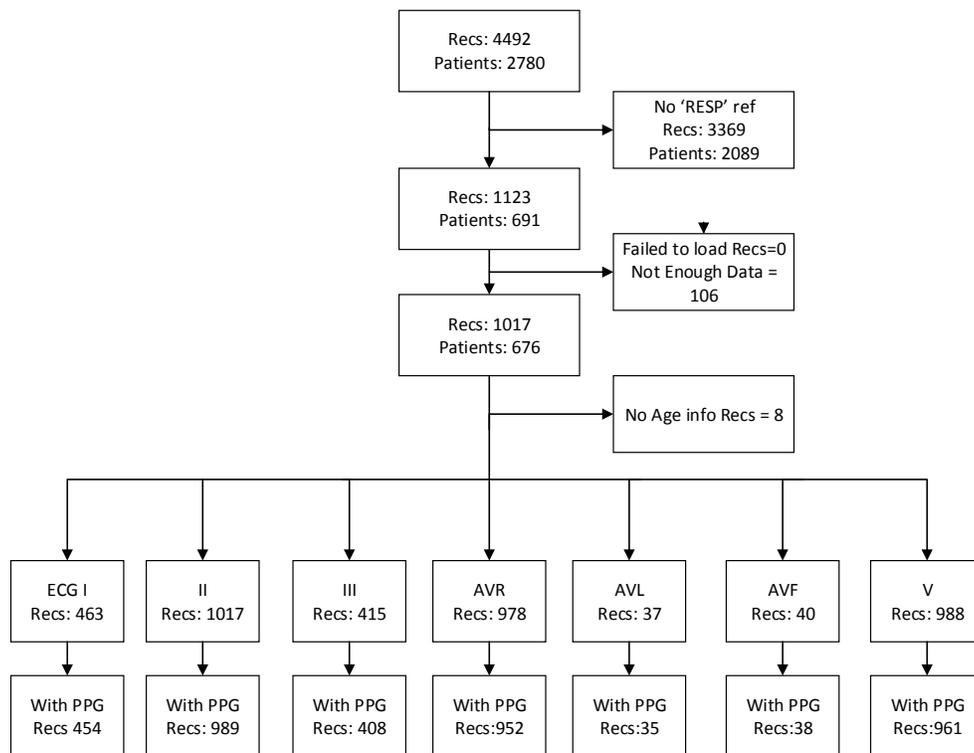


Fig. 1. Consort Diagram for extracting data from MIMICII matched subset

TABLE II

Name	MIMICII	CapnoBase	Fantasia	CALMS2	PICRAM	Listen	Vortal
Updated	2012	2015	2015	2014	2015	2014	2014
Publicly Available	✓	✓	✓	✗	✗	✗	✗
Formatted/ ↑ bspprojects9	✓	✓	✓	✗	✗	✗	✗
Raw data	physionet1_temp	URL	URL	bspproject5	bspproject12	✗	✗
ECG Signal	✓	✓	✓	✓ (very few)	ICU ✗, ward ✓	✓	✓
PPG Signal	✓	✓	✗	✓	ICU ✗, ward ✓	✓	✓
Accelometry Signal	✗	✗	✗	✗	✗	✗	✗
Subject Population	patient	patient	healthy	post-surgery <sup>a</sup>	adult	post-cardiac surg	healthy(young/elderly)
Clinical Setting	ICU	post-surg	✗	post-op ward	ICU, ward	ICU, ward	laboratory
Breathing (s/v) <sup>b</sup>	s, v	s,v	s	s	ICU s,v / ward s,v <sup>c</sup>	s,v	s,v
No. of records	1017 <sup>d</sup>	42	40	~ 250	ICU>9000, ward 441	196	42 young, 14 elderly
Neonates (<1 y.o.)	✗	✗	✗	✗	✗	✗	✗
Paediatrics (1-18)	✓	✓	✗	✗	✗	✗	✗
Young Adult (19-40)	✓	✓	✓	✓ (very few)	✓	✓	✓
Adult	✓	✓	✓	✓	✓	✓	✗
Elderly (>70 y.o.)	✓	✓	✓	✓	✓	✓	✓
Unwell?	✓	✓	✗	✓	✓	✓	✗
Chronically Unwell?	✗	✗	✗	✗	✗	✗	✗
Acutely Unwell?	✓	✓	✗	✓	✓	✓	✗
Ambulatory?	✗	✓	✗	✓	ward ✓	✓, ✗	✓, ✗
Recording Time	~8 min	8 min	~2:00 h	1:30 h	ward 1-2 d	2d ICU, 5d ward	<sup>e</sup>
ECG/PPG Acq. Equip.	IP	PPG <sup>f</sup>	PPG <sup>g</sup> , ECG <sup>h</sup>	IP	<sup>i</sup>	ICU <sup>j</sup> , ward <sup>k</sup>	<sup>l</sup>
Continuous RR Signal	✗	pCO <sub>2</sub> <sup>m</sup>	IP	IP	✗	ICU - IP, ward ✗	IP
Other Reference RR	✗	annotation	✗	nurse	nurse	ICU <sup>n</sup> , ward (nurse)	✗
Avalability	✓	✓	✓	approx. needed	approx. needed	> 6 months	>3 months

<sup>a</sup>gastro-intestinal<sup>b</sup>spontaneous/ ventilated<sup>c</sup>non-invasive<sup>d</sup>the extraction from matched subset of 4492 records<sup>e</sup>young: 10 mins at rest (supine), (2 mins walking approx 5 mins running)- 10 mins at rest (supine) after exercise, elderly: 10 mins at rest (no exercise)<sup>f</sup>Datex Ohmeda (100 Hz)<sup>g</sup>Nonin (75 hz)<sup>h</sup>Hidalgo (256 Hz)<sup>i</sup>PPG: Nonin 4100 Bluetooth Enabled<sup>j</sup>Philips bedside monitor (PPG 125 Hz, ECG 125 Hz)<sup>k</sup>Philips telemetry (PPG, ECG)<sup>l</sup>Philips bedside monitor (ECG 125 Hz, PPG 125 Hz), Nonin wearable sensor (PPG 75 Hz)<sup>m</sup>capnometry wavefrom (25 Hz), airflow<sup>n</sup>ventilator or manual